

# The L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> Sources

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## Contents

<b>a</b>	<b>ltdirchk.dtx</b>	<b>1</b>
<b>1</b>	<b>L<sup>A</sup>T<sub>E</sub>X System Dependent Initialisations</b>	<b>1</b>
<b>2</b>	<b>Initialisation</b>	<b>2</b>
2.1	INITEX . . . . .	2
2.2	Some bits of 2e . . . . .	4
<b>3</b>	<b>texsys.cfg</b>	<b>5</b>
3.1	texsys.cfg . . . . .	5
3.2	UNIX (web2c) . . . . .	6
3.3	UNIX (other) . . . . .	7
3.4	MSDOS (emtex) . . . . .	7
3.5	MSDOS (other) . . . . .	7
3.6	VMS (DECUS T <sub>E</sub> X, PD VMS 3.6) . . . . .	7
3.7	VMS (???) . . . . .	7
3.8	MACINTOSH (OzT <sub>E</sub> X 1.6) . . . . .	8
3.9	MACINTOSH (other) . . . . .	8
3.10	FAKE EXAMPLE . . . . .	8
<b>4</b>	<b>Setting \@currdir</b>	<b>9</b>
<b>5</b>	<b>Setting \input@path</b>	<b>10</b>

<b>6</b>	<b>Filename Parsing</b>	<b>11</b>
<b>7</b>	<b>T<sub>E</sub>X Versions</b>	<b>13</b>
<b>8</b>	<b>ltxcheck.tex</b>	<b>13</b>
<b>b</b>	<b>lplain.dtx</b>	<b>14</b>
<b>1</b>	<b>Plain T<sub>E</sub>X</b>	<b>14</b>
<b>c</b>	<b>ltvers.dtx</b>	<b>34</b>
<b>1</b>	<b>Version Identification</b>	<b>34</b>
<b>d</b>	<b>lualatex.dtx</b>	<b>38</b>
<b>1</b>	<b>Overview</b>	<b>38</b>
<b>2</b>	<b>Core T<sub>E</sub>X functionality</b>	<b>38</b>
<b>3</b>	<b>Plain T<sub>E</sub>X interface</b>	<b>39</b>
<b>4</b>	<b>Lua functionality</b>	<b>39</b>
4.1	Allocators in Lua . . . . .	39
4.2	Lua access to T <sub>E</sub> X register numbers . . . . .	40
4.3	Module utilities . . . . .	41
4.4	Callback management . . . . .	41
<b>5</b>	<b>Implementation</b>	<b>42</b>
5.1	Minimum LuaT <sub>E</sub> X version . . . . .	42
5.2	Older L <sup>A</sup> T <sub>E</sub> X/Plain T <sub>E</sub> X setup . . . . .	42
5.2.1	Fixes to <code>etex.src/etex.sty</code> . . . . .	43
5.2.2	luatex specific settings . . . . .	43
5.3	Attributes . . . . .	44
5.4	Category code tables . . . . .	44
5.5	Named Lua functions . . . . .	46
5.6	Custom whatsits . . . . .	47
5.7	Lua bytecode registers . . . . .	47
5.8	Lua chunk registers . . . . .	47
5.9	Lua loader . . . . .	47
5.10	Lua module preliminaries . . . . .	49
5.11	Lua module utilities . . . . .	49
5.11.1	Module tracking . . . . .	49
5.11.2	Module messages . . . . .	50
5.12	Accessing register numbers from Lua . . . . .	51
5.13	Attribute allocation . . . . .	52
5.14	Custom whatsit allocation . . . . .	53
5.15	Bytecode register allocation . . . . .	53

5.16	Lua chunk name allocation . . . . .	54
5.17	Lua function allocation . . . . .	54
5.18	Lua callback management . . . . .	54
5.18.1	Housekeeping . . . . .	54
5.18.2	Handlers . . . . .	57
5.18.3	Public functions for callback management . . . . .	59
<b>e</b>	<b>ltxexpl.dtx</b>	<b>65</b>
<b>1</b>	<b>expl3-dependent code</b>	<b>65</b>
1.1	Loader . . . . .	65
1.2	Using expl3 code . . . . .	67
<b>f</b>	<b>ltxdefns.dtx</b>	<b>69</b>
<b>1</b>	<b>Definitions</b>	<b>69</b>
1.1	Initex initialisations . . . . .	69
1.2	Saved versions of TeX primitives . . . . .	69
1.3	Command definitions . . . . .	70
1.4	Robust commands and protect . . . . .	79
1.5	Acting on robust commands . . . . .	85
1.5.1	Copying robust commands . . . . .	87
1.5.2	Showing robust commands . . . . .	88
1.5.3	Commands defined with <code>\DeclareRobustCommand</code> . . . . .	89
1.5.4	Commands defined with <code>\newcommand</code> (with optional argument) . . . . .	91
1.6	Internal defining commands . . . . .	92
<b>2</b>	<b>Discretionary Hyphenation</b>	<b>96</b>
<b>g</b>	<b>ltxhooks.dtx</b>	<b>99</b>
<b>1</b>	<b>Introduction</b>	<b>99</b>
<b>2</b>	<b>Package writer interface</b>	<b>99</b>
2.1	L <sup>A</sup> T <sub>E</sub> X 2 <sub>ε</sub> interfaces . . . . .	99
2.1.1	Declaring hooks and using them in code . . . . .	99
2.1.2	Updating code for hooks . . . . .	101
2.1.3	Hook names and default labels . . . . .	102
2.1.4	Defining relations between hook code . . . . .	103
2.1.5	Querying hooks . . . . .	105
2.1.6	Displaying hook code . . . . .	106
2.1.7	Debugging hook code . . . . .	108
2.2	L3 programming layer (expl3) interfaces . . . . .	108
2.3	On the order of hook code execution . . . . .	110
2.4	The use of “reversed” hooks . . . . .	111
2.5	Difference between “normal” and “one-time” hooks . . . . .	112
2.6	Private L <sup>A</sup> T <sub>E</sub> X kernel hooks . . . . .	113
2.7	Legacy L <sup>A</sup> T <sub>E</sub> X 2 <sub>ε</sub> interfaces . . . . .	113

2.8	<code>LaTeX 2<sub>ε</sub></code> commands and environments augmented by hooks . . . . .	114
2.8.1	Generic hooks for all environments . . . . .	114
2.8.2	Hooks provided by <code>\begin{document}</code> . . . . .	115
2.8.3	Hooks provided by <code>\end{document}</code> . . . . .	116
2.8.4	Hooks provided <code>\shipout</code> operations . . . . .	117
2.8.5	Hooks provided by file loading operations . . . . .	118
2.8.6	Hooks provided in NFSS commands . . . . .	118
<b>3</b>	<b>The Implementation</b> . . . . .	<b>118</b>
3.1	Loading further extensions . . . . .	118
3.2	Debugging . . . . .	119
3.3	Borrowing from internals of other kernel modules . . . . .	119
3.4	Declarations . . . . .	119
3.5	Providing new hooks . . . . .	121
3.6	Parsing a label . . . . .	123
3.7	Setting rules for hooks code . . . . .	131
3.8	Specifying code for next invocation . . . . .	144
3.9	Using the hook . . . . .	145
3.10	Querying a hook . . . . .	147
3.11	Messages . . . . .	149
3.12	<code>LaTeX 2<sub>ε</sub></code> package interface commands . . . . .	149
3.13	Internal commands needed elsewhere . . . . .	152
<b>h</b>	<b><code>lalloc.dtx</code></b> . . . . .	<b>154</b>
<b>1</b>	<b>Counters</b> . . . . .	<b>154</b>
<b>i</b>	<b><code>lcntrl.dtx</code></b> . . . . .	<b>156</b>
<b>1</b>	<b>Program control structure</b> . . . . .	<b>156</b>
<b>j</b>	<b><code>lerror.dtx</code></b> . . . . .	<b>160</b>
<b>1</b>	<b>Error handling and tracing</b> . . . . .	<b>160</b>
1.1	General commands . . . . .	160
1.2	Specific errors . . . . .	165
1.3	Tracing . . . . .	169
<b>k</b>	<b><code>ltpar.dtx</code></b> . . . . .	<b>170</b>
<b>1</b>	<b>Paragraphs</b> . . . . .	<b>170</b>
1.1	Implementation . . . . .	170
<b>l</b>	<b><code>ltspace.dtx</code></b> . . . . .	<b>172</b>

<b>1</b>	<b>Spacing</b>	<b>172</b>
1.1	User Commands . . . . .	172
1.2	Chris' comments . . . . .	172
1.3	Some immediate actions . . . . .	174
1.4	The code . . . . .	175
1.5	Vertical spacing . . . . .	182
1.6	Horizontal space (and breaks) . . . . .	187
<b>m</b>	<b>ltlogos.dtx</b>	<b>191</b>
<b>1</b>	<b>Logos</b>	<b>191</b>
<b>n</b>	<b>ltfiles.dtx</b>	<b>192</b>
<b>1</b>	<b>File Handling</b>	<b>192</b>
1.1	Safe Input Macros . . . . .	204
1.2	Listing files . . . . .	210
<b>o</b>	<b>ltoutenc.dtx</b>	<b>212</b>
<b>1</b>	<b>Font encodings</b>	<b>212</b>
1.1	Removing encoding-specific commands . . . . .	214
1.2	The order of declarations . . . . .	215
1.3	Docstrip modules . . . . .	215
1.4	Definitions for the kernel . . . . .	216
1.4.1	Declaration commands . . . . .	216
1.4.2	Hyphenation . . . . .	224
1.4.3	Miscellania . . . . .	224
1.4.4	Default encodings . . . . .	224
1.4.5	Math material . . . . .	227
1.5	Definitions for the OT1 encoding . . . . .	228
1.6	Definitions for the T1 encoding . . . . .	230
1.7	Definitions for the OMS encoding . . . . .	236
1.8	Definitions for the OML encoding . . . . .	236
1.9	Definitions for the OT4 encoding . . . . .	237
1.10	Definitions for the TS1 encoding . . . . .	239
1.11	Definitions for the TU encoding . . . . .	243
<b>2</b>	<b>Package files</b>	<b>254</b>
2.1	The fontenc package . . . . .	254
<b>p</b>	<b>ltcounts.dtx</b>	<b>257</b>
<b>1</b>	<b>Counters and Lengths</b>	<b>257</b>
1.1	Environment Counter Macros . . . . .	257

<b>q</b>	<b>ltnlength.dtx</b>	<b>265</b>
<b>1</b>	<b>Lengths</b>	<b>265</b>
<b>r</b>	<b>ltfssbas.dtx</b>	<b>267</b>
<b>1</b>	<b>Preliminary macros</b>	<b>267</b>
<b>2</b>	<b>Macros for setting up the tables</b>	<b>268</b>
<b>3</b>	<b>Selecting a new font</b>	<b>275</b>
3.1	Macros for the user . . . . .	275
3.2	Macros for loading fonts . . . . .	279
<b>4</b>	<b>Assigning math fonts to <i>versions</i></b>	<b>286</b>
<b>s</b>	<b>ltfssaxes.dtx</b>	<b>293</b>
<b>1</b>	<b>Changing the font series</b>	<b>293</b>
1.1	The series lookup table . . . . .	293
1.2	Mapping rules for series changes . . . . .	294
1.3	Changing to a new series . . . . .	302
<b>2</b>	<b>Changing the shape</b>	<b>305</b>
2.1	Mapping rules for shape combinations . . . . .	306
2.2	Changing to a new shape . . . . .	307
<b>3</b>	<b>Make sure we win . . .</b>	<b>308</b>
<b>t</b>	<b>ltfssstrc.dtx</b>	<b>311</b>
<b>1</b>	<b>Introduction</b>	<b>311</b>
<b>2</b>	<b>A driver for this document</b>	<b>311</b>
<b>3</b>	<b>The Implementation</b>	<b>312</b>
<b>4</b>	<b>Handling Options</b>	<b>312</b>
<b>5</b>	<b>Macros common to fam.tex and tracefnt.sty</b>	<b>314</b>
5.1	General font loading . . . . .	314
5.2	Math fonts setup . . . . .	319
5.2.1	Outline of algorithm for math font sizes . . . . .	319
5.2.2	Code for math font size setting . . . . .	320
5.2.3	Other code for math . . . . .	321
<b>6</b>	<b>Scaled font extraction</b>	<b>323</b>
6.1	Sizefunctions . . . . .	330

<b>u</b>	<b>ltfsscmp.dtx</b>	<b>334</b>
<b>v</b>	<b>ltfssdcl.dtx</b>	<b>339</b>
<b>1</b>	<b>Interface Commands</b>	<b>339</b>
<b>w</b>	<b>ltfssini.dtx</b>	<b>366</b>
<b>1</b>	<b>NFSS Initialisation</b>	<b>366</b>
1.1	Providing math <i>versions</i> . . . . .	366
<b>2</b>	<b>Custom series settings for main document families</b>	<b>367</b>
<b>3</b>	<b>Supporting nested emphasis</b>	<b>381</b>
3.1	Legacy . . . . .	384
3.2	Miscellaneous . . . . .	385
<b>x</b>	<b>fontdef.dtx</b>	<b>389</b>
<b>1</b>	<b>Introduction</b>	<b>389</b>
<b>2</b>	<b>Customization</b>	<b>389</b>
<b>3</b>	<b>The docstrip modules</b>	<b>390</b>
<b>4</b>	<b>A driver for this document</b>	<b>390</b>
<b>5</b>	<b>The fonttext.ltx file</b>	<b>390</b>
5.1	Encodings . . . . .	391
5.2	Defaults . . . . .	393
<b>6</b>	<b>The fontmath.ltx file</b>	<b>395</b>
6.1	The font encodings used . . . . .	395
6.1.1	Symbolfont and Alphabet declarations . . . . .	395
6.2	Math font sizes . . . . .	396
6.3	The math symbol assignments . . . . .	397
6.3.1	The letters . . . . .	397
6.3.2	The digits . . . . .	398
6.3.3	Punctuation, brace, etc. keys . . . . .	398
6.3.4	Delimitercodes for characters . . . . .	398
6.4	Symbols accessed via control sequences . . . . .	399
6.4.1	Greek letters . . . . .	399
6.4.2	Ordinary symbols . . . . .	400
6.4.3	Large Operators . . . . .	400
6.4.4	Binary symbols . . . . .	401
6.4.5	Relations . . . . .	402
6.4.6	Arrows . . . . .	403
6.4.7	Punctuation symbols . . . . .	404
6.4.8	Math accents . . . . .	405

6.4.9	Radicals . . . . .	405
6.4.10	Over and under something, etc . . . . .	405
6.4.11	Delimiters . . . . .	406
6.5	Math versions of text commands . . . . .	407
6.6	Other special functions and parameters . . . . .	407
6.6.1	Biggggg . . . . .	407
6.6.2	The log-like functions . . . . .	408
6.6.3	Parameters . . . . .	408
<b>7</b>	<b>Default cfg files</b>	<b>408</b>
<b>y</b>	<b>preload.dtx</b>	<b>410</b>
<b>1</b>	<b>Overview</b>	<b>410</b>
<b>2</b>	<b>Customization</b>	<b>410</b>
<b>3</b>	<b>Module switches for the DOCSTRIP program</b>	<b>410</b>
<b>4</b>	<b>A driver for this document</b>	<b>411</b>
<b>5</b>	<b>The code</b>	<b>411</b>
<b>z</b>	<b>lftntcmd.dtx</b>	<b>413</b>
<b>1</b>	<b>Introduction</b>	<b>413</b>
<b>2</b>	<b>The implementation</b>	<b>415</b>
<b>3</b>	<b>Initialization</b>	<b>421</b>
<b>A</b>	<b>ltextcomp.dtx</b>	<b>422</b>
<b>1</b>	<b>Sub-encodings</b>	<b>426</b>
1.1	Sub-encoding 1 (drop symbols not working in Latin Modern) . . . . .	428
1.2	Sub-encoding 2 (majority of new OTF fonts via autoinst) . . . . .	428
1.3	Sub-encoding 3 . . . . .	430
1.4	Sub-encoding 4 . . . . .	430
1.5	Sub-encoding 5 (most older PS fonts) . . . . .	430
1.6	Sub-encoding 6 . . . . .	431
1.7	Sub-encoding 7 . . . . .	431
1.8	Sub-encoding 8 . . . . .	431
1.9	Sub-encoding 9 (most missing) . . . . .	431
<b>2</b>	<b>Unicode engine specials</b>	<b>431</b>
<b>3</b>	<b>Font family sub-encodings setup</b>	<b>432</b>
<b>4</b>	<b>Legacy symbol support for lists and footnote symbols</b>	<b>436</b>



<b>5</b>	<b>The <code>textcomp</code> package</b>	<b>440</b>
5.1	The old <code>textcomp</code> package code	441
5.1.1	Supporting oldstyle digits	450
5.1.2	Subset encoding defaults	450
<b>B</b>	<b><code>ltpageno.dtx</code></b>	<b>453</b>
<b>1</b>	<b>Page Numbering</b>	<b>453</b>
<b>C</b>	<b><code>ltxref.dtx</code></b>	<b>454</b>
<b>1</b>	<b>Cross Referencing</b>	<b>454</b>
1.1	Cross Referencing	454
<b>D</b>	<b><code>ltmiscen.dtx</code></b>	<b>459</b>
<b>1</b>	<b>Miscellaneous Environments</b>	<b>459</b>
1.1	Environments	459
1.2	Center, Flushright, Flushleft	470
1.3	Verbatim	473
<b>E</b>	<b><code>ltmath.dtx</code></b>	<b>480</b>
<b>1</b>	<b>Math setup</b>	<b>480</b>
1.1	Math commands based on plain $\text{\TeX}$	480
1.1.1	The log-like functions	480
1.1.2	Biggggg	481
1.1.3	The UNSORTED Rest	481
1.2	Math Environments	487
1.3	External options to the standard document classes	492
1.3.1	Left equation numbering	492
1.3.2	Flush left equations	492
<b>F</b>	<b><code>ltlists.dtx</code></b>	<b>495</b>
<b>1</b>	<b>List, and related environments</b>	<b>495</b>
1.1	List and Trivlist	496
1.2	Vertical Spacing (skips)	497
1.3	Penalties	497
1.4	Horizontal Spacing (dimens)	497
1.5	Default Values	497
1.6	Itemize and Enumerate	508
<b>G</b>	<b><code>ltboxes.dtx</code></b>	<b>511</b>

<b>1</b>	<b>L<sup>A</sup>T<sub>E</sub>X Box commands</b>	<b>511</b>
1.1	Some low-level constructs . . . . .	525
<b>H</b>	<b>l<sub>ttab</sub>.dtx</b>	<b>526</b>
<b>1</b>	<b>Tabbing, Tabular and Array Environments</b>	<b>526</b>
1.1	tabbing . . . . .	526
1.2	array and tabular environments . . . . .	535
<b>I</b>	<b>l<sub>tpictur</sub>.dtx</b>	<b>551</b>
<b>1</b>	<b>Picture Mode</b>	<b>551</b>
1.1	Curves . . . . .	578
<b>J</b>	<b>l<sub>tthm</sub>.dtx</b>	<b>583</b>
<b>1</b>	<b>Theorem Environments</b>	<b>583</b>
<b>K</b>	<b>l<sub>tsect</sub>.dtx</b>	<b>587</b>
<b>1</b>	<b>Sectioning Commands</b>	<b>587</b>
1.1	The Title . . . . .	587
1.2	Sectioning . . . . .	588
1.2.1	Initializations . . . . .	595
1.3	Table of Contents etc. . . . .	595
1.3.1	Convention . . . . .	595
1.3.2	Commands . . . . .	595
<b>L</b>	<b>l<sub>tfloat</sub>.dtx</b>	<b>600</b>
<b>1</b>	<b>Floats</b>	<b>600</b>
1.1	Floating Environments . . . . .	600
1.2	Footnotes . . . . .	614
<b>M</b>	<b>l<sub>tidxglo</sub>.dtx</b>	<b>621</b>
<b>1</b>	<b>Index and Glossary Generation</b>	<b>621</b>
<b>N</b>	<b>l<sub>tbibl</sub>.dtx</b>	<b>624</b>
<b>1</b>	<b>Bibliography Generation</b>	<b>624</b>
1.1	Default definitions . . . . .	627
<b>O</b>	<b>l<sub>tpage</sub>.dtx</b>	<b>628</b>

<b>1</b>	<b>Page styles and related commands</b>	<b>628</b>
1.1	Page Style Commands . . . . .	628
1.2	How a page style makes running heads and feet . . . . .	628
1.3	marking conventions . . . . .	628
<b>P</b>	<b>ltxclass.dtx</b>	<b>632</b>
<b>1</b>	<b>Introduction</b>	<b>632</b>
<b>2</b>	<b>User interface</b>	<b>632</b>
2.1	Option processing . . . . .	633
<b>3</b>	<b>Class and Package interface</b>	<b>634</b>
3.1	Class name and version . . . . .	634
3.2	Package name and version . . . . .	634
3.3	Requiring other packages . . . . .	634
3.4	Declaring new options . . . . .	635
3.5	Safe Input Macros . . . . .	636
<b>4</b>	<b>Implementation</b>	<b>636</b>
4.1	Hooks . . . . .	657
4.2	Providing shipment . . . . .	659
<b>5</b>	<b>Package/class rollback mechanism</b>	<b>667</b>
<b>6</b>	<b>After Preamble</b>	<b>675</b>
<b>Q</b>	<b>ltxfilehook.dtx</b>	<b>676</b>
<b>1</b>	<b>Introduction</b>	<b>676</b>
1.1	Provided hooks . . . . .	676
1.2	General hooks for file reading . . . . .	676
1.3	Hooks for package and class files . . . . .	677
1.4	Hooks for <code>\include</code> files . . . . .	678
1.5	High-level interfaces for <code>L<sup>A</sup>T<sub>E</sub>X</code> . . . . .	679
1.6	Internal interfaces for <code>L<sup>A</sup>T<sub>E</sub>X</code> . . . . .	679
1.7	A sample package for structuring the log output . . . . .	680
<b>2</b>	<b>The Implementation</b>	<b>681</b>
2.1	Document and package-level commands . . . . .	681
2.2	<code>expl3</code> helpers . . . . .	681
2.3	Declaring the file-related hooks . . . . .	683
2.4	Patching <code>L<sup>A</sup>T<sub>E</sub>X</code> 's <code>\InputIfFileExists</code> command . . . . .	683
2.5	Declaring a file substitution . . . . .	685
2.6	Selecting a file ( <code>\set@curr@file</code> ) . . . . .	686
2.7	Replacing a file and detecting loops . . . . .	689
2.7.1	The Tortoise and Hare algorithm . . . . .	690
2.8	Preventing a package from loading . . . . .	691
2.9	High-level interfaces for <code>L<sup>A</sup>T<sub>E</sub>X</code> . . . . .	692

2.10	Internal commands needed elsewhere . . . . .	692
<b>3</b>	<b>A sample package for structuring the log output</b>	<b>693</b>
<b>4</b>	<b>Package emulations</b>	<b>694</b>
4.1	Package atveryend emulation . . . . .	694
<b>R</b>	<b>ltshipout.dtx</b>	<b>695</b>
<b>1</b>	<b>Introduction</b>	<b>695</b>
1.1	Overloading the <code>\shipout</code> primitive . . . . .	695
1.2	Provided hooks . . . . .	696
1.3	Special commands for use inside the hooks . . . . .	697
1.4	Information counters . . . . .	698
1.5	Debugging shipout code . . . . .	698
<b>2</b>	<b>Emulating commands from other packages</b>	<b>698</b>
2.1	Emulating atbegshi . . . . .	699
2.2	Emulating everyshi . . . . .	699
2.3	Emulating atendddvi . . . . .	700
2.4	Emulating everypage . . . . .	700
<b>3</b>	<b>The Implementation</b>	<b>700</b>
3.1	Debugging . . . . .	700
3.2	Handling the end of job hook . . . . .	709
<b>4</b>	<b>Legacy L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> interfaces</b>	<b>712</b>
<b>5</b>	<b>Internal commands needed elsewhere</b>	<b>712</b>
<b>6</b>	<b>Package emulation for compatibility</b>	<b>714</b>
6.1	Package atendddvi emulation . . . . .	714
6.2	Package atbegshi emulation . . . . .	714
6.3	Package everyshi emulation . . . . .	716
<b>S</b>	<b>ltoutput.dtx</b>	<b>717</b>
<b>1</b>	<b>Output Routine</b>	<b>717</b>
1.1	Floats . . . . .	717
1.1.1	Kludgeins . . . . .	773
1.1.2	Float control . . . . .	774
1.1.3	Float placement parameters . . . . .	787
<b>T</b>	<b>lthyphen.dtx</b>	<b>790</b>
<b>U</b>	<b>ltfinal.dtx</b>	<b>792</b>

<b>1</b>	<b>Final settings</b>	<b>792</b>
1.1	Debugging . . . . .	792
1.2	Typesetting parameters . . . . .	792
1.3	Lccodes for hyphenation . . . . .	794
1.4	Hyphenation . . . . .	797
1.5	Font loading . . . . .	798
1.6	Input encoding . . . . .	798
1.7	Lccodes and uccodes . . . . .	802
1.8	Applying Patch files . . . . .	804
1.9	Freeing Memory . . . . .	805
1.10	Initialise file list . . . . .	806
1.11	Do some temporary work for pre-release . . . . .	806
1.12	Some last minute initializations . . . . .	806
1.13	Dumping the format . . . . .	806
	 <b>Change History</b>	 <b>807</b>
	 <b>Index</b>	 <b>869</b>

# File a

## ltdirchk.dtx

### 1 L<sup>A</sup>T<sub>E</sub>X System Dependent Initialisations

This file implements the semi-automatic determination of various system dependent parts of the initialisation. The actual definitions may be placed in a file `texsys.cfg`. Thus for operating systems for which the tests here do not result in acceptable settings, a ‘hand written’ `texsys.cfg` may be produced.

The macros that must be defined are:

`\@currdir`      `\@currdir{filename}{space}` should expand to a form of the filename that uniquely refers to the ‘current directory’ if this is possible. (The expansion should also end with a space.) on UNIX, this is `\def\@currdir{./}`. For more exotic operating systems you may want to make `\@currdir` a macro with arguments delimited by `.` and/or `{space}`. If the operating system has no concept of directory structure, this macro should be defined to be empty.

`\input@path`      If the primitive `\openin` searches the same directories as the primitive `\input`, then it is possible to tell (using `\ifeof`) whether a file exists before trying to input it. For systems like this, `\input@path` should be left undefined.

If `\openin` does not ‘follow’ `\input` then `\input@path` must be defined to be a list of directories to search for input files. The format for each directory is as for `\@currdir`, normally just a prefix is required, but it may be a macro with space-delimited argument. That is, if `<dir>` is an entry in the input path, T<sub>E</sub>X will try to load the expansion of `<dir>{filename}{space}`

So either `<dir>` should be defined as a macro with argument delimited by space, or it should just expand to a directory name, including the final directory separator, so that it may be concatenated with the `<filename>`. This means that for UNIX-like syntax, each `<dir>` should end with a slash, `/`.

`\input@path` should expand to a list of such directories, each in a `{}` group.

`\filename@parse`      After a call of the form: `\filename@parse{<filename>}`, the three macros `\filename@area`, `\filename@base` and `\filename@ext` should be defined to be the ‘area’ (or directory), basename and extension respectively. If there was no extension specified in `<filename>`, `\filename@ext` should be `\let` to `\relax` (so this case may be tested with `\@ifundefined{filename@ext}` and, perhaps a default extension substituted).

Normally one would not need to define this macro in `texsys.cfg` as the automatic tests can supply parsers that work with UNIX and VMS and Macintosh syntax, as well as a basic parser that will cover many other cases. However some operating systems may need a ‘hand produced’ parser in which case it should be defined in this file.

The UNIX parser also works for most MSDOS T<sub>E</sub>X versions. Currently if the UNIX, VMS or Macintosh parser is not used, `\filename@parse` is defined to always return an empty area, and to split the argument into basename and extension at the first ‘.’ that occurs in the name. Parsers for other formats may be defined in `texsys.cfg`, in which case they will be used in preference to the default definitions.

`\@TeXversion`      `\@TeXversion` is now set automatically by the initialisation tests in this file. You should not need to set it in `texsys.cfg`, however the following documentation is left for information. L<sup>A</sup>T<sub>E</sub>X does not set this variable exactly, the automatic tests set it to:

2 for any version,  $v$ ,  $v < 3.0$

3 for any version,  $v$ ,  $3.0 \leq v \leq 3.14$

`\undefined` otherwise.

However these values are accurate enough for L<sup>A</sup>T<sub>E</sub>X to take appropriate action for these old T<sub>E</sub>Xs.

If your T<sub>E</sub>X is older than version 3.141, then you should define `\@TeXversion` (using `\def`) to be the version number. If you do not do this<sup>1</sup>, L<sup>A</sup>T<sub>E</sub>X will not work around a bug in old T<sub>E</sub>X versions, and so error messages will appear in a very strange format, with `^^J` appearing instead of line breaks:

```
LaTeX Error: \rubbish undefined.^^J^^JSee the LaTeX manual or LaTeX=
Companion
for explanation.^^JType H <return> for immediate help.
...

.3 \renewcommand{\rubbish}
      {}
```

However if you put `\def\@TeXversion{3.14}` in `texsys.cfg` the following format will be used:

```
LaTeX Error: \rubbish undefined.

ee the LaTeX manual or LaTeX Companion for explanation.
ype H <return> for immediate help.
.
...

.3 \renewcommand{\rubbish}
      {}
```

Note that this has an extra line ! . which does not appear in error messages that use the default settings with a current version of T<sub>E</sub>X, but this should not cause any confusion we hope.

## 2 Initialisation

As this file is read at a very early stage, some definitions that are normally considered to be part of the format must be made here.

### 2.1 INITEX

```
1 <*dircheck>
2 <*initex>
3 <initex>\ifnum\catcode'\{=1
4 <initex> \errmessage
5 <initex> {LaTeX must be made using an initex with no format preloaded}
6 <initex>\fi
7 \catcode'\{=1
```

---

<sup>1</sup>Actually if your T<sub>E</sub>X is really old, version 2, L<sup>A</sup>T<sub>E</sub>X can detect this, and sets `\@TeXversion` to 2 if it is not set in the `cfg` file.

```
8 \catcode'\}=2
```

If LuaTeX is in use the extensions and other new primitives have to be activated: this is done as early as possible. Older versions of LuaTeX do not hide the primitives: a version check is not needed as the version itself will be missing in the case where action is needed!

```
9 \ifx\directlua\undefined
10 \else
11 \ifx\luatexversion\undefined
```

Enable e-TeX/pdfTeX/Umath primitives with their natural names

```
12 \directlua{tex.enableprimitives("",%
13 tex.extraprimitives('etex', 'pdftex', 'umath'))}
```

In current formats enable primitives with unprefix names. the latexrelease guards allow the primitives to be defined with a \luatex prefix if older formats are specified.

```
14 </initex>
15 </dircheck>
16 <*initex, latexrelease>
17 <latexrelease> \ifx\directlua\undefined\else
18 <latexrelease> \IncludeInRelease{2015/10/01}{\luatexluafunction}
19 <latexrelease> {LuaTeX (prefixed names)}%
20 \directlua{tex.enableprimitives("",%
21 tex.extraprimitives("omega", "aleph", "luatex"))}
22 <latexrelease> \EndIncludeInRelease
23 <latexrelease> \IncludeInRelease{0000/00/00}{\luatexluafunction}
24 <latexrelease> {LuaTeX (prefixed names)}%
25 <latexrelease> \directlua{
26 <latexrelease> tex.enableprimitives(
27 <latexrelease> "luatex",
28 <latexrelease> tex.extraprimitives("core", "omega", "aleph", "luatex")
29 <latexrelease> )
30 <latexrelease> local i
31 <latexrelease> local t = { }
32 <latexrelease> for _,i in pairs(tex.extraprimitives("luatex")) do
33 <latexrelease> if not string.match(i, "U") then
34 <latexrelease> if not string.match(i, "~luatex") then
35 <latexrelease> table.insert(t,i)
36 <latexrelease> end
37 <latexrelease> else
38 <latexrelease> if string.match(i, "~Uchar$") then
39 <latexrelease> table.insert(t,i)
40 <latexrelease> end
41 <latexrelease> end
42 <latexrelease> end
43 <latexrelease> for _,i in pairs(t) do
44 <latexrelease> tex.print(
45 <latexrelease> "\noexpand\\let\noexpand\\" .. i
46 <latexrelease> .. "\noexpand\\undefined"
47 <latexrelease> )
48 <latexrelease> end
49 <latexrelease> }
50 <latexrelease> \EndIncludeInRelease
51 <latexrelease> \fi
52 </initex, latexrelease>
53 <*dircheck>
54 <*initex>
```



```

55 \fi
56 \fi

A test can now be made for eTeX.
57 \initex\ifx\TeXversion\undefined
58 \initex \errmessage
59 \initex {LaTeX requires e-TeX}
60 \initex \expandafter\endinput
61 \initex\fi

That distraction over, back to the basics of a format.
62 \catcode'\#=6
63 \catcode'\^=7
64 \chardef\active=13
65 \catcode'\@=11
66 \countdef\count@=255
67 \let\bgroup={ \let\egroup=}
68 \ifx\@@input\@undefined\let\@@input\input\fi
69 \ifx\@@end\@undefined\let\@@end\end\fi
70 \chardef\@inputcheck0
71 \chardef\sixt@n=16
72 \newlinechar'\^^J
73 \def\typeout{\immediate\write17}
74 \def\dospecials{\do\ \do\\\do\{\do\}\do\$\do\&%
75 \do\#\do\^{\do\_ \do\% \do\~}
76 \def\@makeother#1{\catcode'#1=12\relax}
77 \def\space{ }
78 \def\@tempwafalse{\let\if@tempswa\iffalse}
79 \def\@tempwattrue{\let\if@tempswa\iftrue}
80 \let\if@tempswa\iffalse
81 \def\loop#1\repeat{\def\iterate{#1\relax\expandafter\iterate\fi}%
82 \iterate \let\iterate\relax}
83 \let\repeat\fi
84 \endinitex

```

## 2.2 Some bits of 2e

```

85 \*2kernel)
86 \def\two@digits#1{\ifnum#1<10 0\fi\number#1}
87 \long\def\@firstoftwo#1#2{#1}
88 \long\def\@secondoftwo#1#2{#2}

```

This is a special version of \ProvidesFile for initex use.

```

89 \def\ProvidesFile#1{%
90 \begingroup
91 \catcode'\ 10 %
92 \ifnum \endlinechar<256 %
93 \ifnum \endlinechar>\m@ne
94 \catcode\endlinechar 10 %
95 \fi
96 \fi
97 \@makeother\%
98 \@ifnextchar[{\@providesfile{#1}}{\@providesfile{#1}[]}]
99 \def\@providesfile#1[#2]{%
100 \wlog{File: #1 #2}%
101 \@addtofilelist{ #2}%
102 \endgroup}

```

```

103 \long\def\@addtofilelist#1{}
104 \def\@empty{}
105 \catcode'\%=12
106 \def\@percentchar{%}
107 \catcode'\%=14
108 \let\@currdir\@undefined
109 \let\input@path\@undefined
110 \let\filename@parse\@undefined

```

`\strip@prefix`

```

111 \def\strip@prefix#1>{}
112 </2ekernel>

```

(End definition for `\strip@prefix`. This function is documented on page ??.)

### 3 texsys.cfg

As mentioned above, any site specific definitions required to describe the filename handling must be entered into a file `texsys.cfg`. If `texsys.cfg` can not be located by `\openin`, we write a default version out. The default version only contains comments, so we do not actually input the file in that case. The automatic tests later will, hopefully, correctly define the required macros.

The tricky code below checks to see if `texsys.cfg` exists. If it does not, all the text in this file between `START` and `END` is copied verbatim to a new file `texsys.cfg`. If `texsys.cfg` is found, then it is simply input. This is only done when this file is being used unstripped.

```

113 <*docstrip>
114 \openin15=texsys.cfg
115 \ifeof15
116 \typeout{** Writing a default texsys.cfg}
117 \immediate\openout15=texsys.cfg
118 \begingroup
119 \catcode'\^M\active%
120 \let^M\par%
121 \def\reserved@a#1^M{%
122   \def\reserved@b{#1}%
123   \ifx\reserved@b\reserved@c\endgroup\else%
124     \immediate\write15{#1}%
125     \expandafter\reserved@a\fi}%
126 \def\reserved@d#1START^M{\let\do\@makeother\dospecials\reserved@a}%
127 \catcode'\%=12
128 \def\reserved@c{END}
129 \reserved@d

```

START

#### 3.1 texsys.cfg

This file contains the site specific definitions of the four macros `\@currdir`, `\input@path`, `\filename@parse` and `\TeXversion`.

As distributed it only contains comments, however this 'empty' file will work on many systems because of the automatic tests built into `ltdirchk.dtx`. You *are* allowed to edit this file to add definitions of these macros appropriate to your system.

The macros that must be defined are:

`\@currdir`      `\@currdir{filename}<space>` should expand to a form of the filename that uniquely refers to the ‘current directory’ if this is possible. (The expansion should also end with a space.) on UNIX, this is `\def\@currdir{./}`. For more exotic operating systems you may want to make `\@currdir` a macro with arguments delimited by `.` and/or `<space>`. If the operating system has no concept of directory structure, this macro should be defined to be empty.

`\input@path`      If the primitive `\openin` searches the same directories as the primitive `\input`, then it is possible to tell (using `\ifeof`) whether a file exists before trying to input it. For systems like this, `\input@path` should be left undefined.

If `\openin` does not ‘follow’ `\input` then `\input@path` must be defined to be a list of directories to search for input files. The format for each directory is as for `\@currdir`, normally just a prefix is required, but it may be a macro with space-delimited argument. That is, if `<dir>` is an entry in the input path, `TeX` will try to load the expansion of

`<dir><filename><space>`

So either `<dir>` should be defined as a macro with argument delimited by space, or it should just expand to a directory name, including the final directory separator, so that it may be concatenated with the `<filename>`. This means that for UNIX-like syntax, each `<dir>` should end with a slash, `/`. One exception to this rule is that the input path should *always* contain the empty directory `{}` as this will allow ‘full pathnames’ to be used, and the ‘current directory’ to be searched.

`\input@path` should expand to a list of such directories, each in a `{}` group.

`\filename@parse`      After a call of the form: `\filename@parse{<filename>}`, the three macros `\filename@area`, `\filename@base` and `\filename@ext` should be defined to be the ‘area’ (or directory), basename and extension respectively. If there was no extension specified in `<filename>`, `\filename@ext` should be `\let` to `\relax` (so this case may be tested with `\@ifundefined{filename@ext}` and, perhaps a default extension substituted).

Normally one would not need to define this macro in `texsys.cfg` as the automatic tests can supply parsers that work with UNIX and VMS syntax, as well as a basic parser that will cover many other cases. However some operating systems may need a ‘hand produced’ parser in which case it should be defined in this file.

The UNIX parser also works for most MSDOS `TeX` versions. Currently if the UNIX or VMS parser is not used, `\filename@parse` is defined to always return an empty area, and to split the argument into basename and extension at the first ‘.’ that occurs in the name. Parsers for other formats may be defined in `texsys.cfg`, in which case they will be used in preference to the default definitions.

`\@TeXversion`      You should not need to set this macro in `texsys.cfg`. `LaTeX` tests to set this automatically. See the comments in the opening section of `ltdirchk.dtx`.

The following sections give examples of definitions which might work on various systems. These are currently mainly untested as I only have access to a few systems, all of which do not need this file as the automatic tests work. All the code is commented out.

## 3.2 UNIX (web2c)

This implementation does make `\openin` and `\input` look in the same places. Acceptable settings are made by `ltdirchk.dtx`, and so this file may be empty. The definitions below are therefore just for information.

130 `%\def\@currdir{./}`

131 `%\let\input@path\@undefined`

### 3.3 UNIX (other)

Apparently some commercial UNIX implementations have different paths for `\openin` and `\input`. For these one could use definitions like the following (with whatever directories are used at your site): note that the directory names should end with `/`.

```
132 % \def\currdir{./}
133 % \def\input@path{%
134 %   {/usr/local/lib/tex/inputs/distrib/}%
135 %   {/usr/local/lib/tex/inputs/contrib/}%
136 %   {/usr/local/lib/tex/inputs/local/}%
137 % }
```

### 3.4 MSDOS (emtex)

This implementation does make `\openin` and `\input` look in the same places. Acceptable settings are made by `ltdirchk.dtx`, and so this file may be empty. The definitions below are therefore just for information.

```
138 % \def\currdir{./}
139 % \let\input@path\undefined
```

### 3.5 MSDOS (other)

Some PC implementations have different paths for `\openin` and `\input`. For these one could use definitions like the following (with whatever directories are used at your site): note that the directory names should end with `/`. This assumes the implementation uses UNIX style `/` as the directory separator.

```
140 % \def\currdir{./}
141 % \def\input@path{%
142 %   {c:/tex/inputs/distrib/}%
143 %   {c:/tex/inputs/contrib/}%
144 %   {c:/tex/inputs/local/}%
145 % }
```

### 3.6 VMS (DECUS T<sub>E</sub>X, PD VMS 3.6)

This implementation does make `\openin` and `\input` look in the same places. Acceptable settings are made by `ltdirchk.dtx`, and so this file may be empty. The definitions below are therefore just for information.

```
146 % \def\currdir{[] }
147 % \let\input@path\undefined
```

### 3.7 VMS (???)

Some VMS implementations have different paths for `\openin` and `\input`. For these one could use definitions like the following:

```
148 % \def\currdir{[] }
149 % \def\input@path{%
150 %   {tex_inputs:}%
151 %   {SOMEDISK:[SOME.TEXT.DIRECTORY]}%
152 % }
```

### 3.8 MACINTOSH (OzTeX 1.6)

This implementation does make `\openin` and `\input` look in the same places. Acceptable settings are made by `ltdirchk.dtx`, and so this file may be empty. The definitions below are therefore just for information.

```
153 % \def\@currdir{:}
154 % \let\input@path\@undefined
```

### 3.9 MACINTOSH (other)

Some Macintosh implementations have different paths for `\openin` and `\input`. For these one could use definitions like the following (with whatever folders are used on your machine): note that the directory names should end with `:`, and they should contain *no* spaces.

```
155 % \def\@currdir{:}
156 % \def\input@path{%
157 %   {Hard-Disk:Applications:TeX:TeX-inputs:}%
158 %   {Hard-Disk:Applications:TeX:My-inputs:}%
159 % }
```

### 3.10 FAKE EXAMPLE

This example is for an operating system that has filenames of the form `<area>name`. For maximum compatibility with macro sets, you want `name.ext` to be mapped to `<ext>name`, and `<area>name.ext` to be mapped to `<area.ext>name`. `\input` does this mapping automatically, but `\openin` does not, and does not look in the same places as `\input`. `<>name` is the desired ‘current directory’ syntax.

the following code would possibly work:

```
160 % \def\@dir#1#2 {%
161 %   \@d@r{#1}#2..\@nil}
162 % \def\@d@r#1#2.#3.#4\@nil{%
163 %   <\ifx\@dir#1\@dir\else#1\ifx\@dir#3\@dir\else.\fi\fi#3>#2 }
164 %
165 % \def\@currdir{\@dir{}}
166 % \def\input@path{%
167 %   {\@dir{area.one}}}%
168 %   {\@dir{area.two}}}%
169 % }
```

END

```
170 \immediate\closeout15
```

If `texsys.cfg` did exist, then input it.

```
171 \else
172 \typeout{** Using the existing texsys.cfg}
173 \closein15
174 \input texsys.cfg
175 \fi
176 </docstrip>
```

If the stripped version of this file is being used (in `latex2e.ltx`) then `texsys.cfg` should be there, so just input it.

```
177 <dircheck>\input texsys.cfg
```

## 4 Setting \@currdir

`\@currdir` This is a local definition of `\IfFileExists`. It tries to relocate `texsys.aux`. If it succeeds, then the `\@currdir` syntax has been determined. If all the tests fail then `\@currdir` will be set to `\@empty`, and `ltxcheck` will warn of this when it checks the format.

```
178 \begingroup
179 \count@ \time
180 \divide \count@ 60
181 \count2 = - \count@
182 \multiply \count2 60
183 \advance \count2 \time
```

The current date and time stamp.

```
184 \edef \today {%
\today 185 \the \year / \two@digits {\the \month} / \two@digits {\the \day} : %
186 \two@digits {\the \count@} : \two@digits {\the \count2}}
```

Create a file `texsys.aux` (hopefully in the current directory), then try to locate it again.

```
187 \immediate \openout15 = texsys.aux
188 \immediate \write15 {\today ^^J}
189 \immediate \closeout15 %
```

`#1` is the file to try, `#2` is what to do on success, `#3` on failure. Note that this definition is overwritten later on again!

```
190 \def \IfFileExists #1#2#3 {%
191 \openin \@inputcheck #1 %
192 \ifeof \@inputcheck
193 #3 \relax
194 \else
195 \read \@inputcheck to \reserved@a
196 \ifx \reserved@a \today
197 \typeout {#1 found} #2 \relax
198 \else
199 \typeout {BAD: old file \reserved@a (should be \today)} %
200 #3 \relax
201 \fi
202 \fi
203 \closein \@inputcheck}
204 \endlinechar = -1
```

If `\@currdir` has not been pre-defined in `texsys.cfg` then test for UNIX, VMS and Oz-TeX-Mac. syntax.

```
205 \ifx \@currdir \@undefined
206 \IfFileExists {./texsys.aux} {\gdef \@currdir {./}} %
207 {\IfFileExists {} {texsys.aux} {\gdef \@currdir {}}} %
208 {\IfFileExists {:texsys.aux} {\gdef \@currdir {:}} {}} %
```

If it is still undefined at this point, all the above tests failed. Earlier versions interactively prompted for a definition at this point, but it seems impossible to reliably obtain information from users at this point in the installation. This version of the file produces

a format with no user-interaction. Later if the format is not suitable for the system, `texsys.cfg` may be edited and the format re-made.

```

209 \ifx\@currdir\undefined
210 \global\let\@currdir\empty
211 \typeout{^^J^^J%
212     !! No syntax for the current directory could be found^^J%
213 }%
214 \fi

```

Otherwise `\@currdir` was defined in `texsys.cfg`. In this case check that the syntax specified works on this system. (In case a complete  $\text{\LaTeX}$  system has been copied from one system to another.) If the test fails, give up. The installer should remove or correct the offending `texsys.cfg` and try again.

```

215 \else
216 \IfFileExists{\@currdir texsys.aux}{}{%
217 \edef\reserved@a{\errhelp{%
218 texsys.cfg specifies the current directory syntax to be^^J%
219 \meaning\@currdir^^J%
220 but this does not work on this system.^^J%
221 Remove texsys.cfg and restart.}}\reserved@a
222 \errmessage{Bad texsys.cfg file: \noexpand\@currdir}\@@end}

```

The version of `\@currdir` in `texsys.cfg` looks OK.

```

223 \fi

224 \immediate\closeout15 %
225 \endgroup

226 \typeout{^^J^^J%
227     \noexpand\@currdir set to:
228     \expandafter\strip@prefix\meaning\@currdir.^^J%
229 }

```

(End definition for `\@currdir`, `\IfFileExists`, and `\today`. These functions are documented on page ??.)

Stop here if the file is being used unstripped.

```

230 \*docstrip>
231 \relax\endinput
232 </docstrip>

```

## 5 Setting `\input@path`

Earlier versions of this file attempted to automatically test whether `\input@path` was required, and interactively prompt for a path if necessary. This was not found to be very reliable. The first-time installer of  $\text{\LaTeX}$  2 $\epsilon$  can not be expected to have enough information to supply the correct information to the prompts. Now the interaction is omitted. After the format is made the installer can attempt to run the test document `ltxcheck.tex` through  $\text{\LaTeX}$  2 $\epsilon$ . This will check, amongst other things, whether `texsys.cfg` will need to be edited and the format remade.

`\input@path` Now set up the `\input@path`.

`\input@path` should either be undefined, or a list of directories as described in the introduction.

```

233 \typeout{^^J%
234     Assuming \noexpand\openin and \noexpand\input^^J%
235     \ifx\input@path\@undefined
\input@path has not been pre-defined.
236     have the same search path.^^J%
237     \else
\input@path has been defined in texsys.cfg.
238     have different search paths.^^J%
239     LaTeX will use the path specified by \noexpand\input@path:^^J%
240     \fi
241     }

```

(End definition for \input@path. This function is documented on page ??.)

## 6 Filename Parsing

`\filename@parse` Split a filename into its components.

```

242 \ifx\filename@parse\@undefined
243     \def\reserved@a{.}\ifx\@currdir\reserved@a
\filename@parse was not specified in texsys.cfg, but \@currdir looks like UNIX...
244     \typeout{^^JDefining UNIX/DOS style filename parser.^^J}
245     \def\filename@parse#1{%
246         \let\filename@area\@empty
247         \expandafter\filename@path#1/\}
Search for the last /.
248     \def\filename@path#1/#2\{%
249         \ifx\#2\%
250             \def\reserved@a{\filename@simple#1.\}%
251         \else
252             \edef\filename@area{\filename@area#1/\}%
253             \def\reserved@a{\filename@path#2\}%
254         \fi
255         \reserved@a}
256 \else\def\reserved@a{[]}\ifx\@currdir\reserved@a
\filename@parse was not specified in texsys.cfg, but \@currdir looks like VMS...
257     \typeout{^^JDefining VMS style filename parser.^^J}
258     \def\filename@parse#1{%
259         \let\filename@area\@empty
260         \expandafter\filename@path#1]\}
Search for the last ].
261     \def\filename@path#1]#2\{%
262         \ifx\#2\%
263             \def\reserved@a{\filename@simple#1.\}%
264         \else
265             \edef\filename@area{\filename@area#1]\}%
266             \def\reserved@a{\filename@path#2\}%
267         \fi
268         \reserved@a}

```



```
269 \else\def\reserved@a{:}\ifx\@currdir\reserved@a
```

\filename@parse was not specified in texsys.cfg, but \@currdir looks like Macintosh...

```
270 \typeout{^^JDefining Mac style filename parser.^^J}
271 \def\filename@parse#1{%
272   \let\filename@area\@empty
273   \expandafter\filename@path#1:\}
```

Search for the last :.

```
274 \def\filename@path#1:#2\{%
275   \ifx\#2\%
276     \def\reserved@a{\filename@simple#1.\}%
277   \else
278     \edef\filename@area{\filename@area#1:}%
279     \def\reserved@a{\filename@path#2\}%
280   \fi
281   \reserved@a}
```

```
282 \else
```

\filename@parse was not specified in texsys.cfg. So just make a simple parser that always sets \filename@area to empty.

```
283 \typeout{^^JDefining generic filename parser.^^J}
284 \def\filename@parse#1{%
285   \let\filename@area\@empty
286   \expandafter\filename@simple#1.\}
287 \fi\fi\fi
```

\filename@simple is used by all three versions. Finally we can split off the extension.

```
288 </dircheck>
289 <*dircheck, latexrelease>
290 <latexrelease>\IncludeInRelease{2019/10/01}{\filename@simple}
291 <latexrelease>                                     {Final dot for extension}%
292 \def\filename@simple#1.#2\{%
293   \ifx\#2\%
294     \let\filename@ext\relax
295     \edef\filename@base{#1}%
296   \else
297     \filename@dots{#1}#2\%
298   \fi}
299 \def\filename@dots#1#2.#3\{%
300   \ifx\#3\%
301     \def\filename@ext{#2}%
302     \edef\filename@base{#1}%
303   \else
304     \filename@dots{#1.#2}#3\%
305   \fi}
306 <latexrelease>\EndIncludeInRelease
307 <latexrelease>\IncludeInRelease{0000/00/00}{\filename@simple}
308 <latexrelease>                                     {Final dot for extension}%
309 <latexrelease> \def\filename@simple#1.#2\{%
310 <latexrelease>   \ifx\#2\%
311 <latexrelease>     \let\filename@ext\relax
```

```

312 <latexrelease> \else
313 <latexrelease> \edef\filename@ext{\filename@dot#2\}%
314 <latexrelease> \fi
315 <latexrelease> \edef\filename@base{#1}}
316 <latexrelease> \EndIncludeInRelease
317 </dircheck, latexrelease>
318 <*dircheck>

Remove a final dot, added earlier.
319 \def\filename@dot#1.\{#1}
320 \else
Otherwise, \filename@parse was specified in texsys.cfg.
321 \typeout{^^J^^J%
322 \noexpand\filename@parse was defined in texsys.cfg:^^J%
323 \expandafter\strip@prefix\meaning\filename@parse.^^J%
324 }
325 \fi

(End definition for \filename@parse. This function is documented on page ??.)

```

## 7 T<sub>E</sub>X Versions

`\@TeXversion` T<sub>E</sub>X versions older than 3.141 require `\@TeXversion` to be set. This can be determined automatically due to a trick suggested by Bernd Raichle. (Actually this will not always get the correct version number, eg T<sub>E</sub>X3.14 would be detected as T<sub>E</sub>X3, but L<sup>A</sup>T<sub>E</sub>X only needs to take account of T<sub>E</sub>X's older than 3, or between 3 and 3.14.

```

326 \ifx\@TeXversion\undefined
327 \ifx\@undefined\inputlineno
328 \def\@TeXversion{2}
329 \else
330 {\catcode'\^^J=\active
331 \def\reserved@a#1#2\@@{\if#1\string~3\fi}
332 \edef\reserved@a{\expandafter\reserved@a\string^^J\@@}
333 \ifx\reserved@a\@empty\else\gdef\@TeXversion{3}\fi}
334 \fi
335 \fi

(End definition for \@TeXversion. This function is documented on page ??.)
336 </dircheck>

```

## 8 lt<sub>x</sub>check.tex

After the format has been made, and `article.cls` moved with the other files to the 'standard input directory' as specified in `install.txt`, the format may be checked by running the file `ltxcheck.tex`.

# File b

## lplain.dtx

### 1 Plain T<sub>E</sub>X

L<sup>A</sup>T<sub>E</sub>X includes almost all of the functionality of Knuth's original 'Basic Macros' That is, the plain T<sub>E</sub>X format described in Appendix B of the T<sub>E</sub>XBook. However, some of the user commands are not much use so, in order to save memory, we may remove them from the kernel into a package. Here is a list of the commands that may be removed (PROBABLY NOT COMPLETE).

```
\magstep    \magstephalf
\mathhexbox
\vglue      \vgl@
\hglue      \hgl@
```

This file is by now very small as most of it has been moved to more appropriate kernel files: it may disappear completely one day.

L<sup>A</sup>T<sub>E</sub>X font definitions are done using NFSS2 so none of PLAIN's font definitions are in L<sup>A</sup>T<sub>E</sub>X.

L<sup>A</sup>T<sub>E</sub>X has its own tabbing environment, so PLAIN's is disabled.

L<sup>A</sup>T<sub>E</sub>X uses its own output routine, so most of the plain one was removed.

```
1 (*2kernel)
2 \catcode'\{=1 % left brace is begin-group character
3 \catcode'\}=2 % right brace is end-group character
4 \catcode'\$=3 % dollar sign is math shift
5 \catcode'\&=4 % ampersand is alignment tab
6 \catcode'\#=6 % hash mark is macro parameter character
7 \catcode'\^=7 % circumflex and uparrow are for superscripts
8 \catcode'\_ =8 % underline and downarrow are for subscripts
9 \catcode'\^^I=10 % ascii tab is a blank space
10 \chardef\active=13 \catcode'\~=\active % tilde is active
11 \catcode'\^^L=\active \def^^L{\par}% ascii form-feed is \par
12 \message{catcodes,}
```

We had to define the \catcodes right away, before the message line, since \message uses the { and } characters. When INITEX (the T<sub>E</sub>X initializer) starts up, it has defined the following \catcode values:

```
\catcode'\^^@=9 %  ascii null is ignored
\catcode'\^^M=5 %  ascii return is end-line
\catcode'\ =0 %    backslash is TeX escape character
\catcode'\%=14 %   percent sign is comment character
\catcode'\ =10 %   ascii space is blank space
\catcode'\^^?=15 %  ascii delete is invalid
\catcode'\A=11 ... \catcode'\Z=11 % uppercase letters
\catcode'\a=11 ... \catcode'\z=11 % lowercase letters
all others are type 12 (other)
```

Here is a list of the characters that have been specially catcoded:

```
13 \def\dospecials{\do\ \do\\\do\{\do\}\do\$ \do\&%
14 \do\# \do\^ \do\_ \do\% \do\~}
```

(not counting ascii null, tab, linefeed, formfeed, return, delete) Each symbol in the list is preceded by , which can be defined if you want to do something to every item in the list.

We make @ signs act like letters, temporarily, to avoid conflict between user names and internal control sequences of plain format.

```
15 \catcode'\@=11
```

To make the plain macros more efficient in time and space, several constant values are declared here as control sequences. If they were changed, anything could happen; so they are private symbols.

`\@ne` Small constants are defined using `\chardef`.

```
\tw@ 16 \chardef\@ne=1
\thr@@ 17 \chardef\tw@=2
\sixt@@n 18 \chardef\thr@@=3
\@cclv 19 \chardef\sixt@@n=16
        20 \chardef\@cclv=255
```

*(End definition for \@ne and others. These functions are documented on page ??.)*

`\@ccclvi` Constants above 255 defined using `\mathchardef`.

```
\@m 21 \mathchardef\@ccclvi=256
\@M 22 \mathchardef\@m=1000
\@MM 23 \mathchardef\@M=10000
      24 \mathchardef\@MM=20000
```

*(End definition for \@ccclvi and others. These functions are documented on page ??.)*

Allocation of registers

Here are macros for the automatic allocation of `\count`, `\box`, `\dimen`, `\skip`, `\muskip`, and `\toks` registers, as well as `\read` and `\write` stream numbers, `\fam` codes, `\language` codes, and `\insert` numbers.

```
25 \message{registers,}
```

When a register is used only temporarily, it need not be allocated; grouping can be used, making the value previously in the register return after the close of the group. The main use of these macros is for registers that are defined by one macro and used by others, possibly at different nesting levels. All such registers should be defined through these macros; otherwise conflicts may occur, especially when two or more macro packages are being used at the same time.

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

The following counters are reserved:

- 0 to 9 page numbering
- 10 count allocation
- 11 dimen allocation
- 12 skip allocation
- 13 muskip allocation
- 14 box allocation
- 15 toks allocation
- 16 read file allocation
- 17 write file allocation
- 18 math family allocation
- 19 language allocation
- 20 insert allocation
- 21 the most recently allocated number

22 constant -1

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

New counters are allocated starting with 23, 24, etc. Other registers are allocated starting with 10. This leaves 0 through 9 for the user to play with safely, except that counts 0 to 9 are considered to be the page and subpage numbers (since they are displayed during output). In this scheme, `\count 10` always contains the number of the highest-numbered counter that has been allocated, `\count 14` the highest-numbered box, etc. Inserts are given numbers 254, 253, etc., since they require a `\count`, `\dimen`, `\skip`, and `\box` all with the same number; `\count 20` contains the lowest-numbered insert that has been allocated. Of course, `\box255` is reserved for `\output`; `\count255`, `\dimen255`, and `\skip255` can be used freely.

It is recommended that macro designers always use `\global` assignments with respect to registers numbered

1, 3, 5, 7, 9,

and always non-`\global` assignments with respect to registers

0, 2, 4, 6, 8, 255.

This will prevent “save stack buildup” that might otherwise occur.

```
26 \count10=22 % allocates \count registers 23, 24, ...
27 \count11=9 % allocates \dimen registers 10, 11, ...
28 \count12=9 % allocates \skip registers 10, 11, ...
29 \count13=9 % allocates \muskip registers 10, 11, ...
30 \count14=9 % allocates \box registers 10, 11, ...
31 \count15=9 % allocates \toks registers 10, 11, ...
32 \count16=-1 % allocates input streams 0, 1, ...
33 \count17=-1 % allocates output streams 0, 1, ...
34 \count18=3 % allocates math families 4, 5, ...
35 \count19=0 % allocates \language codes 1, 2, ...
36 \count20=255 % allocates insertions 254, 253, ...
```

`\insc@unt` The insertion counter and most recent allocation.

`\allocationnumber`

```
37 \countdef\insc@unt=20
38 \countdef\allocationnumber=21
```

*(End definition for \insc@unt and \allocationnumber. These functions are documented on page ??.)*

`\m@ne` The constant  $-1$ .

```
39 \countdef\m@ne=22 \m@ne=-1
```

*(End definition for \m@ne. This function is documented on page ??.)*

`\wlog` Write on log file (only)

```
40 \def\wlog{\immediate\write\m@ne}
```

*(End definition for \wlog. This function is documented on page ??.)*

`\count@` Here are abbreviations for the names of scratch registers that don’t need to be allocated.

`\dimen@` 41 `\countdef\count@=255`

`\dimen@i` 42 `\dimendef\dimen@=0`

`\dimen@ii` 43 `\dimendef\dimen@i=1 % global only`

`\skip@` 44 `\dimendef\dimen@ii=2`

`\toks@` 45 `\skipdef\skip@=0`

```
46 \toksdef\toks@=0
```

(End definition for \count@ and others. These functions are documented on page ??.)

```

\newcount Now, we define \newcount, \newbox, etc. so that you can say \newcount\foo and \foo
\newdimen will be defined (with \countdef) to be the next counter.
\newskip To find out which counter \foo is, you can look at \allocationnumber.
\newmuskip Since there's no \boxdef command, \chardef is used to define a \newbox,
\newbox \newinsert, \newfam, and so on.
\newtoks LATEX change: remove \outer from \newcount and \newdimen (FMi) This is nec-
\newread essary to use \newcount inside \if... later on. Also remove from \newskip, \newbox
\newwrite \newwrite and \newfam (DPC) to save later redefinition.
\newfam
\newlanguage
47 </2kernel>
48 <*2kernel|latexrelease>
49 <latexrelease>\IncludeInRelease{2015/01/01}%
50 <latexrelease> {\newcount}{Extended Allocation}%

51 \def\newcount {\e@alloc\count \countdef {\count10}\insc@unt\float@count}
52 \def\newdimen {\e@alloc\dimen \dimendef {\count11}\insc@unt\float@count}
53 \def\newskip {\e@alloc\skip \skipdef {\count12}\insc@unt\float@count}
54 \def\newmuskip
55 {\e@alloc\muskip\muskipdef{\count13}\m@ne\e@alloc@top}

For compatibility use \chardef in the classical range.

56 \def\newbox {\e@alloc\box
57 {\ifnum\allocationnumber<\cclvi
58 \expandafter\chardef
59 \else
60 \expandafter\e@alloc@chardef
61 \fi}
62 {\count14}\insc@unt\float@count}
63 \def\newtoks {\e@alloc\toks \toksdef{\count15}\m@ne\e@alloc@top}
64 \def\newread {\e@alloc\read \chardef{\count16}\m@ne\sixt@n}

Skip \write18 due to its traditional use as a shell-escape.

65 \ifx\directlua\@undefined
66 \def\newwrite {\e@alloc\write \chardef{\count17}\m@ne\sixt@n}
67 \else
68 \def\newwrite {\e@alloc\write
69 {\ifnum\allocationnumber=18
70 \advance\count17\@ne
71 \allocationnumber\count17 %
72 \fi
73 \global\chardef}%
74 {\count17}%
75 \m@ne
76 {128}}
77 \fi

78 \def\new@mathgroup
79 {\e@alloc\mathgroup\chardef{\count18}\m@ne\e@mathgroup@top}
80 \let\newfam\new@mathgroup

81 \ifx\directlua\@undefined
82 \def\newlanguage {\e@alloc\language \chardef{\count19}\m@ne\cclvi}
83 \else
84 \def\newlanguage {\e@alloc\language \chardef{\count19}\m@ne{16384}}

```

```

85 \fi
86 </2ekernel | latexrelease>
87 <latexrelease>\EndIncludeInRelease
88 <latexrelease>\IncludeInRelease{0000/00/00}%
89 <latexrelease>          {\newcount}{Extended Allocation}%
90 <latexrelease>\def\newcount{\alloc@0\count\countdef\insc@unt}
91 <latexrelease>\def\newdimen{\alloc@1\dimen\dimendef\insc@unt}
92 <latexrelease>\def\newskip{\alloc@2\skip\skipdef\insc@unt}
93 <latexrelease>\def\newmuskip{\alloc@3\muskip\muskipdef\@ccclvi}
94 <latexrelease>\def\newbox{\alloc@4\box\chardef\insc@unt}
95 <latexrelease>\def\newtoks{\alloc@5\toks\toksdef\@ccclvi}
96 <latexrelease>\def\newread{\alloc@6\read\chardef\sixt@@n}
97 <latexrelease>\def\newwrite{\alloc@7\write\chardef\sixt@@n}
98 <latexrelease>\def\new@mathgroup{\alloc@8\fam\chardef\sixt@@n}
99 <latexrelease>\def\newlanguage{\alloc@9\language\chardef\@ccclvi}
100 <latexrelease>\let\newfam\new@mathgroup
101 <latexrelease>\EndIncludeInRelease

```

(End definition for \newcount and others. These functions are documented on page ??.)

\e@alloc@chardef The upper limit of extended registers, which leaves this number (eg \dimen32767) always  
 \e@alloc@top unallocated by these macros. cf traditional \dimen255.

```

102 <*2ekernel | latexrelease>
103 <latexrelease>\IncludeInRelease{2015/01/01}%
104 <latexrelease>          {\e@alloc@chardef}{Extended Allocation}%

```

```

105 \ifx\directlua\undefined
106   \ifx\widowpenalties\undefined

```

classic tex has  $2^8$  registers.

```

107   \mathchardef\e@alloc@top=255
108   \let\e@alloc@chardef\chardef
109   \else

```

etex and xetex have  $2^{15}$  registers.

```

110   \mathchardef\e@alloc@top=32767
111   \let\e@alloc@chardef\mathchardef
112   \fi
113   \else

```

luatex has  $2^{16}$  registers.

```

114   \chardef\e@alloc@top=65535
115   \let\e@alloc@chardef\chardef
116   \fi
117 </2ekernel | latexrelease>
118 <latexrelease>\EndIncludeInRelease
119 <latexrelease>\IncludeInRelease{0000/00/00}%
120 <latexrelease>          {\e@alloc@chardef}{Extended Allocation}%
121 <latexrelease>\let\e@alloc@top\undefined
122 <latexrelease>\let\e@alloc@chardef\undefined
123 <latexrelease>\EndIncludeInRelease

```

(End definition for \e@alloc@chardef and \e@alloc@top. These functions are documented on page ??.)

`\e@mathgroup@top` The upper limit of extended math groups (`\fam`) 16 in classic T<sub>E</sub>X and e-T<sub>E</sub>X, but 256 in Unicode TeX variants.

```

124 <*2ekernel | latexrelease>
125 <latexrelease>\IncludeInRelease{2015/01/01}%
126 <latexrelease>                {\e@mathgroup@top}{Extended Allocation}%
127 \ifx\Umathcode\@undefined
classic and e tex have 16 fam (0–15).
128   \chardef\e@mathgroup@top=16
129   \else
xetex and luatex have 256 fam (0–255).
130   \chardef\e@mathgroup@top=256
131   \fi
132 </2ekernel | latexrelease>
133 <latexrelease>\EndIncludeInRelease
134 <latexrelease>\IncludeInRelease{0000/00/00}%
135 <latexrelease>                {\e@mathgroup@top}{Extended Allocation}%
136 <latexrelease>\let\e@mathgroup@top\@undefined
137 <latexrelease>\EndIncludeInRelease

```

*(End definition for `\e@mathgroup@top`. This function is documented on page ??.)*

`\e@alloc` A modified version of `\alloc@` that takes the count register rather than just the final digit of its number (assuming `\count1x`). It also has an extra argument to give the top of the extended range.

```

                #1 #2      #3      #4      #5      #6
      \e@alloc type defcmd current top extended-top newname
      Note that if just a single allocation range is required (not omitting a range up to
      255 for inserts) then −1 should be used for the first upper bound argument, #4.
138 <*2ekernel | latexrelease>
139 <latexrelease>\IncludeInRelease{2015/01/01}{\e@alloc}{Extended Allocation}%
140 \def\e@alloc#1#2#3#4#5#6{%
141   \global\advance#3\@ne
142   \e@ch@ck{#3}{#4}{#5}#1%
143   \allocationnumber#3\relax
144   \global#2#6\allocationnumber
145   \wlog{\string#6=\string#1\the\allocationnumber}}%
146 </2ekernel | latexrelease>
147 <latexrelease>\EndIncludeInRelease
148 <latexrelease>\IncludeInRelease{0000/00/00}{\e@alloc}{Extended Allocation}%
149 <latexrelease>\let\e@alloc\@undefined
150 <latexrelease>\EndIncludeInRelease
151 <*2ekernel>

```

*(End definition for `\e@alloc`. This function is documented on page ??.)*

`\e@ch@ck` Extended check command. If the first range is exceeded, bump to 256 (or 266 for counts) and try again, testing the extended range.



Allocate matching registers from the top of the extended range and add to \@freelist.

```

\extrafloats 152 </2kernel>
153 <*2kernel | latexrelease>
154 <latexrelease> \IncludeInRelease{2015/10/01}
155 <latexrelease> { \e@ch@ck } { Extended Allocation (checking) } %

156 \gdef \e@ch@ck#1#2#3#4{%
157   \ifnum#1<#2\else

      If we've reached the classical top limit, bump to 256 or 266 for counts (count 256–265
      are reserved by the allocation system).

158     \ifnum#1=#2\relax
159       \global#1\@cclvi
160       \ifx\count#4\global\advance#1 10 \fi
161     \fi

      Check we are below the extended limit.

162     \ifnum#1<#3\relax
163     \else
164       \errmessage{No room for a new \string#4}%
165     \fi
166   \fi}%
167 <latexrelease> \EndIncludeInRelease
168 <latexrelease> \IncludeInRelease{2015/01/01}%
169 <latexrelease> { \e@ch@ck } { Extended Allocation (checking) } %
170 <latexrelease> \gdef \e@ch@ck#1#2#3#4{%
171 <latexrelease>   \ifnum#1<#2\else
172 <latexrelease>     \ifnum#1=#2\relax
173 <latexrelease>       #1\@cclvi
174 <latexrelease>       \ifx\count#4\advance#1 10 \fi
175 <latexrelease>       \fi
176 <latexrelease>       \ifnum#1<#3\relax
177 <latexrelease>       \else
178 <latexrelease>         \errmessage{No room for a new #4}%
179 <latexrelease>       \fi
180 <latexrelease>     \fi}%
181 <latexrelease> \EndIncludeInRelease
182 <latexrelease> \IncludeInRelease{0000/00/00}%
183 <latexrelease> { \e@ch@ck } { Extended Allocation (checking) } %
184 <latexrelease> \let \e@ch@ck \@undefined
185 <latexrelease> \EndIncludeInRelease

186 <latexrelease> \IncludeInRelease{2015/01/01}%
187 <latexrelease> { \extrafloats } { Extra floats } %

188 \let \float@count \e@alloc@top

\extrafloats 189 \ifx\numexpr\@undefined

      In classic TeX use \newinsert to allocate float boxes.

190 \def\extrafloats#1{%
191   \count@#1\relax
192   \ifnum\count@>\z@
193     \newinsert\reserved@a
194     \global\expandafter\chardef

```

```

195 \csname bx@\the\allocationnumber\endcsname\allocationnumber
196 \@cons\@freelist{\csname bx@\the\allocationnumber\endcsname}%
197 \advance\count@m@ne
198 \expandafter\extrafloats
199 \expandafter\count@
200 \fi
201 }%
202 \else

```

In e-tex take float boxes from the top of the extended range.

```

203 \def\extrafloats#1{%
204 \ifnum#1>\z@
205 \count@\numexpr\float@count-1\relax
206 \ch@ck0\count@\count
207 \ch@ck1\count@\dimen
208 \ch@ck2\count@\skip
209 \ch@ck4\count@\box
210 \global\@alloc@chardef\float@count\count@
211 \global\expandafter\@alloc@chardef
212 \csname bx@\the\float@count\endcsname\float@count
213 \@cons\@freelist{\csname bx@\the\float@count\endcsname}%
214 \expandafter
215 \extrafloats\expandafter{\numexpr#1-1\relax}%
216 \fi}%
217 \fi
218 </2ekernel | latexrelease>
219 <latexrelease>\EndIncludeInRelease
220 <latexrelease>\IncludeInRelease{0000/00/00}%
221 <latexrelease> \extrafloats}{Extra floats}%
222 <latexrelease>\let\float@count\@undefined
223 <latexrelease>\let\extrafloats\@undefined
224 <latexrelease>\EndIncludeInRelease
225 <*2ekernel>

```

*(End definition for \e@ch@ck, \extrafloats, and \extrafloats. These functions are documented on page ??.)*

**\alloc@** Since \e@alloc was added in 2015, \@alloc has not been used, but was left as some legacy code calls it. However the original definition gives spurious errors once the “classic” registers run out, so it is now defined to call \e@alloc internally.

```

226 </2ekernel>
227 <*2ekernel | latexrelease>
228 <latexrelease>\IncludeInRelease{2020/10/01}
229 <latexrelease> \alloc@}{emulate alloc@}%
230 \def\alloc@#1#2#3#4{\e@alloc#2#3{\count1#1}#4\float@count}
231 </2ekernel | latexrelease>
232 <latexrelease>\EndIncludeInRelease
233 <latexrelease>\IncludeInRelease{0000/00/00}%
234 <latexrelease> \alloc@}{emulate alloc@}%
235 <latexrelease>\def\alloc@#1#2#3#4#5{\global\advance\count1#1\@ne
236 <latexrelease> \ch@ck#1#4#2%
237 <latexrelease> \allocationnumber\count1#1%
238 <latexrelease> \global#3#5\allocationnumber

```

```

239 <latexrelease> \wlog{\string#5=\string#2\the\allocationnumber}}
240 <latexrelease>\EndIncludeInRelease
241 <*2ekernel>

```

(End definition for \alloc@. This function is documented on page ??.)

\newinsert

```

242 </2ekernel>
243 <*2ekernel | latexrelease>
244 <latexrelease>\IncludeInRelease{2015/10/01}
245 <latexrelease> \newinsert}{Extended \newinsert}%
246 \ifx\numexpr@undefined

```

If e-TeX is not available use the original plain TeX definition of \newinsert.

```

247 \def\newinsert#1{\global\advance\insc@unt \m@ne
248 \ch@ck0\insc@unt\count
249 \ch@ck1\insc@unt\dimen
250 \ch@ck2\insc@unt\skip
251 \ch@ck4\insc@unt\box
252 \allocationnumber\insc@unt
253 \global\chardef#1\allocationnumber
254 \wlog{\string#1=\string\insert\the\allocationnumber}}

```

```

255 \else

```

The highest register allowed with \insert.

```

256 \ifx\directlua@undefined
257 \chardef\@insert@top255
258 \else
259 \chardef\@insert@top\@alloc@top
260 \fi

```

If the classic registers are exhausted, take an insert from the free float list and use \extrafloats to add a new float to that list.

```

261 \def\newinsert#1{%
262 \@tempswafalse
263 \global\advance\insc@unt\m@ne
264 \ifnum\count10<\insc@unt
265 \ifnum\count11<\insc@unt
266 \ifnum\count12<\insc@unt
267 \ifnum\count14<\insc@unt
268 \@tempswatrue
269 \fi\fi\fi\fi
270 \if@tempswa
271 \allocationnumber\insc@unt
272 \else
273 \global\advance\insc@unt\@ne
274 \extrafloats\@ne
275 \@next\@currbox\@freelist
276 {\ifnum\@currbox<\@insert@top
277 \allocationnumber\@currbox
278 \else
279 \ch@ck0\m@ne\insert
280 \fi}%
281 {\ch@ck0\m@ne\insert}%

```

```

282 \fi
283 \global\chardef#1\allocationnumber
284 \wlog{\string#1=\string\insert\the\allocationnumber}%
285 }

286 \fi
287 </2ekernel | latexrelease>

288 <latexrelease>\EndIncludeInRelease
289 <latexrelease>\IncludeInRelease{0000/00/00}%
290 <latexrelease>          {\newinsert}{Extended \newinsert}%
291 <latexrelease>\let\@insert@top\@undefined
292 <latexrelease>\def\newinsert#1{\global\advance\insc@unt \m@ne
293 <latexrelease> \ch@ck0\insc@unt\count
294 <latexrelease> \ch@ck1\insc@unt\dimen
295 <latexrelease> \ch@ck2\insc@unt\skip
296 <latexrelease> \ch@ck4\insc@unt\box
297 <latexrelease> \allocationnumber\insc@unt
298 <latexrelease> \global\chardef#1\allocationnumber
299 <latexrelease> \wlog{\string#1=\string\insert\the\allocationnumber}}
300 <latexrelease>\EndIncludeInRelease
301 <*2ekernel>

```

(End definition for \newinsert. This function is documented on page ??.)

\ch@ck

```

302 \gdef\ch@ck#1#2#3{%
303   \ifnum\count1#1<#2\else
304     \errmessage{No room for a new #3}%
305   \fi}

```

(End definition for \ch@ck. This function is documented on page ??.)

\newhelp

```

306 \def\newhelp#1#2{\newtoks#1#1\expandafter{\csname#2\endcsname}}

```

(End definition for \newhelp. This function is documented on page ??.)

\maxdimen Here are some examples of allocation.

```

\hideskip 307 \newdimen\maxdimen \maxdimen=16383.99999pt % the largest legal <dimen>
308 \newskip\hideskip \hideskip=-1000pt plus 1fill % negative but can grow

```

(End definition for \maxdimen and \hideskip. These functions are documented on page ??.)

\p@

\z@

\z@skip

\voidb@x

```

309 \newdimen\p@ \p@=1pt % this saves macro space and time
310 \newdimen\z@ \z@=0pt % can be used both for 0pt and 0
311 \newskip\z@skip \z@skip=0pt plus0pt minus0pt
312 \newbox\voidb@x % permanently void box register

```

(End definition for \p@ and others. These functions are documented on page ??.)

Assign initial values to T<sub>E</sub>X's parameters

```

313 \message{parameters,}

```

All of  $\text{\TeX}$ 's numeric parameters are listed here, but the code is commented out if no special value needs to be set. INITEX makes all parameters zero except where noted. *Historical  $\text{\LaTeX}$  2.09 comments (not necessarily accurate any more):*

```

314 \pretolerance=100
315 \tolerance=200 % INITEX sets this to 10000
316 \hbadness=1000
317 \vbadness=1000
318 \linepenalty=10
319 \hyphenpenalty=50
320 \exhyphenpenalty=50
321 \binoppenalty=700
322 \relpenalty=500
323 \clubpenalty=150
324 \widowpenalty=150
325 \displaywidowpenalty=50
326 \brokenpenalty=100
327 \predisplaypenalty=10000

\postdisplaypenalty=0
\interlinepenalty=0
\floatingpenalty=0, set during \insert
\outputpenalty=0, set before TeX enters \output

328 \doublehyphendemerits=10000
329 \finalhyphendemerits=5000
330 \adjdemerits=10000

\looseness=0, cleared by TeX after each paragraph
\pausing=0
\holdinginserts=0
\tracingonline=0
\tracingmacros=0
\tracingstats=0
\tracingparagraphs=0
\tracingpages=0
\tracingoutput=0

331 \tracinglostchars=1

\tracingcommands=0
\tracingrestores=0
\language=0

332 \uchyph=1

\lefthyphenmin=2 \righthyphenmin=3 set below
\globaldefs=0
\maxdeadcycles=25 % INITEX does this
\hangafter=1 % INITEX does this, also TeX after each paragraph
\fam=0
\mag=1000 % INITEX does this
\escapechar='\ % INITEX does this

333 \defaultthyphenchar='\-
334 \defaultskewchar=-1

```

```

\endlinechar='\^M % INITEX does this
\newlinechar=-1      \LaTeX\ sets this in ltdefs.dtx.

335 \delimiterfactor=901

\time=now % TeX does this at beginning of job
\day=now % TeX does this at beginning of job
\month=now % TeX does this at beginning of job
\year=now % TeX does this at beginning of job

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

In L<sup>A</sup>T<sub>E</sub>X we don't want box information in the transcript unless we do a full tracing.

```

336 \showboxbreadth=-1
337 \showboxdepth=-1
338 \errorcontextlines=-1

339 \hfuzz=0.1pt
340 \vfuzz=0.1pt
341 \overfullrule=5pt
342 \maxdepth=4pt
343 \splitmaxdepth=\maxdimen
344 \boxmaxdepth=\maxdimen

```

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```

\lineskiplimit=0pt, changed by \normalbaselines

345 \delimitershortfall=5pt
346 \nulldelimiterspace=1.2pt
347 \scriptspace=0.5pt

\mathsurround=0pt
\predisplaysize=0pt, set before TeX enters $$
\displaywidth=0pt, set before TeX enters $$
\displayindent=0pt, set before TeX enters $$

348 \parindent=20pt

\hangindent=0pt, zeroed by TeX after each paragraph
\hoffset=0pt
\voffset=0pt

\baselineskip=0pt, changed by \normalbaselines
\lineskip=0pt, changed by \normalbaselines

349 \parskip=0pt plus 1pt
350 \abovedisplayskip=12pt plus 3pt minus 9pt
351 \abovedisplayshortskip=0pt plus 3pt
352 \belowdisplayskip=12pt plus 3pt minus 9pt
353 \belowdisplayshortskip=7pt plus 3pt minus 4pt

\leftskip=0pt
\rightskip=0pt

354 \topskip=10pt
355 \splittopskip=10pt

```

```

\tabskip=0pt
\spaceskip=0pt
\xspaceskip=0pt
356 \parfillskip=0pt plus 1fil
End of historical LATEX 2.09 comments.

\normalbaselineskip We also define special registers that function like parameters:
\normallineskip 357 \newskip\normalbaselineskip \normalbaselineskip=12pt
\normallineskiplimit 358 \newskip\normallineskip \normallineskip=1pt
359 \newdimen\normallineskiplimit \normallineskiplimit=0pt

(End definition for \normalbaselineskip, \normallineskip, and \normallineskiplimit. These func-
tions are documented on page ??.)

\interfootlinepenalty
360 \newcount\interfootnotelinepenalty \interfootnotelinepenalty=100

(End definition for \interfootlinepenalty. This function is documented on page ??.)
Definitions for preloaded fonts

\magstephalf
\magstep 361 \def\magstephalf{1095 }
362 \def\magstep#1{\ifcase#1 \@m\or 1200\or 1440\or 1728\or
363 2074\or 2488\fi\relax}

(End definition for \magstephalf and \magstep. These functions are documented on page ??.)
Macros for setting ordinary text

\frenchspacing
\nonfrenchspacing 364 \def\frenchspacing{\sfcode'\.\@m \sfcode'\?\@m \sfcode'\!\@m
365 \sfcode'\:\@m \sfcode'\;\@m \sfcode'\,\@m}
366 \def\nonfrenchspacing{\sfcode'\.3000\sfcode'\?3000\sfcode'\!3000%
367 \sfcode'\:2000\sfcode'\;1500\sfcode'\,1250 }

(End definition for \frenchspacing and \nonfrenchspacing. These functions are documented on page
??.)

\normalbaselines
368 \def\normalbaselines{\lineskip\normallineskip
369 \baselineskip\normalbaselineskip \lineskiplimit\normallineskiplimit}

(End definition for \normalbaselines. This function is documented on page ??.)

\M Save a bit of space by using \let here.
\I 370 \def\^M{\ } % control <return> = control <space>
371 \let\^I\^M % same for <tab>

(End definition for \M and \I. These functions are documented on page ??.)

\lq
\rq 372 \def\lq{' }
373 \def\rq{' }

(End definition for \lq and \rq. These functions are documented on page ??.)

```

```

\lbrack
\rbrack 374 \def\lbrack{[}
          375 \def\rbrack{]}

(End definition for \lbrack and \rbrack. These functions are documented on page ??.)

\aa      These are not from plain.tex but they are similar to other commands found here and
\AA      nowhere else, being alternate input forms for characters.
          376 \def \aa {\r a}
          377 \def \AA {\r A}

(End definition for \aa and \AA. These functions are documented on page ??.)

\endgraf
\endline 378 \let\endgraf=\par
          379 \let\endline=\cr

(End definition for \endgraf and \endline. These functions are documented on page ??.)

\space
          380 \def\space{ }

(End definition for \space. This function is documented on page ??.)

\empty   This probably ought to go altogether, but let it to the LATEX version to save space.
          381 \let\empty@empty

(End definition for \empty. This function is documented on page ??.)

\null
          382 \def\null{\hbox{}}

(End definition for \null. This function is documented on page ??.)

\bgroup
\egroup  383 \let\bgroup={
          384 \let\egroup=}

(End definition for \bgroup and \egroup. These functions are documented on page ??.)

\obeylines In \obeylines, we say \let^^M=\par instead of \def^^M{\par} since this allows, for
\obeyspaces example, \let\par=\cr \obeylines \halign{...
          385 {\catcode'\^^M=\active % these lines must end with %
          386 \gdef\obeylines{\catcode'\^^M\active \let^^M\par}%
          387 \global\let^^M\par} % this is in case ^^M appears in a \write
          388 \def\obeyspaces{\catcode'\ \active}
          389 {\obeyspaces\global\let \space}

(End definition for \obeylines and \obeyspaces. These functions are documented on page ??.)

```



`\loop` We use Kabelschacht's method of doing loops, see TUB 8#2 (1987). (unless that breaks something :-). It turned out to need an extra `\relax`: see pr/642 (`\loop` could do one iteration too much in certain cases).

```

390 \long\def \loop #1\repeat{%
391   \def\iterate{#1\relax % Extra \relax
392             \expandafter\iterate\fi
393             }%
394   \iterate
395   \let\iterate\relax
396 }

```

This setting of `\repeat` is needed to make `\loop...\if...\repeat` skippable within another `\if....`

```

397 \let\repeat=\fi

```

(End definition for `\loop`, `\iterate`, and `\repeat`. These functions are documented on page ??.)

L<sup>A</sup>T<sub>E</sub>X defines `\smallskip`, etc. in `ltspace.dtx`.

`\nointerlineskip`  
`\offinterlineskip`

```

398 \def\nointerlineskip{\prevdepth-\@m\p@}
399 \def\offinterlineskip{\baselineskip-\@m\p@
400   \lineskip\z@ \lineskiplimit\maxdimen}

```

(End definition for `\nointerlineskip` and `\offinterlineskip`. These functions are documented on page ??.)

`\vglue`  
`\hglue`

```

401 \def\vglue{\afterassignment\vgl@skip@=}
402 \def\vgl@{\par \dimen@\prevdepth \hrule \@height\z@
403   \nobreak\vskip\skip@ \prevdepth\dimen@}
404 \def\hglue{\afterassignment\hgl@skip@=}
405 \def\hgl@{\leavevmode \count@\spacefactor \vrule \@width\z@
406   \nobreak\hskip\skip@ \spacefactor\count@}

```

(End definition for `\vglue` and `\hglue`. These functions are documented on page ??.)

L<sup>A</sup>T<sub>E</sub>X defines `~` in `ltdfn.dtx`.

`\slash` This generates a / acting a bit like - but still allows hyphenation in the word part preceding it (but not after).

```

407 \def\slash{/\penalty\exhyphenpenalty}

```

(End definition for `\slash`. This function is documented on page ??.)

`\break`  
`\nobreak`  
`\allowbreak`

```

408 \def\break{\penalty-\@M}
409 \def\nobreak{\penalty \@M}
410 \def\allowbreak{\penalty \z@}

```

(End definition for `\break`, `\nobreak`, and `\allowbreak`. These functions are documented on page ??.)

`\filbreak`  
`\goodbreak`

```

411 \def\filbreak{\par\vfil\penalty-200\vfilneg}
412 \def\goodbreak{\par\penalty-500 }

```

(End definition for `\filbreak` and `\goodbreak`. These functions are documented on page ??.)

`\eject` Define `\eject` as in plain T<sub>E</sub>X but define `\supereject` only in the compatibility file.

```

413 \def\eject{\par\break}

(End definition for \eject. This function is documented on page ??.)

```

`\removelastskip`

```

414 \def\removelastskip{\ifdim\lastskip=\z@\else\vskip-\lastskip\fi}

(End definition for \removelastskip. This function is documented on page ??.)

```

`\smallbreak`  
`\medbreak`  
`\bigbreak`

```

415 \def\smallbreak{\par\ifdim\lastskip<\smallskipamount
416   \removelastskip\penalty-50\smallskip\fi}
417 \def\medbreak{\par\ifdim\lastskip<\medskipamount
418   \removelastskip\penalty-100\medskip\fi}
419 \def\bigbreak{\par\ifdim\lastskip<\bigskipamount
420   \removelastskip\penalty-200\bigskip\fi}

(End definition for \smallbreak, \medbreak, and \bigbreak. These functions are documented on page ??.)

```

`\m@th`

```

421 \def\m@th{\mathsurround\z@}

(End definition for \m@th. This function is documented on page ??.)

```

`\underbar` Due to L<sup>A</sup>T<sub>E</sub>X's redefinition of `\underline` plain T<sub>E</sub>X's `\underbar` can be done in a simpler fashion (but do we need it at all?).

```

422 \def\underbar#1{\underline{\sbox\tw@{#1}\dp\tw@=\z@\box\tw@}}

(End definition for \underbar. This function is documented on page ??.)

```

`\strutbox` L<sup>A</sup>T<sub>E</sub>X sets `\strutbox` in `\set@fontsize`.

`\strut`

```

423 \newbox\strutbox
424 \def\strut{\relax\ifmmode\copy\strutbox\else\unhcopy\strutbox\fi}

(End definition for \strutbox and \strut. These functions are documented on page ??.)

```

`\hidewidth` For alignment entries that can stick out.

```

425 \def\hidewidth{\hskip\hideskip}

(End definition for \hidewidth. This function is documented on page ??.)

```

`\narrower`

```

426 \def\narrower{%
427   \advance\leftskip\parindent
428   \advance\rightskip\parindent}

(End definition for \narrower. This function is documented on page ??.)

```

L<sup>A</sup>T<sub>E</sub>X defines `\ae` and similar commands elsewhere.

```

429 \chardef\%='\'
430 \chardef\&='&
431 \chardef\#='#

```

Most text commands are actually encoding specific and therefore defined later, so commented out or removed from this file.

`\leavevmode` begins a paragraph, if necessary

```

432 \def\leavevmode{\unhbox\voidb@x}

```

(End definition for `\leavevmode`. This function is documented on page ??.)

`\mathhexbox`

```

433 \def\mathhexbox#1#2#3{\mbox{$\m@th \mathchar"#1#2#3$}}

```

(End definition for `\mathhexbox`. This function is documented on page ??.)

`\ialign`

```

434 \def\ialign{\everycr{}\tabskip\z@skip\halign} % initialized \halign

```

(End definition for `\ialign`. This function is documented on page ??.)

`\oalign`

```

435 \def\oalign#1{\leavevmode\topof\baselineskip\z@skip \lineskip.25ex%
436 \ialign{##\crr#1\crr}}
437 \def\o@lign{\lineskiplimit\z@ \oalign}
438 \def\oalign{\lineskiplimit-\maxdimen \oalign}

```

(End definition for `\oalign`, `\o@lign`, and `\oalign`. These functions are documented on page ??.)

`\sh@ft` The definition of this macro in plain.tex was improved in about 1997; but as a result its usage was changed and its new definition is not appropriate for L<sup>A</sup>T<sub>E</sub>X.

Since the version given here has been in use by L<sup>A</sup>T<sub>E</sub>X for many years it does not seem prudent to remove it now. As far as we can tell it has only been used to define `\b` and `\d` but this cannot be certain.

```

439 \def\sh@ft#1{\dimen@.00#1ex\multiply\dimen@\fontdimen1\font
440 \kern-.0156\dimen@} % compensate for slant in lowered accents

```

(End definition for `\sh@ft`. This function is documented on page ??.)

`\ltx@sh@ft` This is the L<sup>A</sup>T<sub>E</sub>X version of the second incarnation of the plain macro `\sh@ft`, which takes a dimension as its argument. It shifts a pseudo-accent horizontally by an amount proportional to the product of its argument and the slant-per-point (`fontdimen 1`).

```

441 \def\ltx@sh@ft #1{%
442 \dimen@ #1%
443 \kern \strip@pt
444 \fontdimen1\font \dimen@
445 } % kern by #1 times the current slant

```

(End definition for `\ltx@sh@ft`. This function is documented on page ??.)

L<sup>A</sup>T<sub>E</sub>X change: the text commands such as `\d`, `\b`, `\c`, `\copyright`, `\TeX` are now defined elsewhere.

L<sup>A</sup>T<sub>E</sub>X change: Make `\t` work in a moving argument. Now defined elsewhere.

`\hrulefill` L<sup>A</sup>T<sub>E</sub>X change: `\kern\z@` added to end of `\hrulefill` and `\dotfill` to make them work

`\dotfill` in ‘tabular’ and ‘array’ environments. (Change made 24 July 1987). L<sup>A</sup>T<sub>E</sub>X change: `\leavevmode` added at beginning of `\dotfill` and `\hrulefill` so that they work as expected in vertical mode.

```

446 \def\hrulefill{\leavevmode\leaders\hrule\hfill\kern\z@}

```

The box in `\dotfill` originally contained (in `plain.tex`):

```
\mkern 1.5mu .\mkern 1.5mu;
```

the width of `.44em` differs from this by `.04pt` which is probably an acceptable difference within leaders.

```
447 \def\dotfill{%
448   \leavevmode
449   \cleaders \hb@xt@ .44em{\hss.\hss}\hfill
450   \kern\z@}
```

(End definition for `\hrulefill` and `\dotfill`. These functions are documented on page ??.)

INITEX sets `\sfcode x=1000` for all `x`, except that `\sfcode'X=999` for uppercase letters. The following changes are needed:

```
451 \sfcode'\=0 \sfcode'\'=0 \sfcode'\]=0
```

The `\nonfrenchspacing` macro will make further changes to `\sfcode` values.

Definitions related to output

`\magnification` doesn't work in L<sup>A</sup>T<sub>E</sub>X.

```
def\magnification{\afterassignment\m@g\count@}
def\m@g{\mag\count@
  \hsize6.5truein\vsize8.9truein\dimen\footins8truein}
```

`\showoverfull` The following commands are used in debugging:

```
452 \def\showoverfull{\tracingonline\@ne}
```

(End definition for `\showoverfull`. This function is documented on page ??.)

`\showoutput`  
`\loggingoutput`

```
453 \gdef\loggingoutput{\tracingoutput\@ne
454   \showboxbreadth\maxdimen\showboxdepth\maxdimen\errorstopmode}
455 \gdef\showoutput{\loggingoutput\showoverfull}
456 </2ekernel>
```

(End definition for `\showoutput` and `\loggingoutput`. These functions are documented on page ??.)

`\tracingall`

`\loggingall`

```
457 <latexrelease>\IncludeInRelease{2015/01/01}{\loggingall}{etex tracing}%
458 <*2ekernel | latexrelease>
459 \ifx\tracingscantokens\undefined
460 \gdef\loggingall{%
461   \tracingstats\tw@
462   \tracingpages\@ne
463   \tracinglostchars\@ne
464   \tracingparagraphs\@ne
465   \errorcontextlines\maxdimen
466   \loggingoutput
467   \tracingmacros\tw@
468   \tracingcommands\tw@
469   \tracingrestores\@ne
470   }%
471 \else
472 \gdef\loggingall{%
473   \tracingstats\tw@
474   \tracingpages\@ne
```

```

475 \tracinglostchars\tw@
476 \tracingparagraphs\@ne
477 \tracinggroups\@ne
478 \tracingifs\@ne
479 \tracingscantokens\@ne
480 \tracingnesting\@ne
481 \errorcontextlines\maxdimen
482 \loggingoutput
483 \tracingmacros\tw@
484 \tracingcommands\thr@@
485 \tracingrestores\@ne
486 \tracingassigns\@ne
487 }%
488 \fi
489 \gdef\tracingall{\showoverfull\loggingall}
490 </2ekernel | latexrelease>
491 <latexrelease>\EndIncludeInRelease
492 <latexrelease>\IncludeInRelease{0000/00/00}{\loggingall}{etex tracing}%
493 <latexrelease>\gdef\loggingall{\tracingcommands\tw@\tracingstats\tw@
494 <latexrelease> \tracingpages\@ne\tracinglostchars\@ne
495 <latexrelease> \tracingmacros\tw@\tracingparagraphs\@ne\tracingrestores\@ne
496 <latexrelease> \errorcontextlines\maxdimen\loggingoutput}
497 <latexrelease> \gdef\tracingall{\loggingall\showoverfull}
498 <latexrelease>\EndIncludeInRelease

```

*(End definition for \tracingall and \loggingall. These functions are documented on page ??.)*

**\tracingnone**

**\hideoutput**

```

499 <latexrelease>\IncludeInRelease{2015/01/01}{\tracingnone}%
500 <latexrelease> \turn off etex tracing}%
501 <*2ekernel | latexrelease>
502 \ifx\tracingscantokens\@undefined
503 \def\tracingnone{%
504 \tracingonline\z@
505 \tracingcommands\z@
506 \showboxdepth\m@ne
507 \showboxbreadth\m@ne
508 \tracingoutput\z@
509 \errorcontextlines\m@ne
510 \tracingrestores\z@
511 \tracingparagraphs\z@
512 \tracingmacros\z@
513 \tracinglostchars\@ne
514 \tracingpages\z@
515 \tracingstats\z@
516 }%
517 \else
518 \def\tracingnone{%
519 \tracingassigns\z@
520 \tracingrestores\z@
521 \tracingonline\z@
522 \tracingcommands\z@
523 \showboxdepth\m@ne
524 \showboxbreadth\m@ne

```

```

525 \tracingoutput\z@
526 \errorcontextlines\m@ne
527 \tracingnesting\z@
528 \tracingscantokens\z@
529 \tracingifs\z@
530 \tracinggroups\z@
531 \tracingparagraphs\z@
532 \tracingmacros\z@
533 \tracinglostchars\@ne
534 \tracingpages\z@
535 \tracingstats\z@
536 }%
537 \fi

538 \def\hideoutput{%
539 \tracingoutput\z@
540 \showboxbreadth\m@ne
541 \showboxdepth\m@ne
542 \tracingonline\m@ne
543 }%

544 </2ekernel | latexrelease>
545 <latexrelease>\EndIncludeInRelease
546 <latexrelease>\IncludeInRelease{0000/00/00}{\tracingnone}%
547 <latexrelease> \turn off etex tracing}%
548 <latexrelease>\let\tracingnone\@undefined
549 <latexrelease>\let\hideoutput\@undefined
550 <latexrelease>\EndIncludeInRelease

(End definition for \tracingnone and \hideoutput. These functions are documented on page ??.)
\LaTeX change: \showhyphens Defined later.
Punctuation affects the spacing.

551 <*2ekernel>
552 \nonfrenchspacing
553 </2ekernel>

```

## File c

# ltvers.dtx

## 1 Version Identification

First we identify the date and version number of this release of L<sup>A</sup>T<sub>E</sub>X, and set `\everyjob` so that it is printed at the start of every L<sup>A</sup>T<sub>E</sub>X run.

`\fmtname` A `\patch@level` of 0 or higher denotes an official public release. A negative value indicates a candidate release that is not distributed.

`\fmtversion`

`\latexreleaseversion` If we put code updates into the kernel that are supposed to go into the next release we set the `\patch@level` to -1 and the `\fmtversion` / `\latexreleaseversion` to the dated of the next release (guessed, the real value is not so important and will get corrected when we make the release official).

`\patch@level`

If the `\patch@level` is already at -1 we do nothing here and use the `\fmtversion` date for any new `\IncludeInRelease` line when we add further code.

Finally, if we do make a public release we either just set the `\patch@level` to zero (if our initial guess was good) or we also change the date and then have to additionally change to that date on all the `\IncludeInRelease` statements that used the “guessed” date.

```
1 <*2ekernel>
2 \def\fmtname{LaTeX2e}
3 \edef\fmtversion
4 </2ekernel>
5 <latexrelease>\edef\latexreleaseversion
6 <*2ekernel | latexrelease>
7 {2020-10-01}
8 </2ekernel | latexrelease>
9 <*2ekernel>
10 \def\patch@level{2}
```

For more fine grain control there is the possibility to name the current development branch. This is only used when the `\patch@level` is negative (i.e., a pre-release format) and is intended to help us internally when we locally install a format out of some development branch.

```
\development@branch@name 11 \edef\development@branch@name{}
```

*(End definition for `\fmtname` and others. These functions are documented on page ??.)*

Check that the format being made is not too old. The error message complains about ‘more than 5 years’ but in fact the error is not triggered until 65 months.

This code is currently not activated as we don’t know if we already got to the last official 2e version (due to staff shortage or due to a successor (think positive:-)).

```
12 \iffalse
13 \def\reserved@a#1/#2/#3\@nil{%
14   \count@ \year
15   \advance\count@-#1\relax
16   \multiply\count@ by 12\relax
17   \advance\count@ \month
18   \advance\count@-#2\relax}
19 \expandafter\reserved@a\fmtversion\@nil
```

```

20 \ifnum\count@>65
21   \typeout{^^J%
22   !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J%
23   ! You are attempting to make a LaTeX format from a source file^^J%
24   ! That is more than five years old.^^J%
25   !^^J%
26   ! If you enter <return> to scroll past this message then the format^^J%
27   ! will be built, but please consider obtaining newer source files^^J%
28   ! before continuing to build LaTeX.^^J%
29   !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J%
30 }
31 \errhelp{To avoid this error message, obtain new LaTeX sources.}
32 \errmessage{LaTeX source files more than 5 years old!}
33 \fi
34 \let\reserved@a\relax
35 \fi
36 \ifnum0\ifnum\patch@level=0 \ifx\development@branch@name\empty 1\fi\fi>0 %
37   \everyjob\expandafter{\the\everyjob
38     \typeout{\fmtname \space<\fmtversion>}}
39   \immediate
40   \write16{\fmtname \space<\fmtversion>}
41 \else\ifnum\patch@level>0
42   \everyjob\expandafter{\the\everyjob
43     \typeout{\fmtname \space<\fmtversion> patch level \patch@level}}
44   \immediate
45   \write16{\fmtname \space<\fmtversion> patch level \patch@level}
46 \else
47   \everyjob\expandafter{\the\everyjob
48     \typeout{\fmtname \space<\fmtversion> pre-release-\number-\patch@level\space
49       \ifx\development@branch@name\undefined \else
50         \ifx\development@branch@name\empty \else
51           \space (\development@branch@name\space branch)%
52         \fi
53       \fi
54     }}
55   \immediate
56   \write16{\fmtname \space<\fmtversion> pre-release-\number-\patch@level\space
57     \ifx\development@branch@name\undefined \else
58       \ifx\development@branch@name\empty \else
59         \space (\development@branch@name\space branch)%
60       \fi
61     \fi
62   }
63   \fi
64 \fi
65 </2ekernel>
66 <2ekernel>\let\currname\empty
67 (*2ekernel | latexrelease)

```



```

68 <latexrelease>\newif\if@includeinrelease
69 <latexrelease>\@includeinreleasefalse
70 \def\IncludeInRelease#1{%
71   \if@includeinrelease
72     \PackageError{latexrelease}{mis-matched IncludeInRelease}%
73       {There is an \string\EndIncludeRelease\space missing}%
74   \@includeinreleasefalse
75   \fi
76   \kernel@ifnextchar[%
77     {\@IncludeInRelease{#1}}
78     {\@IncludeInRelease{#1}[#1]}

```

If a specific date has not been specified in `latexrelease` use ‘#1’.

```

79 \def\@IncludeInRelease#1[#2]{\@IncludeInRelease#2}
80 \def\@IncludeInRelease#1#2#3{%
81   \toks@{[#1] #3}%
82   \expandafter\ifx\csname\string#2+\@currname+IIR\endcsname\relax

```

If we roll back and the first patch already match then applying that is actually reapplying what is already in the format, i.e., it is useless and possibly allocating new registers. However, it makes the logic simpler so this is the way it is for now. In theory we could always jump over the first patch because that is only really needed for rolling forward. So maybe one day ...

```

83   \ifnum\expandafter\@parse@version#1//00\@nil
84     >\expandafter\@parse@version\fmtversion//00\@nil
85     \GenericInfo{}{Skipping: \the\toks@}%
86     \expandafter\expandafter\expandafter\@gobble@IncludeInRelease
87   \else
88     \GenericInfo{}{Applying: \the\toks@}%
89     \@includeinreleasetrue
90     \expandafter\let\csname\string#2+\@currname+IIR\endcsname\@empty
91   \fi
92   \else
93     \GenericInfo{}{Already applied: \the\toks@}%
94     \expandafter\@gobble@IncludeInRelease
95   \fi
96 }
97 \def\EndIncludeInRelease{%
98   \if@includeinrelease
99     \@includeinreleasefalse
100   \else
101     \PackageError{latexrelease}{mis-matched EndIncludeInRelease}{}%
102   \fi}
103 \long\def\@gobble@IncludeInRelease#1\EndIncludeInRelease{%
104   \@includeinreleasefalse
105   \@check@IncludeInRelease#1\IncludeInRelease\@check@IncludeInRelease
106   \@end@check@IncludeInRelease}
107 \long\def\@check@IncludeInRelease#1\IncludeInRelease
108   #2#3\@end@check@IncludeInRelease{%
109   \ifx\@check@IncludeInRelease#2\else
110     \PackageError{latexrelease}{skipped IncludeInRelease for tag \string#2}{}%
111   \fi}

```

<sup>112</sup> `</2ekernel | latexrelease>`

*(End definition for `\IncludeInRelease`. This function is documented on page ??.)*

# File d

## lualatex.dtx

### 1 Overview

LuaTeX adds a number of engine-specific functions to TeX. Several of these require set up that is best done in the kernel or need related support functions. This file provides *basic* support for LuaTeX at the L<sup>A</sup>T<sub>Ε</sub>X 2<sub>ε</sub> kernel level plus as a loadable file which can be used with plain TeX and L<sup>A</sup>T<sub>Ε</sub>X.

This file contains code for both TeX (to be stored as part of the format) and Lua (to be loaded at the start of each job). In the Lua code, the kernel uses the namespace `luatexbase`.

The following `\count` registers are used here for register allocation:

```
\e@alloc@attribute@count Attributes (default 258)
\e@alloc@ccodetable@count Category code tables (default 259)
\e@alloc@luafunction@count Lua functions (default 260)
  \e@alloc@whatsit@count User whatsits (default 261)
  \e@alloc@bytecode@count Lua bytecodes (default 262)
  \e@alloc@luachunk@count Lua chunks (default 263)
```

(`\count 256` is used for `\newmarks` allocation and `\count 257` is used for `\newXeTeXintercharclass` with XeTeX, with code defined in `ltxfinal.dtx`). With any L<sup>A</sup>T<sub>Ε</sub>X 2<sub>ε</sub> kernel from 2015 onward these registers are part of the block in the extended area reserved by the kernel (prior to 2015 the L<sup>A</sup>T<sub>Ε</sub>X 2<sub>ε</sub> kernel did not provide any functionality for the extended allocation area).

### 2 Core TeX functionality

The commands defined here are defined for possible inclusion in a future L<sup>A</sup>T<sub>Ε</sub>X format, however also extracted to the file `lualatex.tex` which may be used with older L<sup>A</sup>T<sub>Ε</sub>X formats, and with plain TeX.

<code>\newattribute</code>	<code>\newattribute{&lt;attribute&gt;}</code> Defines a named <code>\attribute</code> , indexed from 1 ( <i>i.e.</i> <code>\attribute0</code> is never defined). Attributes initially have the marker value <code>-"7FFFFFFF</code> ('unset') set by the engine.
<code>\newcatcodetable</code>	<code>\newcatcodetable{&lt;catcodetable&gt;}</code> Defines a named <code>\catcodetable</code> , indexed from 1 ( <code>\catcodetable0</code> is never assigned). A new catcode table will be populated with exactly those values assigned by IniTeX (as described in the LuaTeX manual).
<code>\newluafunction</code>	<code>\newluafunction{&lt;function&gt;}</code> Defines a named <code>\luafunction</code> , indexed from 1. (Lua indexes tables from 1 so <code>\luafunction0</code> is not available).
<code>\newwhatsit</code>	<code>\newwhatsit{&lt;whatsit&gt;}</code> Defines a custom <code>\whatsit</code> , indexed from 1.
<code>\newluabytecode</code>	<code>\newluabytecode{&lt;bytecode&gt;}</code>

	Allocates a number for Lua bytecode register, indexed from 1.
<code>\newluachunkname</code>	<code>newluachunkname{⟨chunkname⟩}</code> Allocates a number for Lua chunk register, indexed from 1. Also enters the name of the register (without backslash) into the <code>lua.name</code> table to be used in stack traces.
<code>\catcodetable@initex</code>	Predefined category code tables with the obvious assignments. Note that the <code>latex</code> and
<code>\catcodetable@string</code>	<code>atletter</code> tables set the full Unicode range to the codes predefined by the kernel.
<code>\catcodetable@latex</code>	<code>\setattribute{⟨attribute⟩}{⟨value⟩}</code>
<code>\catcodetable@atletter</code>	<code>\unsetattribute{⟨attribute⟩}</code>
<code>\setattribute</code>	Set and unset attributes in a manner analogous to <code>\setlength</code> . Note that attributes
<code>\unsetattribute</code>	take a marker value when unset so this operation is distinct from setting the value to zero.

### 3 Plain T<sub>E</sub>X interface

The `luatex` interface may be used with plain T<sub>E</sub>X using `\input{luatex}`. This inputs `luatex.tex` which inputs `etex.src` (or `etex.sty` if used with L<sup>A</sup>T<sub>E</sub>X) if it is not already input, and then defines some internal commands to allow the `luatex` interface to be defined.

The `luatexbase` package interface may also be used in plain T<sub>E</sub>X, as before, by inputting the package `\input luatexbase.sty`. The new version of `luatexbase` is based on this `luatex` code but implements a compatibility layer providing the interface of the original package.

## 4 Lua functionality

### 4.1 Allocators in Lua

<code>new_attribute</code>	<code>luatexbase.new_attribute(⟨attribute⟩)</code> Returns an allocation number for the <code>⟨attribute⟩</code> , indexed from 1. The attribute will be initialised with the marker value <code>-"7FFFFFFF</code> ('unset'). The attribute allocation sequence is shared with the T <sub>E</sub> X code but this function does <i>not</i> define a token using <code>\attributedef</code> . The attribute name is recorded in the <code>attributes</code> table. A metatable is provided so that the table syntax can be used consistently for attributes declared in T <sub>E</sub> X or Lua.
<code>new_whatsit</code>	<code>luatexbase.new_whatsit(⟨whatsit⟩)</code> Returns an allocation number for the custom <code>⟨whatsit⟩</code> , indexed from 1.
<code>new_bytecode</code>	<code>luatexbase.new_bytecode(⟨bytecode⟩)</code> Returns an allocation number for a bytecode register, indexed from 1. The optional <code>⟨name⟩</code> argument is just used for logging.
<code>new_chunkname</code>	<code>luatexbase.new_chunkname(⟨chunkname⟩)</code> Returns an allocation number for a Lua chunk name for use with <code>\directlua</code> and <code>\latelua</code> , indexed from 1. The number is returned and also <code>⟨name⟩</code> argument is added to the <code>lua.name</code> array at that index.
<code>new_luafunction</code>	<code>luatexbase.new_luafunction(⟨functionname⟩)</code> Returns an allocation number for a lua function for use with <code>\luafunction</code> , <code>\lateluafunction</code> , and <code>\lua<sub>def</sub></code> , indexed from 1. The optional <code>⟨functionname⟩</code> argument is just used for logging.

These functions all require access to a named T<sub>E</sub>X count register to manage their allocations. The standard names are those defined above for access from T<sub>E</sub>X,

e.g. `\e@alloc@attribute@count`, but these can be adjusted by defining the variable `\type_count_name` before loading `ltxlua.tex`, for example

```
local attribute_count_name = "attributetracker"
require("ltxlua")
```

would use a  $\TeX$  `\count` (`\countdef`'d token) called `attributetracker` in place of `\e@alloc@attribute@count`.

## 4.2 Lua access to $\TeX$ register numbers

`registernumber` `luaTeXbase.registernumber(<name>)`

Sometimes (notably in the case of Lua attributes) it is necessary to access a register *by number* that has been allocated by  $\TeX$ . This package provides a function to look up the relevant number using Lua $\TeX$ 's internal tables. After for example `\newattribute\myattrib, \myattrib` would be defined by (say) `\myattrib=\attribute15`. `luaTeXbase.registernumber("myattrib")` would then return the register number, 15 in this case. If the string passed as argument does not correspond to a token defined by `\attributedef`, `\countdef` or similar commands, the Lua value `false` is returned.

As an example, consider the input:

```
\newcommand\test[1]{%
\typeout{#1: \expandafter\meaning\csname#1\endcsname^^J
\space\space\space\space
\directlua{tex.write(luaTeXbase.registernumber("#1") or "bad input")}%
}}

\test{undefinedrubbish}

\test{space}

\test{hbox}

\test{@MM}

\test{@tempdima}
\test{@tempdimb}

\test{strutbox}

\test{sixt@@n}

\attributedef\myattr=12
\myattr=200
\test{myattr}
```

If the demonstration code is processed with Lua $\TeX$  then the following would be produced in the log and terminal output.

```
undefinedrubbish: \relax
      bad input
```

```

space: macro:->
    bad input
hbox: \hbox
    bad input
@MM: \mathchar"4E20
    20000
@tempdima: \dimen14
    14
@tempdimb: \dimen15
    15
strutbox: \char"B
    11
sist@@n: \char"10
    16
myattr: \attribute12
    12

```

Notice how undefined commands, or commands unrelated to registers do not produce an error, just return `false` and so print `bad input` here. Note also that commands defined by `\newbox` work and return the number of the box register even though the actual command holding this number is a `\chardef` defined token (there is no `\boxdef`).

### 4.3 Module utilities

`provides_module` `luatexbase.provides_module(<info>)`

This function is used by modules to identify themselves; the `info` should be a table containing information about the module. The required field `name` must contain the name of the module. It is recommended to provide a field `date` in the usual L<sup>A</sup>T<sub>E</sub>X format `yyyy/mm/dd`. Optional fields `version` (a string) and `description` may be used if present. This information will be recorded in the log. Other fields are ignored.

`module_info` `luatexbase.module_info(<module>, <text>)`

`module_warning` `luatexbase.module_warning(<module>, <text>)`

`module_error` `luatexbase.module_error(<module>, <text>)`

These functions are similar to L<sup>A</sup>T<sub>E</sub>X's `\PackageError`, `\PackageWarning` and `\PackageInfo` in the way they format the output. No automatic line breaking is done, you may still use `\n` as usual for that, and the name of the package will be prepended to each output line.

Note that `luatexbase.module_error` raises an actual Lua error with `error()`, which currently means a call stack will be dumped. While this may not look pretty, at least it provides useful information for tracking the error down.

### 4.4 Callback management

`add_to_callback` `luatexbase.add_to_callback(<callback>, <function>, <description>)` Registers the *<function>* into the *<callback>* with a textual *<description>* of the function. Functions are inserted into the callback in the order loaded.

`remove_from_callback` `luatexbase.remove_from_callback(<callback>, <description>)` Removes the callback function with *<description>* from the *<callback>*. The removed function and its description are returned as the results of this function.

`in_callback` `luatexbase.in_callback(<callback>, <description>)` Checks if the *<description>* matches one of the functions added to the list for the *<callback>*, returning a boolean value.

<code>disable_callback</code>	<code>luatexbase.disable_callback(&lt;callback&gt;)</code> Sets the <code>&lt;callback&gt;</code> to <code>false</code> as described in the LuaTeX manual for the underlying <code>callback.register</code> built-in. Callbacks will only be set to false (and thus be skipped entirely) if there are no functions registered using the callback.
<code>callback_descriptions</code>	A list of the descriptions of functions registered to the specified callback is returned. <code>{}</code> is returned if there are no functions registered.
<code>create_callback</code>	<code>luatexbase.create_callback(&lt;name&gt;,metatype,&lt;default&gt;)</code> Defines a user defined callback. The last argument is a default function or <code>false</code> .
<code>call_callback</code>	<code>luatexbase.call_callback(&lt;name&gt;,...)</code> Calls a user defined callback with the supplied arguments.

## 5 Implementation

```

1 <*2ekernel | tex | latexrelease>
2 <2ekernel | latexrelease>\ifx\directlua\@undefined\else

```

### 5.1 Minimum LuaTeX version

LuaTeX has changed a lot over time. In the kernel support for ancient versions is not provided: trying to build a format with a very old binary therefore gives some information in the log and loading stops. The cut-off selected here relates to the tree-searching behaviour of `require()`: from version 0.60, LuaTeX will correctly find Lua files in the `texmf` tree without ‘help’.

```

3 <latexrelease>\IncludeInRelease{2015/10/01}
4 <latexrelease>                {\newluafunction}{LuaTeX}%
5 \ifnum\luatexversion<60 %
6   \wlog{*****}
7   \wlog{* LuaTeX version too old for ltuatex support *}
8   \wlog{*****}
9   \expandafter\endinput
10 \fi

```

Two simple L<sup>A</sup>T<sub>E</sub>X macros from `ltdfn.s.dtx` have to be defined here because `ltdfn.s.dtx` is not loaded yet when `ltluatex.dtx` is executed.

```

11 \long\def\@gobble#1{}
12 \long\def\@firstofone#1{#1}

```

### 5.2 Older L<sup>A</sup>T<sub>E</sub>X/Plain T<sub>E</sub>X setup

```

13 <*tex>

```

Older L<sup>A</sup>T<sub>E</sub>X formats don’t have the primitives with ‘native’ names: sort that out. If they already exist this will still be safe.

```

14 \directlua{tex.enableprimitives("",tex.extraprimitives("luatex"))}
15 \ifx\@alloc\@undefined

```

In pre-2014 L<sup>A</sup>T<sub>E</sub>X, or plain T<sub>E</sub>X, load `etex.{sty,src}`.

```

16 \ifx\documentclass\@undefined
17   \ifx\loccount\@undefined
18     \input{etex.src}%
19   \fi
20   \catcode'\@=11 %
21   \outer\expandafter\def\csname newfam\endcsname

```

```

22                                     {\alloc@8\fam\chardef\et@xmaxfam}
23 \else
24   \RequirePackage{etex}
25   \expandafter\def\csname newfam\endcsname
26                                     {\alloc@8\fam\chardef\et@xmaxfam}
27   \expandafter\let\expandafter\new@mathgroup\csname newfam\endcsname
28 \fi

```

### 5.2.1 Fixes to etex.src/etex.sty

These could and probably should be made directly in an update to `etex.src` which already has some LuaTeX-specific code, but does not define the correct range for LuaTeX. 2015-07-13 higher range in luatex.

```

29 \edef \et@xmaxregs {\ifx\directlua\@undefined 32768\else 65536\fi}

```

luatex/xetex also allow more math fam.

```

30 \edef \et@xmaxfam {\ifx\Umathcode\@undefined\sixt@@n\else\ccclvi\fi}
31 \count 270=\et@xmaxregs % locally allocates \count registers
32 \count 271=\et@xmaxregs % ditto for \dimen registers
33 \count 272=\et@xmaxregs % ditto for \skip registers
34 \count 273=\et@xmaxregs % ditto for \muskip registers
35 \count 274=\et@xmaxregs % ditto for \box registers
36 \count 275=\et@xmaxregs % ditto for \toks registers
37 \count 276=\et@xmaxregs % ditto for \marks classes

```

and 256 or 16 fam. (Done above due to plain/LaTeX differences in ltuatex.)

```

38 % \outer\def\newfam{\alloc@8\fam\chardef\et@xmaxfam}

```

End of proposed changes to `etex.src`

### 5.2.2 luatex specific settings

Switch to global cf `luatex.sty` to leave room for inserts not really needed for luatex but possibly most compatible with existing use.

```

39 \expandafter\let\csname newcount\expandafter\expandafter\endcsname
40   \csname globcount\endcsname
41 \expandafter\let\csname newdimen\expandafter\expandafter\endcsname
42   \csname globdimen\endcsname
43 \expandafter\let\csname newskip\expandafter\expandafter\endcsname
44   \csname globskip\endcsname
45 \expandafter\let\csname newbox\expandafter\expandafter\endcsname
46   \csname globbox\endcsname

```

Define `\e@alloc` as in latex (the existing macros in `etex.src` hard to extend to further register types as they assume specific 26x and 27x count range. For compatibility the existing register allocation is not changed.

```

47 \chardef\e@alloc@top=65535
48 \let\e@alloc\chardef\chardef
49 \def\e@alloc#1#2#3#4#5#6{%
50   \global\advance#3\@ne
51   \e@ch@ck{#3}{#4}{#5}#1%
52   \allocationnumber#3\relax
53   \global#2#6\allocationnumber
54   \wlog{\string#6=\string#1\the\allocationnumber}}%

```



```

55 \gdef\@ch@ck#1#2#3#4{%
56   \ifnum#1<#2\else
57     \ifnum#1=#2\relax
58       #1\@cclvi
59       \ifx\count#4\advance#1 10 \fi
60     \fi
61     \ifnum#1<#3\relax
62     \else
63       \errmessage{No room for a new \string#4}%
64     \fi
65   \fi}%

```

Fix up allocations not to clash with `etex.src`.

```

66 \expandafter\csname newcount\endcsname\@alloc@attribute@count
67 \expandafter\csname newcount\endcsname\@alloc@ccodetable@count
68 \expandafter\csname newcount\endcsname\@alloc@luafunction@count
69 \expandafter\csname newcount\endcsname\@alloc@whatsit@count
70 \expandafter\csname newcount\endcsname\@alloc@bytecode@count
71 \expandafter\csname newcount\endcsname\@alloc@luachunk@count

```

End of conditional setup for plain T<sub>E</sub>X / old L<sup>A</sup>T<sub>E</sub>X.

```

72 \fi
73 \</tex>

```

### 5.3 Attributes

`\newattribute` As is generally the case for the LuaT<sub>E</sub>X registers we start here from 1. Notably, some code assumes that `\attribute0` is never used so this is important in this case.

```

74 \ifx\@alloc@attribute@count\@undefined
75   \countdef\@alloc@attribute@count=258
76   \@alloc@attribute@count=\z@
77 \fi
78 \def\newattribute#1{%
79   \@alloc@attribute\attributedef
80   \@alloc@attribute@count\m@ne\@alloc@top#1%
81 }

```

(End definition for `\newattribute`. This function is documented on page ??.)

`\setattribute` Handy utilities.  
`\unsetattribute`

```

82 \def\setattribute#1#2{#1=\numexpr#2\relax}
83 \def\unsetattribute#1{#1=-"7FFFFFFF\relax}

```

(End definition for `\setattribute` and `\unsetattribute`. These functions are documented on page ??.)

### 5.4 Category code tables

`\newcatcodetable` Category code tables are allocated with a limit half of that used by LuaT<sub>E</sub>X for everything else. At the end of allocation there needs to be an initialisation step. Table 0 is already taken (it's the global one for current use) so the allocation starts at 1.

```

84 \ifx\@alloc@ccodetable@count\@undefined
85   \countdef\@alloc@ccodetable@count=259
86   \@alloc@ccodetable@count=\z@
87 \fi

```

```

88 \def\newcatcodetable#1{%
89   \e@alloc\catcodetable\chardef
90   \e@alloc\ccodetable@count\m@ne{"8000}#1%
91   \initcatcodetable\allocationnumber
92 }

```

(End definition for \newcatcodetable. This function is documented on page ??.)

```

\catcodetable@initex Save a small set of standard tables. The Unicode data is read here in using a parser sim-
\catcodetable@string plified from that in load-unicode-data: only the nature of letters needs to be detected.
\catcodetable@latex
\catcodetable@atletter
93 \newcatcodetable\catcodetable@initex
94 \newcatcodetable\catcodetable@string
95 \begingroup
96   \def\setrangecatcode#1#2#3{%
97     \ifnum#1>#2 %
98       \expandafter\@gobble
99     \else
100       \expandafter\@firstofone
101     \fi
102     {%
103       \catcode#1=#3 %
104       \expandafter\setrangecatcode\expandafter
105       {\number\numexpr#1 + 1\relax}{#2}{#3}
106     }%
107   }
108   \@firstofone{%
109     \catcodetable\catcodetable@initex
110     \catcode0=12 %
111     \catcode13=12 %
112     \catcode37=12 %
113     \setrangecatcode{65}{90}{12}%
114     \setrangecatcode{97}{122}{12}%
115     \catcode92=12 %
116     \catcode127=12 %
117     \savecatcodetable\catcodetable@string
118   \endgroup
119   }%
120 \newcatcodetable\catcodetable@latex
121 \newcatcodetable\catcodetable@atletter
122 \begingroup
123   \def\parseunicodedataI#1;#2;#3;#4\relax{%
124     \parseunicodedataII#1;#3;#2 First>\relax
125   }%
126   \def\parseunicodedataII#1;#2;#3 First>#4\relax{%
127     \ifx\relax#4\relax
128       \expandafter\parseunicodedataIII
129     \else
130       \expandafter\parseunicodedataIV
131     \fi
132     {#1}#2\relax%
133   }%
134   \def\parseunicodedataIII#1#2#3\relax{%
135     \ifnum 0%
136     \if L#21\fi

```

```

137     \if M#21\fi
138     >0 %
139     \catcode"#1=11 %
140     \fi
141 }%
142 \def\parseunicodedataIV#1#2#3\relax{%
143     \read\unicoderead to \unicodedataline
144     \if L#2%
145         \count0="#1 %
146         \expandafter\parseunicodedataV\unicodedataline\relax
147     \fi
148 }%
149 \def\parseunicodedataV#1;#2\relax{%
150     \loop
151         \unless\ifnum\count0>"#1 %
152             \catcode\count0=11 %
153             \advance\count0 by 1 %
154     \repeat
155 }%
156 \def\storedpar{\par}%
157 \chardef\unicoderead=\numexpr\count16 + 1\relax
158 \openin\unicoderead=UnicodeData.txt %
159 \loop\unless\ifeof\unicoderead %
160     \read\unicoderead to \unicodedataline
161     \unless\ifx\unicodedataline\storedpar
162         \expandafter\parseunicodedataI\unicodedataline\relax
163     \fi
164 \repeat
165 \closein\unicoderead
166 \@firstofone{%
167     \catcode64=12 %
168     \savecatcodetable\catcodetable@latex
169     \catcode64=11 %
170     \savecatcodetable\catcodetable@atletter
171 }
172 \endgroup

```

(End definition for \catcodetable@initex and others. These functions are documented on page ??.)

## 5.5 Named Lua functions

`\newluafunction` Much the same story for allocating Lua<sub>TEX</sub> functions except here they are just numbers so they are allocated in the same way as boxes. Lua indexes from 1 so once again slot 0 is skipped.

```

173 \ifx\e@alloc@luafunction@count\undefined
174     \countdef\e@alloc@luafunction@count=260
175     \e@alloc@luafunction@count=\z@
176 \fi
177 \def\newluafunction{%
178     \e@alloc@luafunction\e@alloc@chardef
179     \e@alloc@luafunction@count\m@ne\e@alloc@top
180 }

```

(End definition for \newluafunction. This function is documented on page ??.)

## 5.6 Custom whatsits

`\newwhatsit` These are only settable from Lua but for consistency are definable here.

```
181 \ifx\e@alloc@whatsit@count\@undefined
182   \countdef\e@alloc@whatsit@count=261
183   \e@alloc@whatsit@count=\z@
184 \fi
185 \def\newwhatsit#1{%
186   \e@alloc@whatsit\e@alloc@chardef
187   \e@alloc@whatsit@count\m@ne\e@alloc@top#1%
188 }
```

*(End definition for \newwhatsit. This function is documented on page ??.)*

## 5.7 Lua bytecode registers

`\newluabytocode` These are only settable from Lua but for consistency are definable here.

```
189 \ifx\e@alloc@bytocode@count\@undefined
190   \countdef\e@alloc@bytocode@count=262
191   \e@alloc@bytocode@count=\z@
192 \fi
193 \def\newluabytocode#1{%
194   \e@alloc@luabytocode\e@alloc@chardef
195   \e@alloc@bytocode@count\m@ne\e@alloc@top#1%
196 }
```

*(End definition for \newluabytocode. This function is documented on page ??.)*

## 5.8 Lua chunk registers

`\newluachunkname` As for bytecode registers, but in addition we need to add a string to the `lua.name` table to use in stack tracing. We use the name of the command passed to the allocator, with no backslash.

```
197 \ifx\e@alloc@luachunk@count\@undefined
198   \countdef\e@alloc@luachunk@count=263
199   \e@alloc@luachunk@count=\z@
200 \fi
201 \def\newluachunkname#1{%
202   \e@alloc@luachunk\e@alloc@chardef
203   \e@alloc@luachunk@count\m@ne\e@alloc@top#1%
204   {\escapechar\m@ne
205    \directlua{lua.name[\the\allocationnumber]="\string#1"}}%
206 }
```

*(End definition for \newluachunkname. This function is documented on page ??.)*

## 5.9 Lua loader

Lua code loaded in the format often has to be loaded again at the beginning of every job, so we define a helper which allows us to avoid duplicated code:

```
207 \def\now@and@everyjob#1{%
208   \everyjob\expandafter{\the\everyjob
209     #1%
```

```

210 }%
211 #1%
212 }

```

Load the Lua code at the start of every job. For the conversion of T<sub>E</sub>X into numbers at the Lua side we need some known registers: for convenience we use a set of systematic names, which means using a group around the Lua loader.

```

213 <2ekernel>\now@and@everyjob{%
214   \begingroup
215     \attributedef\attributezero=0 %
216     \chardef      \charzero      =0 %

```

Note name change required on older luatex, for hash table access.

```

217     \countdef      \CountZero    =0 %
218     \dimendef      \dimenzero    =0 %
219     \mathchardef    \mathcharzero=0 %
220     \muskipdef      \muskipzero   =0 %
221     \skipdef        \skipzero     =0 %
222     \toksdef        \tokszero     =0 %
223     \directlua{require("ltnatex")}
224   \endgroup
225 <2ekernel>}
226 <latexrelease>\EndIncludeInRelease

227 <latexrelease>\IncludeInRelease{0000/00/00}
228 <latexrelease>          {\newluafunction}{LuaTeX}%
229 <latexrelease>\let\@alloc@attribute@count\@undefined
230 <latexrelease>\let\newattribute\@undefined
231 <latexrelease>\let\setattribute\@undefined
232 <latexrelease>\let\unsetattribute\@undefined
233 <latexrelease>\let\@alloc@ccodetable@count\@undefined
234 <latexrelease>\let\newcatcodetable\@undefined
235 <latexrelease>\let\catcodetable@initex\@undefined
236 <latexrelease>\let\catcodetable@string\@undefined
237 <latexrelease>\let\catcodetable@latex\@undefined
238 <latexrelease>\let\catcodetable@atletter\@undefined
239 <latexrelease>\let\@alloc@luafunction@count\@undefined
240 <latexrelease>\let\newluafunction\@undefined
241 <latexrelease>\let\@alloc@luafunction@count\@undefined
242 <latexrelease>\let\newwhatsit\@undefined
243 <latexrelease>\let\@alloc@whatsit@count\@undefined
244 <latexrelease>\let\newluabytcode\@undefined
245 <latexrelease>\let\@alloc@bytcode@count\@undefined
246 <latexrelease>\let\newluachunkname\@undefined
247 <latexrelease>\let\@alloc@luachunk@count\@undefined
248 <latexrelease>\directlua{luatexbase.uninstall()}
249 <latexrelease>\EndIncludeInRelease

```

In \everyjob, if luaotfload is available, load it and switch to TU.

```

250 <latexrelease>\IncludeInRelease{2017/01/01}%
251 <latexrelease>          {\fontencoding}{TU in everyjob}%
252 <latexrelease>\fontencoding{TU}\let\encodingdefault\fontencoding
253 <latexrelease>\ifx\directlua\@undefined\else
254 <2ekernel>\everyjob\expandafter{%
255 <2ekernel>  \the\everyjob

```

```

256 <*2kernel, latexrelease>
257   \directlua{%
258   if xpcall(function ()%
259             require('luaotfload-main')%
260             end, texio.write_nl) then %
261     local _void = luaotfload.main ()%
262     else %
263     texio.write_nl('Error in luaotfload: reverting to OT1')%
264     tex.print('\string\def\string\encodingdefault{OT1}')%
265     end %
266   }%
267   \let\f@encoding\encodingdefault
268   \expandafter\let\csname ver@luaotfload.sty\endcsname\fmtversion
269 </2kernel, latexrelease>
270 <latexrelease>\fi
271 <2kernel> }
272 <latexrelease>\EndIncludeInRelease
273 <latexrelease>\IncludeInRelease{0000/00/00}%
274 <latexrelease>          {\fontencoding}{TU in everyjob}%
275 <latexrelease>\fontencoding{OT1}\let\encodingdefault\f@encoding
276 <latexrelease>\EndIncludeInRelease
277 <2kernel | latexrelease>\fi
278 </2kernel | tex | latexrelease>

```

## 5.10 Lua module preliminaries

```

279 <*lua>

```

Some set up for the Lua module which is needed for all of the Lua functionality added here.

**luatexbase** Set up the table for the returned functions. This is used to expose all of the public functions.

```

280 luatexbase      = luatexbase or { }
281 local luatexbase = luatexbase

```

*(End definition for luatexbase. This function is documented on page ??.)*

Some Lua best practice: use local versions of functions where possible.

```

282 local string_gsub      = string.gsub
283 local tex_count        = tex.count
284 local tex_setattribute = tex.setattribute
285 local tex_setcount     = tex.setcount
286 local texio_write_nl   = texio.write_nl

287 local luatexbase_warning
288 local luatexbase_error

```

## 5.11 Lua module utilities

### 5.11.1 Module tracking

**modules** To allow tracking of module usage, a structure is provided to store information and to return it.

```

289 local modules = modules or { }

```

(End definition for modules. This function is documented on page ??.)

`provides_module` Local function to write to the log.

```
290 local function luatexbase_log(text)
291     texio_write_nl("log", text)
292 end
```

Modelled on `\ProvidesPackage`, we store much the same information but with a little more structure.

```
293 local function provides_module(info)
294     if not (info and info.name) then
295         luatexbase_error("Missing module name for provides_module")
296     end
297     local function spaced(text)
298         return text and (" " .. text) or ""
299     end
300     luatexbase_log(
301         "Lua module: " .. info.name
302         .. spaced(info.date)
303         .. spaced(info.version)
304         .. spaced(info.description)
305     )
306     modules[info.name] = info
307 end
308 luatexbase.provides_module = provides_module
```

(End definition for `provides_module`. This function is documented on page ??.)

### 5.11.2 Module messages

There are various warnings and errors that need to be given. For warnings we can get exactly the same formatting as from  $\TeX$ . For errors we have to make some changes. Here we give the text of the error in the  $\LaTeX$  format then force an error from Lua to halt the run. Splitting the message text is done using `\n` which takes the place of `\MessageBreak`.

First an auxiliary for the formatting: this measures up the message leader so we always get the correct indent.

```
309 local function msg_format(mod, msg_type, text)
310     local leader = ""
311     local cont
312     local first_head
313     if mod == "LaTeX" then
314         cont = string_gsub(leader, ".", " ")
315         first_head = leader .. "LaTeX: "
316     else
317         first_head = leader .. "Module " .. msg_type
318         cont = "(" .. mod .. ")"
319         .. string_gsub(first_head, ".", " ")
320         first_head = leader .. "Module " .. mod .. " " .. msg_type .. ":"
321     end
322     if msg_type == "Error" then
323         first_head = "\n" .. first_head
324     end
325     if string.sub(text,-1) ~= "\n" then
```

```

326     text = text .. " "
327 end
328 return first_head .. " "
329     .. string_gsub(
330         text
331     .. "on input line "
332         .. tex.inputlineno, "\n", "\n" .. cont .. " "
333     )
334     .. "\n"
335 end

module_info Write messages.
module_warning 336 local function module_info(mod, text)
module_error 337     texio_write_nl("log", msg_format(mod, "Info", text))
338 end
339 luatexbase.module_info = module_info
340 local function module_warning(mod, text)
341     texio_write_nl("term and log", msg_format(mod, "Warning", text))
342 end
343 luatexbase.module_warning = module_warning
344 local function module_error(mod, text)
345     error(msg_format(mod, "Error", text))
346 end
347 luatexbase.module_error = module_error

(End definition for module_info, module_warning, and module_error. These functions are documented
on page ??.)

Dedicated versions for the rest of the code here.

348 function luatexbase_warning(text)
349     module_warning("luatexbase", text)
350 end
351 function luatexbase_error(text)
352     module_error("luatexbase", text)
353 end

```

## 5.12 Accessing register numbers from Lua

Collect up the data from the T<sub>E</sub>X level into a Lua table: from version 0.80, LuaT<sub>E</sub>X makes that easy.

```

354 local luaregisterbasetable = { }
355 local registermap = {
356     attributezero = "assign_attr"    ,
357     charzero      = "char_given"     ,
358     CountZero     = "assign_int"     ,
359     dimenzero     = "assign_dimen"   ,
360     mathcharzero  = "math_given"     ,
361     muskipzero    = "assign_mu_skip" ,
362     skipzero      = "assign_skip"    ,
363     tokszero      = "assign_toks"    ,
364 }
365 local createtoken
366 if tex.luatexversion > 81 then
367     createtoken = token.create
368 elseif tex.luatexversion > 79 then

```



```

369   createtoken = newtoken.create
370 end
371 local hashtokens = tex.hashtokens()
372 local luatexversion = tex.luatexversion
373 for i,j in pairs (registermap) do
374   if luatexversion < 80 then
375     luaregisterbasetable[hashtokens[i][1]] =
376       hashtokens[i][2]
377   else
378     luaregisterbasetable[j] = createtoken(i).mode
379   end
380 end

```

**registernumber** Working out the correct return value can be done in two ways. For older LuaTeX releases it has to be extracted from the `hashtokens`. On the other hand, newer LuaTeX's have `newtoken`, and whilst `.mode` isn't currently documented, Hans Hagen pointed to this approach so we should be OK.

```

381 local registernumber
382 if luatexversion < 80 then
383   function registernumber(name)
384     local nt = hashtokens[name]
385     if (nt and luaregisterbasetable[nt[1]]) then
386       return nt[2] - luaregisterbasetable[nt[1]]
387     else
388       return false
389     end
390   end
391 else
392   function registernumber(name)
393     local nt = createtoken(name)
394     if (luaregisterbasetable[nt.cmdname]) then
395       return nt.mode - luaregisterbasetable[nt.cmdname]
396     else
397       return false
398     end
399   end
400 end
401 luatexbase.registernumber = registernumber

```

*(End definition for `registernumber`. This function is documented on page ??.)*

## 5.13 Attribute allocation

**new\_attribute** As attributes are used for Lua manipulations its useful to be able to assign from this end.

```

402 local attributes=setmetatable(
403   {},
404   {
405     __index = function(t,key)
406       return registernumber(key) or nil
407     end}
408 )
409 luatexbase.attributes = attributes

```

```

410 local attribute_count_name =
411     attribute_count_name or "e@alloc@attribute@count"
412 local function new_attribute(name)
413     tex_setcount("global", attribute_count_name,
414         tex_count[attribute_count_name] + 1)
415     if tex_count[attribute_count_name] > 65534 then
416         luatexbase_error("No room for a new \\attribute")
417     end
418     attributes[name]= tex_count[attribute_count_name]
419     luatexbase_log("Lua-only attribute " .. name .. " = " ..
420         tex_count[attribute_count_name])
421     return tex_count[attribute_count_name]
422 end
423 luatexbase.new_attribute = new_attribute

```

(End definition for `new_attribute`. This function is documented on page ??.)

## 5.14 Custom whatsit allocation

`new_whatsit` Much the same as for attribute allocation in Lua.

```

424 local whatsit_count_name = whatsit_count_name or "e@alloc@whatsit@count"
425 local function new_whatsit(name)
426     tex_setcount("global", whatsit_count_name,
427         tex_count[whatsit_count_name] + 1)
428     if tex_count[whatsit_count_name] > 65534 then
429         luatexbase_error("No room for a new custom whatsit")
430     end
431     luatexbase_log("Custom whatsit " .. (name or "") .. " = " ..
432         tex_count[whatsit_count_name])
433     return tex_count[whatsit_count_name]
434 end
435 luatexbase.new_whatsit = new_whatsit

```

(End definition for `new_whatsit`. This function is documented on page ??.)

## 5.15 Bytecode register allocation

`new_bytecode` Much the same as for attribute allocation in Lua. The optional  $\langle name \rangle$  argument is used in the log if given.

```

436 local bytecode_count_name =
437     bytecode_count_name or "e@alloc@bytecode@count"
438 local function new_bytecode(name)
439     tex_setcount("global", bytecode_count_name,
440         tex_count[bytecode_count_name] + 1)
441     if tex_count[bytecode_count_name] > 65534 then
442         luatexbase_error("No room for a new bytecode register")
443     end
444     luatexbase_log("Lua bytecode " .. (name or "") .. " = " ..
445         tex_count[bytecode_count_name])
446     return tex_count[bytecode_count_name]
447 end
448 luatexbase.new_bytecode = new_bytecode

```

(End definition for `new_bytecode`. This function is documented on page ??.)

## 5.16 Lua chunk name allocation

`new_chunkname` As for bytecode registers but also store the name in the `lua.name` table.

```
449 local chunkname_count_name =  
450     chunkname_count_name or "e@alloc@luachunk@count"  
451 local function new_chunkname(name)  
452     tex_setcount("global", chunkname_count_name,  
453         tex_count[chunkname_count_name] + 1)  
454     local chunkname_count = tex_count[chunkname_count_name]  
455     chunkname_count = chunkname_count + 1  
456     if chunkname_count > 65534 then  
457         luatexbase_error("No room for a new chunkname")  
458     end  
459     lua.name[chunkname_count]=name  
460     luatexbase_log("Lua chunkname " .. (name or "") .. " = " ..  
461         chunkname_count .. "\n")  
462     return chunkname_count  
463 end  
464 luatexbase.new_chunkname = new_chunkname
```

*(End definition for new\_chunkname. This function is documented on page ??.)*

## 5.17 Lua function allocation

`new_luafunction` Much the same as for attribute allocation in Lua. The optional  $\langle name \rangle$  argument is used in the log if given.

```
465 local luafunction_count_name =  
466     luafunction_count_name or "e@alloc@luafunction@count"  
467 local function new_luafunction(name)  
468     tex_setcount("global", luafunction_count_name,  
469         tex_count[luafunction_count_name] + 1)  
470     if tex_count[luafunction_count_name] > 65534 then  
471         luatexbase_error("No room for a new luafunction register")  
472     end  
473     luatexbase_log("Lua function " .. (name or "") .. " = " ..  
474         tex_count[luafunction_count_name])  
475     return tex_count[luafunction_count_name]  
476 end  
477 luatexbase.new_luafunction = new_luafunction
```

*(End definition for new\_luafunction. This function is documented on page ??.)*

## 5.18 Lua callback management

The native mechanism for callbacks in LuaTeX allows only one per function. That is extremely restrictive and so a mechanism is needed to add and remove callbacks from the appropriate hooks.

### 5.18.1 Housekeeping

The main table: keys are callback names, and values are the associated lists of functions. More precisely, the entries in the list are tables holding the actual function as `func` and

the identifying description as `description`. Only callbacks with a non-empty list of functions have an entry in this list.

```
478 local callbacklist = callbacklist or { }
```

Numerical codes for callback types, and name-to-value association (the table keys are strings, the values are numbers).

```
479 local list, data, exclusive, simple, reverselist = 1, 2, 3, 4, 5
480 local types = {
481   list      = list,
482   data      = data,
483   exclusive = exclusive,
484   simple    = simple,
485   reverselist = reverselist,
486 }
```

Now, list all predefined callbacks with their current type, based on the LuaTeX manual version 1.01. A full list of the currently-available callbacks can be obtained using

```
\directlua{
  for i,_ in pairs(callback.list()) do
    texio.write_nl("- " .. i)
  end
}
\bye
```

in plain LuaTeX. (Some undocumented callbacks are omitted as they are to be removed.)

```
487 local callbacktypes = callbacktypes or {
```

Section 8.2: file discovery callbacks.

```
488   find_read_file      = exclusive,
489   find_write_file     = exclusive,
490   find_font_file      = data,
491   find_output_file    = data,
492   find_format_file    = data,
493   find_vf_file        = data,
494   find_map_file       = data,
495   find_enc_file       = data,
496   find_pk_file        = data,
497   find_data_file      = data,
498   find_opentype_file  = data,
499   find_truetype_file  = data,
500   find_type1_file     = data,
501   find_image_file     = data,

502   open_read_file      = exclusive,
503   read_font_file      = exclusive,
504   read_vf_file        = exclusive,
505   read_map_file       = exclusive,
506   read_enc_file       = exclusive,
507   read_pk_file        = exclusive,
508   read_data_file      = exclusive,
509   read_truetype_file  = exclusive,
510   read_type1_file     = exclusive,
511   read_opentype_file  = exclusive,
```

Not currently used by luatex but included for completeness. may be used by a font handler.

```
512 find_cidmap_file = data,  
513 read_cidmap_file = exclusive,
```

Section 8.3: data processing callbacks.

```
514 process_input_buffer = data,  
515 process_output_buffer = data,  
516 process_jobname = data,
```

Section 8.4: node list processing callbacks.

```
517 contribute_filter = simple,  
518 buildpage_filter = simple,  
519 build_page_insert = exclusive,  
520 pre_linebreak_filter = list,  
521 linebreak_filter = exclusive,  
522 append_to_vlist_filter = exclusive,  
523 post_linebreak_filter = reverselist,  
524 hpack_filter = list,  
525 vpack_filter = list,  
526 hpack_quality = list,  
527 vpack_quality = list,  
528 pre_output_filter = list,  
529 process_rule = exclusive,  
530 hyphenate = simple,  
531 ligaturing = simple,  
532 kerning = simple,  
533 insert_local_par = simple,  
534 pre_mlist_to_hlist_filter = list,  
535 mlist_to_hlist = exclusive,  
536 post_mlist_to_hlist_filter = reverselist,  
537 new_graf = exclusive,
```

Section 8.5: information reporting callbacks.

```
538 pre_dump = simple,  
539 start_run = simple,  
540 stop_run = simple,  
541 start_page_number = simple,  
542 stop_page_number = simple,  
543 show_error_hook = simple,  
544 show_warning_message = simple,  
545 show_error_message = simple,  
546 show_lua_error_hook = simple,  
547 start_file = simple,  
548 stop_file = simple,  
549 call_edit = simple,  
550 finish_synctex = simple,  
551 wrapup_run = simple,
```

Section 8.6: PDF-related callbacks.

```
552 finish_pdffile = data,  
553 finish_pdfpage = data,  
554 page_objnum_provider = data,  
555 page_order_index = data,  
556 process_pdf_image_content = data,
```

Section 8.7: font-related callbacks.

```
557 define_font                = exclusive,
558 glyph_info                  = exclusive,
559 glyph_not_found              = exclusive,
560 glyph_stream_provider        = exclusive,
561 make_extensible              = exclusive,
562 font_descriptor_objnum_provider = exclusive,

563 }
564 luatexbase.callbacktypes=callbacktypes
```

**callback.register** Save the original function for registering callbacks and prevent the original being used. The original is saved in a place that remains available so other more sophisticated code can override the approach taken by the kernel if desired.

```
565 local callback_register = callback_register or callback.register
566 function callback.register()
567   luatexbase_error("Attempt to use callback.register() directly\n")
568 end
```

*(End definition for callback.register. This function is documented on page ??.)*

### 5.18.2 Handlers

The handler function is registered into the callback when the first function is added to this callback's list. Then, when the callback is called, the handler takes care of running all functions in the list. When the last function is removed from the callback's list, the handler is unregistered.

More precisely, the functions below are used to generate a specialized function (closure) for a given callback, which is the actual handler.

The way the functions are combined together depends on the type of the callback. There are currently 4 types of callback, depending on the calling convention of the functions the callback can hold:

**simple** is for functions that don't return anything: they are called in order, all with the same argument;

**data** is for functions receiving a piece of data of any type except node list head (and possibly other arguments) and returning it (possibly modified): the functions are called in order, and each is passed the return value of the previous (and the other arguments untouched, if any). The return value is that of the last function;

**list** is a specialized variant of *data* for functions filtering node lists. Such functions may return either the head of a modified node list, or the boolean values **true** or **false**. The functions are chained the same way as for *data* except that for the following. If one function returns **false**, then **false** is immediately returned and the following functions are *not* called. If one function returns **true**, then the same head is passed to the next function. If all functions return **true**, then **true** is returned, otherwise the return value of the last function not returning **true** is used.

**reverselist** is a specialized variant of *list* which executes functions in inverse order.

**exclusive** is for functions with more complex signatures; functions in this type of callback are *not* combined: An error is raised if a second callback is registered..

Handler for data callbacks.

```
569 local function data_handler(name)
570   return function(data, ...)
571     for _,i in ipairs(callbacklist[name]) do
572       data = i.func(data,...)
573     end
574     return data
575   end
576 end
```

Default for user-defined data callbacks without explicit default.

```
577 local function data_handler_default(value)
578   return value
579 end
```

Handler for exclusive callbacks. We can assume `callbacklist[name]` is not empty: otherwise, the function wouldn't be registered in the callback any more.

```
580 local function exclusive_handler(name)
581   return function(...)
582     return callbacklist[name][1].func(...)
583   end
584 end
```

Handler for list callbacks.

```
585 local function list_handler(name)
586   return function(head, ...)
587     local ret
588     local alltrue = true
589     for _,i in ipairs(callbacklist[name]) do
590       ret = i.func(head, ...)
591       if ret == false then
592         luatexbase_warning(
593           "Function '" .. i.description .. "' returned false\n"
594           .. "in callback '" .. name .. "'")
595       end
596       return false
597     end
598     if ret ~= true then
599       alltrue = false
600       head = ret
601     end
602   end
603   return alltrue and true or head
604 end
605 end
```

Default for user-defined list and reverselist callbacks without explicit default.

```
606 local function list_handler_default()
607   return true
608 end
```

Handler for reverselist callbacks.

```
609 local function reverselist_handler(name)
610   return function(head, ...)
611     local ret
612     local alltrue = true
```

```

613     local callbacks = callbacklist[name]
614     for i = #callbacks, 1, -1 do
615         local cb = callbacks[i]
616         ret = cb.func(head, ...)
617         if ret == false then
618             luatexbase_warning(
619                 "Function '" .. cb.description .. "' returned false\n"
620                 .. "in callback '" .. name .. "'")
621         )
622         return false
623     end
624     if ret ~= true then
625         alltrue = false
626         head = ret
627     end
628 end
629 return alltrue and true or head
630 end
631 end

```

Handler for simple callbacks.

```

632 local function simple_handler(name)
633     return function(...)
634         for _,i in ipairs(callbacklist[name]) do
635             i.func(...)
636         end
637     end
638 end

```

Default for user-defined simple callbacks without explicit default.

```

639 local function simple_handler_default()
640 end

```

Keep a handlers table for indexed access and a table with the corresponding default functions.

```

641 local handlers = {
642     [data] = data_handler,
643     [exclusive] = exclusive_handler,
644     [list] = list_handler,
645     [reverselist] = reverselist_handler,
646     [simple] = simple_handler,
647 }
648 local defaults = {
649     [data] = data_handler_default,
650     [exclusive] = nil,
651     [list] = list_handler_default,
652     [reverselist] = list_handler_default,
653     [simple] = simple_handler_default,
654 }

```

### 5.18.3 Public functions for callback management

Defining user callbacks perhaps should be in package code, but impacts on `add_to_callback`. If a default function is not required, it may be declared as `false`. First we need a list of user callbacks.



```

655 local user_callbacks_defaults = {
656   pre_mlist_to_hlist_filter = list_handler_default,
657   mlist_to_hlist = node.mlist_to_hlist,
658   post_mlist_to_hlist_filter = list_handler_default,
659 }

```

`create_callback` The allocator itself.

```

660 local function create_callback(name, ctype, default)
661   local ctype_id = types[ctype]
662   if not name or name == ""
663   or not ctype_id
664   then
665     luatexbase_error("Unable to create callback:\n" ..
666                       "valid callback name and type required")
667   end
668   if callbacktypes[name] then
669     luatexbase_error("Unable to create callback '" .. name ..
670                       "':\ncallback is already defined")
671   end
672   default = default or defaults[ctype_id]
673   if not default then
674     luatexbase_error("Unable to create callback '" .. name ..
675                       "':\ndefault is required for '" .. ctype ..
676                       "': callbacks")
677   elseif type (default) ~= "function" then
678     luatexbase_error("Unable to create callback '" .. name ..
679                       "':\ndefault is not a function")
680   end
681   user_callbacks_defaults[name] = default
682   callbacktypes[name] = ctype_id
683 end
684 luatexbase.create_callback = create_callback

```

(End definition for `create_callback`. This function is documented on page ??.)

`call_callback` Call a user defined callback. First check arguments.

```

685 local function call_callback(name,...)
686   if not name or name == "" then
687     luatexbase_error("Unable to create callback:\n" ..
688                       "valid callback name required")
689   end
690   if user_callbacks_defaults[name] == nil then
691     luatexbase_error("Unable to call callback '" .. name
692                       .. "':\nunknown or empty")
693   end
694   local l = callbacklist[name]
695   local f
696   if not l then
697     f = user_callbacks_defaults[name]
698   else
699     f = handlers[callbacktypes[name]](name)
700   end
701   return f(...)
702 end
703 luatexbase.call_callback=call_callback

```

(End definition for `call_callback`. This function is documented on page ??.)

`add_to_callback` Add a function to a callback. First check arguments.

```
704 local function add_to_callback(name, func, description)
705   if not name or name == "" then
706     luatexbase_error("Unable to register callback:\n" ..
707                       "valid callback name required")
708   end
709   if not callbacktypes[name] or
710     type(func) ~= "function" or
711     not description or
712     description == "" then
713     luatexbase_error(
714       "Unable to register callback.\n\n"
715       .. "Correct usage:\n"
716       .. "add_to_callback(<callback>, <function>, <description>)"
717     )
718   end
```

Then test if this callback is already in use. If not, initialise its list and register the proper handler.

```
719   local l = callbacklist[name]
720   if l == nil then
721     l = { }
722     callbacklist[name] = l
```

If it is not a user defined callback use the primitive callback register.

```
723   if user_callbacks_defaults[name] == nil then
724     callback_register(name, handlers[callbacktypes[name]](name))
725   end
726 end
```

Actually register the function and give an error if more than one exclusive one is registered.

```
727   local f = {
728     func      = func,
729     description = description,
730   }
731   local priority = #l + 1
732   if callbacktypes[name] == exclusive then
733     if #l == 1 then
734       luatexbase_error(
735         "Cannot add second callback to exclusive function\n'" ..
736         name .. "'")
737     end
738   end
739   table.insert(l, priority, f)
```

Keep user informed.

```
740   luatexbase_log(
741     "Inserting '" .. description .. "' at position "
742     .. priority .. " in '" .. name .. "'."
743   )
744 end
745 luatexbase.add_to_callback = add_to_callback
```

(End definition for `add_to_callback`. This function is documented on page ??.)

`remove_from_callback` Remove a function from a callback. First check arguments.

```
746 local function remove_from_callback(name, description)
747   if not name or name == "" then
748     luatexbase_error("Unable to remove function from callback:\n" ..
749                     "valid callback name required")
750   end
751   if not callbacktypes[name] or
752     not description or
753     description == "" then
754     luatexbase_error(
755       "Unable to remove function from callback.\n\n"
756       .. "Correct usage:\n"
757       .. "remove_from_callback(<callback>, <description>)"
758     )
759   end
760   local l = callbacklist[name]
761   if not l then
762     luatexbase_error(
763       "No callback list for '" .. name .. "'\n")
764   end
```

Loop over the callback's function list until we find a matching entry. Remove it and check if the list is empty: if so, unregister the callback handler.

```
765   local index = false
766   for i,j in ipairs(l) do
767     if j.description == description then
768       index = i
769       break
770     end
771   end
772   if not index then
773     luatexbase_error(
774       "No callback '" .. description .. "' registered for '" ..
775       name .. "'\n")
776   end
777   local cb = l[index]
778   table.remove(l, index)
779   luatexbase_log(
780     "Removing '" .. description .. "' from '" .. name .. "'."
781   )
782   if #l == 0 then
783     callbacklist[name] = nil
784     if user_callbacks_defaults[name] == nil then
785       callback_register(name, nil)
786     end
787   end
788   return cb.func,cb.description
789 end
790 luatexbase.remove_from_callback = remove_from_callback
```

(End definition for `remove_from_callback`. This function is documented on page ??.)

**in\_callback** Look for a function description in a callback.

```
791 local function in_callback(name, description)
792   if not name
793     or name == ""
794     or not callbacklist[name]
795     or not callbacktypes[name]
796     or not description then
797     return false
798   end
799   for _, i in pairs(callbacklist[name]) do
800     if i.description == description then
801       return true
802     end
803   end
804   return false
805 end
806 luatexbase.in_callback = in_callback
```

*(End definition for in\_callback. This function is documented on page ??.)*

**disable\_callback** As we subvert the engine interface we need to provide a way to access this functionality.

```
807 local function disable_callback(name)
808   if(callbacklist[name] == nil) then
809     callback_register(name, false)
810   else
811     luatexbase_error("Callback list for " .. name .. " not empty")
812   end
813 end
814 luatexbase.disable_callback = disable_callback
```

*(End definition for disable\_callback. This function is documented on page ??.)*

**callback\_descriptions** List the descriptions of functions registered for the given callback.

```
815 local function callback_descriptions (name)
816   local d = {}
817   if not name
818     or name == ""
819     or not callbacklist[name]
820     or not callbacktypes[name]
821   then
822     return d
823   else
824     for k, i in pairs(callbacklist[name]) do
825       d[k]= i.description
826     end
827   end
828   return d
829 end
830 luatexbase.callback_descriptions =callback_descriptions
```

*(End definition for callback\_descriptions. This function is documented on page ??.)*

**uninstall** Unlike at the  $\text{\TeX}$  level, we have to provide a back-out mechanism here at the same time as the rest of the code. This is not meant for use by anything other than `latexrelease`: as such this is *deliberately* not documented for users!

```

831 local function uninstall()
832   module_info(
833     "luatexbase",
834     "Uninstalling kernel luatexbase code"
835   )
836   callback.register = callback_register
837   luatexbase = nil
838 end
839 luatexbase.uninstall = uninstall

```

*(End definition for uninstall. This function is documented on page ??.)*

**mlist\_to\_hlist** To emulate these callbacks, the “real” `mlist_to_hlist` is replaced by a wrapper calling the wrappers before and after.

```

840 callback_register("mlist_to_hlist", function(head, display_type, need_penalties)
841   local current = call_callback("pre_mlist_to_hlist_filter", head, display_type, need_penalties)
842   if current == false then
843     flush_list(head)
844     return nil
845   elseif current == true then
846     current = head
847   end
848   current = call_callback("mlist_to_hlist", current, display_type, need_penalties)
849   local post = call_callback("post_mlist_to_hlist_filter", current, display_type, need_penalties)
850   if post == true then
851     return current
852   elseif post == false then
853     flush_list(current)
854     return nil
855   end
856   return post
857 end)

```

*(End definition for mlist\_to\_hlist. This function is documented on page ??.)*

```

858 </lua>

```

Reset the catcode of @.

```

859 <tex>\catcode'\@=\etacatcode\relax

```

# File e

## ltexpl.dtx

### 1 expl3-dependent code

#### 1.1 Loader

First define some blank commands, so that in case something goes wrong while loading expl3, we won't get strange Undefined control sequence errors.

```
1 <*2kernel>
2 \def\@expl@sys@load@backend@{}
3 \def\@expl@push@filename@{}
4 \def\@expl@push@filename@aux@{}
5 \def\@expl@pop@filename@{}
6 </2kernel>

   Create a hook for last-minute expl3 material.
7 <*2kernel>
8 \def\@expl@finalise@setup@{}
9 </2kernel>
```

Now define some basics to support loading expl3. These macros can be defined here safely, because they are redefined later on by the kernel, so we define simpler versions just to suit our needs.

```
10 <*2kernel>
11 \long\def\@gobble#1{}
12 \long\def\@firstofone#1{#1}
13 \long\def\@firstoftwo#1#2{#1}
14 \long\def\@secondoftwo#1#2{#2}
15 \long\def\@IfFileExists#1{%
16   \openin\@inputcheck"#1" %
17   \ifeof\@inputcheck
18     \expandafter\@secondoftwo
19   \else
20     \closein\@inputcheck
21     \expandafter\@firstoftwo
22   \fi}
23 \long\def\@ifnextchar#1#2#3{%
24   \let\reserved@d=#1%
25   \def\reserved@a{#2}%
26   \def\reserved@b{#3}%
27   \futurelet\@let@token\@ifnch}
28 \def\@ifnch{%
29   \ifx\@let@token\reserved@d
30     \expandafter\reserved@a
31   \else
32     \expandafter\reserved@b
33   \fi}
34 </2kernel>
```

If we are doing a rollback with a format containing expl3 we aren't reloading it as that creates havoc. This may need a refined version!

```
35 <*2kernel | latexrelease>
```

```

36 <latexrelease>\IncludeInRelease{2020/10/01}%
37 <latexrelease>          {expl3}{Pre-load expl3}%
38 \expandafter\ifx\csname tex\string _let:D\endcsname\relax
39   \expandafter\@firstofone
40 \else
41   \GenericInfo{}{Skipping: expl3 code already part of the format}%
42 <2ekernel> \expandafter\endinput
43 <latexrelease> \expandafter\@gobble
44 \fi

```

Check for the required primitive/engine support and the existence of a loader.

```

45 {%
46   \IfFileExists{expl3.ltx}
47   {%
48     \ifnum0%
49       \ifdefined\pdffilesize 1\fi
50       \ifdefined\filesize 1\fi
51       \ifdefined\luatexversion\ifnum\luatexversion>94 1\fi\fi
52       \ifdefined\kanjiskip 1\fi
53       >0 %
54       \expandafter\@firstofone
55     \else

```

In 2ekernel mode, an error is fatal and building the format is aborted. Use `\batchmode \read -1 to \tokenlist`, which errors with **! Emergency stop**. (cannot `\read from t` and aborts the T<sub>E</sub>X run. In latexrelease mode, raise an error and do nothing. Both ways, the error message shows the minimum expl3 engine requirements.

```

56 <2ekernel>          \def~{ }\def\MessageBreak{^^J~~~~~}%
57 <2ekernel>          \errmessage{LaTeX Error:
58 <latexrelease>      \@latex@error{%
59                     LaTeX requires the e-TeX primitives and additional\MessageBreak
60                     functionality available in the engines:\MessageBreak
61                     - pdfTeX v1.40\MessageBreak
62                     - XeTeX v0.99992\MessageBreak
63                     - LuaTeX v0.95\MessageBreak
64                     - e-(u)pTeX mid-2012\MessageBreak
65                     or later%
66 <latexrelease>      } \@ehd \expandafter\@gobble
67 <2ekernel>          } \batchmode \read -1 to \reserved@a
68 \fi
69 }
70 {%
71 (*2ekernel)
72   \errmessage{LaTeX requires expl3}%
73   \batchmode \read -1 to \reserved@a
74 </2ekernel>
75 (*latexrelease)
76   \@latex@error{LaTeX requires expl3}\@ehd
77   \@gobble
78 </latexrelease>
79 }%
80 {%
81   \input expl3.ltx
82   \ifdefined\NewDocumentCommand
83   \else

```

```

84         \IfFileExists{xparse.ltx}
85         {\input xparse.ltx }
86         {}%
87     \fi
88 }%
89 }
90 \<latexrelease>\EndIncludeInRelease
91 \<latexrelease>
92 \<latexrelease>\IncludeInRelease{2020/02/02}%
93 \<latexrelease>{expl3}{Pre-load expl3}%
94 \<latexrelease>\IfFileExists{expl3.ltx}
95 \<latexrelease>{
96 \<latexrelease>    \ifnum0%
97 \<latexrelease>        \ifdefined\pdffilesize 1\fi
98 \<latexrelease>        \ifdefined\filesize 1\fi
99 \<latexrelease>        \ifdefined\luatexversion\ifnum\luatexversion>94 1\fi\fi
100 \<latexrelease>    >0 %
101 \<latexrelease>    \else
102 \<latexrelease>        \message{Skipping expl3-dependent extensions}
103 \<latexrelease>        \expandafter\@gobbletwo
104 \<latexrelease>    \fi
105 \<latexrelease> }
106 \<latexrelease> {
107 \<latexrelease>    \message{Skipping expl3-dependent extensions}%
108 \<latexrelease>    \@gobbletwo
109 \<latexrelease> }%
110 \<latexrelease>\input{expl3.ltx}
111 \<latexrelease>\EndIncludeInRelease

```

## 1.2 Using expl3 code

In order to ease the implementation of some new features in L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> we may (temporarily) use some coding based on the expl3-code. Such macros will eventually vanish and may be changed unannounced. They are there for internal use in the L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> kernel and are not meant to be used in third-party packages. These macros will always have the @expl@ prefix in their name.

The rest of the name matches the expl3 name but with all underscores replaced by @s and the : replaced by @@, e.g.,

```
\cs_new_eq:NN \@expl@tl@trim@spaces@apply@@nN \tl_trim_spaces_apply:nN
```

if that expl3 command is needed in places that are others coded in L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> conventions.

```
112 \ExplSyntaxOn
```

In this file, each release of LaTeX adds an \IncludeInRelease block, in which the macros copied for that release were defined. In case a rollback is requested, the entire block is changed.

Each macro copied has a \changes entry to explain when and why it was copied, so that further to that may spot it easily.

Here \cs\_gset\_eq:NN is used, instead of the new variant because if different releases use that same name for different purposes, each can copy the macro without worrying about redefinitions.

```

113 \<latexrelease>\IncludeInRelease{2020/10/01}{expl3-2020-10-01}%
114 \<latexrelease>{expl3-macros-added-for-the-2020-10-01-release}%

```



```

115 \cs_gset_eq:NN \@expl@cs@to@str@@N \cs_to_str:N
116 \cs_gset_eq:NN \@expl@str@if@eq@@nnTF \str_if_eq:nnTF

117 \cs_gset_eq:NN \@expl@cs@prefix@spec@@N \cs_prefix_spec:N
118 \cs_gset_eq:NN \@expl@cs@argument@spec@@N \cs_argument_spec:N
119 \cs_gset_eq:NN \@expl@cs@replacement@spec@@N \cs_replacement_spec:N

120 \cs_gset_eq:NN \@expl@str@map@function@@NN \str_map_function:NN
121 \cs_gset_eq:NN \@expl@char@generate@@nn \char_generate:nn

122 <latexrelease>\EndIncludeInRelease
123 <latexrelease>\IncludeInRelease{0000/00/00}{expl3~2020-10-01}%
124 <latexrelease>          {expl3~macros~added~for~the~2020-10-01~release}%
125 <latexrelease>\cs_undefine:N \@expl@cs@to@str@@N
126 <latexrelease>\cs_undefine:N \@expl@str@if@eq@@nnTF
127 <latexrelease>\cs_undefine:N \@expl@cs@prefix@spec@@N
128 <latexrelease>\cs_undefine:N \@expl@cs@argument@spec@@N
129 <latexrelease>\cs_undefine:N \@expl@cs@replacement@spec@@N
130 <latexrelease>\cs_undefine:N \@expl@str@map@function@@NN
131 <latexrelease>\EndIncludeInRelease
132 </2ekernel | latexrelease>

133 \ExplSyntaxOff

```

# File f

## ltdefns.dtx

### 1 Definitions

This section contains commands used in defining other macros.

```
1 <*2ekernel>
```

#### 1.1 Initex initialisations

`\two@digits` Prefix a number less than 10 with ‘0’.

```
2 \def\two@digits#1{\ifnum#1<10 0\fi\number#1}
```

*(End definition for \two@digits. This function is documented on page ??.)*

`\typeout` Display something on the terminal.

```
3 </2ekernel>
4 <*2ekernel | latexrelease>
5 <latexrelease>\IncludeInRelease{2020/10/01}%
6 <latexrelease>{\typeout}{Allow "par" in \typeout}%
7 \protected\long\def\typeout#1{\begingroup
8   \set@display@protect
9   \def\par{^^J^^J}%
10  \immediate\write\@unused{#1}\endgroup}
11 </2ekernel | latexrelease>
12 <latexrelease>\EndIncludeInRelease
13 <latexrelease>\IncludeInRelease{0000/00/00}%
14 <latexrelease>{\typeout}{Allow "par" in \typeout}%
15 <latexrelease>
16 <latexrelease>\def\typeout#1{\begingroup\set@display@protect
17 <latexrelease>\immediate\write\@unused{#1}\endgroup}
18 <latexrelease>\EndIncludeInRelease
19 <*2ekernel>
```

*(End definition for \typeout. This function is documented on page ??.)*

`\newlinechar` A char to be used as new-line in output to files.

```
20 \newlinechar‘^^J
```

*(End definition for \newlinechar. This function is documented on page ??.)*

#### 1.2 Saved versions of TeX primitives

The TeX primitive `\foo` is saved as `\@@foo`. The following primitives are handled in this way:

`\@@par`

```
21 \let\@@par=\par
22 %\let\@@input=\input      %%% moved earlier
23 %\let\@@end=\end          %%%
```

*(End definition for \@@par. This function is documented on page ??.)*

`\@@hyph` Save original primitive definition.

```
24 \let\@@hyph=\-
```

(End definition for `\@@hyph`. This function is documented on page ??.)

`\@@italiccorr` Save the original italic correction.

```
25 \let\@@italiccorr=\/
```

(End definition for `\@@italiccorr`. This function is documented on page ??.)

`\@height` The following definitions save token space. E.g., using `\@height` instead of `height` saves 5 tokens at the cost in time of one macro expansion.

```
26 \def\@height{height} \def\@depth{depth} \def\@width{width}
```

```
27 \def\@minus{minus}
```

```
28 \def\@plus{plus}
```

The next one is another 100 tokens worth.

```
29 \def\hb@xt@{\hbox to}
```

(End definition for `\@height` and others. These functions are documented on page ??.)

```
30 \message{hacks,}
```

`\hb@xt@`

### 1.3 Command definitions

This section defines the following commands:

`\@namedef` `{\NAME}`

Expands to `\def{\NAME}`, except name can contain any characters.

`\@nameuse` `{\NAME}`

Expands to `\{\NAME\}`.

`\@ifnextchar` `X{\YES}{\NO}`

Expands to `\YES` if next character is an ‘X’, and to `\NO` otherwise. (Uses `\reserved@a–\reserved@c`.) NOTE: GOBBLES ANY SPACE FOLLOWING IT.

`\@ifstar` `{\YES}{\NO}`

Gobbles following spaces and then tests if next the character is a ‘\*’. If it is, then it gobbles the ‘\*’ and expands to `\YES`, otherwise it expands to `\NO`.

`\@dblarg` `{\CMD}{\ARG}`

Expands to `\{\CMD\}[\ARG]{\ARG}`. Use `\@dblarg\CS` when `\CS` takes arguments `[ARG1]{ARG2}`, where default is `ARG1 = ARG2`.

`\@ifundefined` `{\NAME}{\YES}{\NO}`

: If `\NAME` is undefined then it executes `\YES`, otherwise it executes `\NO`. More precisely, true if `\NAME` either undefined or = `\relax`.

`\@ifdefinable` `\NAME{\YES}` Executes `\YES` if the user is allowed to define `\NAME`, otherwise it gives an error. The user can define `\NAME` if `\@ifundefined{NAME}` is true, ‘`NAME`’ ≠ ‘`relax`’ and the first three letters of ‘`NAME`’ are not ‘`end`’, and if `\endNAME` is not defined.

`\newcommand` `*{\F00}[\i]{\TEXT}`

User command to define `\F00` to be a macro with `i` arguments (`i = 0` if missing) having the definition `\TEXT`. Produces an error if `\F00` already defined.

Normally the command is defined to be `\long` (ie it may take multiple paragraphs in its argument). In the star-form, the command is not defined as `\long` and a blank line in any argument to the command would generate an error.

`\renewcommand` `*{\F00}[\i]{\TEXT}`

Same as `\newcommand`, except it checks if `\F00` already defined.

`\newenvironment`       $\star{\langle FOO\rangle}[\langle i\rangle]{\langle DEF1\rangle}{\langle DEF2\rangle}$   
equivalent to:  
`\newcommand{\F00}[i]{DEF1} \def{\endF00}{DEF2}`  
(or the appropriate star forms).

`\renewenvironment`      Obvious companion to `\newenvironment`.

`\@cons`                : See description of `\output` routine.

`\@car`                `\@car T1 T2 ... Tn\@nil == T1` (unexpanded)

`\@cdr`                `\@cdr T1 T2 ... Tn\@nil == T2 ... Tn` (unexpanded)

`\typeout`                 $\{\langle message\rangle\}$   
Produces a warning message on the terminal.

`\typein`                  $\{\langle message\rangle\}$   
Types message, asks the user to type in a command, then executes it

`\typein`                  $[\langle\backslash CS\rangle]{\langle MSG\rangle}$   
Same as above, except defines `\CS` to be the input instead of executing it.

`\typein`

```

31 \def\typein{%
32   \let\@typein\relax
33   \@testopt\@xtypein\@typein}

34 \ifx\directlua\@undefined

35 \def\@xtypein[#1]#2{%
36   \typeout{#2}%
37   \advance\endlinechar\@M
38   \read\@inputcheck to#1%
39   \advance\endlinechar-\@M
40   \@typein}%

41 \else

42 \def\@xtypein[#1]#2{%
43   \typeout{#2}%
44   \begingroup \endlinechar\m@ne
45   \read\@inputcheck to#1%
46   \expandafter\endgroup
47   \expandafter\def\expandafter#1\expandafter{#1}%
48   \@typein}%

49 \fi

```

(End definition for `\typein`. This function is documented on page ??.)

`\@namedef`

```

50 \def\@namedef#1{\expandafter\def\csname #1\endcsname}

```

(End definition for `\@namedef`. This function is documented on page ??.)

`\@nameuse`

```

51 \def\@nameuse#1{\csname #1\endcsname}

```

(End definition for `\@nameuse`. This function is documented on page ??.)

```

\@cons
52 \def\@cons#1#2{\begingroup\let\@elt\relax\xdef#1{#1\@elt #2}\endgroup}

(End definition for \@cons. This function is documented on page ??.)

\@car
\@cdr
53 \def\@car#1#2\@nil{#1}
54 \def\@cdr#1#2\@nil{#2}

(End definition for \@car and \@cdr. These functions are documented on page ??.)

\@carchive \@carchive T1 ... Tn\@nil = T1 T2 T3 , n > 3
55 \long\def\@carchive#1#2#3#4\@nil{#1#2#3}

(End definition for \@carchive. This function is documented on page ??.)

\@onlypreamble This macro adds its argument to the list of commands stored in \@preamblecmds
\@preamblecmds to be disabled after \begin{document}. These commands are redefined to generate
\@notprerr at this point.
56 \def\@preamblecmds{}
57 \def\@onlypreamble#1{%
58   \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
59     \@preamblecmds\do#1}}
60 \@onlypreamble\@onlypreamble
61 \@onlypreamble\@preamblecmds

(End definition for \@onlypreamble and \@preamblecmds. These functions are documented on page ??.)

\@star@or@long Look ahead for a *. If present reset \l@ngrel@x so that the next definition, #1, will be
non-long.
62 \def\@star@or@long#1{%
63   \ifstar
64     {\let\l@ngrel@x\relax#1}%
65     {\let\l@ngrel@x\long#1}}

(End definition for \@star@or@long. This function is documented on page ??.)

\l@ngrel@x This is either \relax or \long depending on whether the *-form of a definition command
is being executed.
66 \let\l@ngrel@x\relax

(End definition for \l@ngrel@x. This function is documented on page ??.)

\newcommand User level \newcommand.
67 \def\newcommand{\@star@or@long\new@command}

\new@command
68 \def\new@command#1{%
69   \@testopt{\@newcommand#1}0}

(End definition for \newcommand and \new@command. These functions are documented on page ??.)

\@newcommand Handling arguments for \newcommand.
\@argdef
70 \def\@newcommand#1[#2]{%
\@xargdef
71   \kernel@ifnextchar [{\@xargdef#1[#2]]%
72     {\@argdef#1[#2]}}

```

Define #1 if it is definable.

Both here and in `\@xargdef` the replacement text is absorbed as an argument because if we are not allowed to make the definition we have to get rid of it completely.

```
73 \long\def\@argdef#1[#2]#3{%
74   \@ifdefinable #1{\@yargdef#1\@ne{#2}{#3}}}
```

Handle the second optional argument.

```
75 \long\def\@xargdef#1[#2] [#3]#4{%
76   \@ifdefinable#1{%
```

Define the actual command to be:

```
\def\foo{\@protected@testopt\foo\\foo{default}}
```

where `\\foo` is a csname generated from applying `\csname` and `\string` to `\foo`, ie the actual name contains a backslash and therefore can't clash easily with existing command names. "Default" is the contents of the second optional argument of `(re)newcommand`.

```
77   \expandafter\def\expandafter#1\expandafter{%
78     \expandafter
79     \@protected@testopt
80     \expandafter
81     #1%
82     \csname\string#1\endcsname
83     {#3}}%
```

Now we define the internal macro ie `\\foo` which is supposed to pick up all arguments (optional and mandatory).

```
84   \expandafter\@yargdef
85   \csname\string#1\endcsname
86   \tw@
87   {#2}%
88   {#4}}}
```

*(End definition for \@newcommand, \@argdef, and \@xargdef. These functions are documented on page ??.)*

**\@testopt** This macro encapsulates the most common call to `\@ifnextchar`, saving several tokens each time it is used in the definition of a command with an optional argument. #1 The code to execute in the case that there is a [ need not be a single token but can be any sequence of commands that 'expects' to be followed by [. If this command were only used in `\newcommand` definitions then #1 would be a single token and the braces could be omitted from {#1} in the definition below, saving a bit of memory.

```
89 \long\def\@testopt#1#2{%
90   \kernel@ifnextchar[{#1}{#1[{#2}]]}
```

*(End definition for \@testopt. This function is documented on page ??.)*

**\@protected@testopt** Robust version of `\@testopt`. The extra argument (#1) must be a single token. If protection is needed the call expands to `\protect` applied to this token, and the 2nd and 3rd arguments are discarded (by `\@x@protect`). Otherwise `\@testopt` is called on the 2nd and 3rd arguments.

This method of making commands robust avoids the need for using up two csnames per command, the price is the extra expansion time for the `\ifx` test.

```
91 \def\@protected@testopt#1{%
92   \ifx\protect\@typeset@protect
93     \expandafter\@testopt
```

```

94 \else
95 \x@protect#1%
96 \fi}

```

(End definition for \@protected@testopt. This function is documented on page ??.)

**\@yargdef** These generate a primitive argument specification, from a L<sup>A</sup>T<sub>E</sub>X [*digit*] form; in fact *digit* can be anything such that **\number** *digit* is single digit.

Reorganised slightly so that **\renewcommand{\reserved@a}[1]{foo}** works. I am not sure this is worth it, as a following **\newcommand** would over-write the definition of **\reserved@a**.

Recall that L<sup>A</sup>T<sub>E</sub>X2.09 goes into an infinite loop with **\renewcommand[1]{\@tempa}{foo}** (DPC 6 October 93).

Reorganised again (DPC 1999). Rather than make a loop to construct the argument spec by counting, just extract the required argument spec by using a delimited argument (delimited by the digit). This is faster and uses less tokens. The coding is slightly odd to preserve the old interface (using **#2 = \tw@** as the flag to surround the first argument with []). But the new method did not allow for the number of arguments **#3** not being given as an explicit digit; hence (further expansion of this argument and use of) **\number** was added later in 1999.

It is not clear why these are still **\long**.

```

97 \long \def \@yargdef #1#2#3{%
98 \ifx#2\tw@
99 \def\reserved@b##11{####1}}%
100 \else
101 \let\reserved@b\@gobble
102 \fi
103 \expandafter
104 \@yargd@f \expandafter{\number #3}#1%
105 }

106 \long \def \@yargd@f#1#2{%
107 \def \reserved@a ##1#1##2##{%
108 \expandafter\def\expandafter#2\reserved@b ##1#1%
109 }%
110 \l@ngrel@x \reserved@a 0##1##2##3##4##5##6##7##8##9##1%
111 }

```

(End definition for \@yargdef and \@yargd@f. These functions are documented on page ??.)

**\@reargdef**

```

112 \long\def\@reargdef#1[#2]{%
113 \@yargdef#1\@ne{#2}}

```

(End definition for \@reargdef. This function is documented on page ??.)

**\renewcommand** Check the command name is already used. If not give an error message. Then temporarily disable **\@ifdefinable** then call **\newcommand**. (Previous version **\let#1=\relax** but this does not work too well if **#1** is **\@tempa-e**.)

```

114 \def\renewcommand{\@star@or@long\renew@command}

```

```

\renew@command 115 \def\renew@command#1{%
116   \begingroup \escapechar\m@ne\xdef\@gtempa{\string#1}\endgroup
117   \expandafter\@ifundefined\@gtempa
118     {\@latex@error{Command \string#1 undefined}\@ehc}%
119   \relax
120   \let\@ifdefinable\@rc@ifdefinable
121   \new@command#1}

```

(End definition for \renewcommand and \renew@command. These functions are documented on page ??.)

```

\@ifdefinable Test if user is allowed to define a command.
\@@ifdefinable 122 \long\def\@ifdefinable #1#2{%
\@rc@ifdefinable 123   \edef\reserved@a{\expandafter\@gobble\string #1}%
124   \@ifundefined\reserved@a
125     {\edef\reserved@b{\expandafter\@carcube \reserved@a xxx\@nil}%
126     \ifx \reserved@b\@qend \@notdefinable\else
127     \ifx \reserved@a\@qrelax \@notdefinable\else
128     #2%
129     \fi
130     \fi}%
131   \@notdefinable}

```

Saved definition of \@ifdefinable.

```
132 \let\@@ifdefinable\@ifdefinable
```

Version of \@ifdefinable for use with \renewcommand. Does not do the check this time, but restores the normal definition.

```

133 \long\def\@rc@ifdefinable#1#2{%
134   \let\@ifdefinable\@@ifdefinable
135   #2}

```

(End definition for \@ifdefinable, \@@ifdefinable, and \@rc@ifdefinable. These functions are documented on page ??.)

**\newenvironment** Define a new user environment. #1 is the environment name. #2# Grabs all the tokens up to the first {. These will be any optional arguments. They are not parsed at this point, but are just passed to \@newenv which will eventually call \newcommand. Any optional arguments will then be parsed by \newcommand as it defines the command that executes the ‘begin code’ of the environment.

This #2# trick removed with version 1.2i as it fails if a { occurs in the optional argument. Now use \@ifnextchar directly.

```
136 \def\newenvironment{\@star@or@long\new@environment}
```

```

\new@environment 137 \def\new@environment#1{%
138   \@testopt{\@newenva#1}0}

139 \def\@newenva#1[#2]{%
\@newenva 140   \kernel@ifnextchar [{\@newenvb#1[#2]}{\@newenv{#1}{[#2]}}}]

141 \def\@newenvb#1[#2][#3]{\@newenv{#1}{[#2][#3]}}
\@newenvb

```



(End definition for `\newenvironment` and others. These functions are documented on page ??.)

`\renewenvironment` Redefine an environment. For `\renewenvironment` disable `\@ifdefinable` and then call `\newenvironment`. It is OK to `\let` the argument to `\relax` here as there should not be a `@temp...` environment.

```
142 \def\renewenvironment{\@star@or@long\renew@environment}
```

```
\renew@environment 143 \def\renew@environment#1{%
144   \ifundefined{#1}%
145     {\@latex@error{Environment #1 undefined}\@ehc
146     }\relax
147   \expandafter\let\csname#1\endcsname\relax
148   \expandafter\let\csname end#1\endcsname\relax
149   \new@environment{#1}}
```

(End definition for `\renewenvironment` and `\renew@environment`. These functions are documented on page ??.)

`\@newenv` The internal version of `\newenvironment`.

Call `\newcommand` to define the *begin-code* for the environment. `\def` is used for the *end-code* as it does not take arguments. (but may contain `\pars`)

Make sure that an attempt to define a ‘graf’ or ‘group’ environment fails.

```
150 \long\def\@newenv#1#2#3#4{%
151   \ifundefined{#1}%
152     {\expandafter\let\csname#1\endcsname\expandafter\endcsname
153     \csname end#1\endcsname}%
154     \relax
155   \expandafter\new@command
156     \csname #1\endcsname#2{#3}%
157     \l@ngrel@x\expandafter\def\csname end#1\endcsname{#4}}
```

(End definition for `\@newenv`. This function is documented on page ??.)

`\newif` And here’s a different sort of allocation: For example, `\newif\ifffoo` creates `\footrue`, `\foofalse` to go with `\ifffoo`.

```
158 \def\newif#1{%
159   \count@\escapechar \escapechar\m@ne
160   \let#1\iffalse
161   \@if#1\iftrue
162     \@if#1\iffalse
163   \escapechar\count@}
```

```
\@if 164 \def\@if#1#2{%
165   \expandafter\def\csname\expandafter\@gobbletwo\string#1%
166     \expandafter\@gobbletwo\string#2\endcsname
167     {\let#1#2}}
```

(End definition for `\newif` and `\@if`. These functions are documented on page ??.)

`\providecommand` `\providecommand` takes the same arguments as `\newcommand`, but discards them if #1 is already defined. Otherwise it just acts like `\newcommand`. This implementation currently leaves any discarded definition in `\reserved@a` (and possibly `\\reserved@a`) this wastes a bit of space, but it will be reclaimed as soon as these scratch macros are redefined.

```
168 \def\providecommand{\@star@or@long\providecommand}
```

```
\providecommand 169 \def\providecommand#1{%
170   \begingroup
171   \escapechar\m@ne\xdef\@gtempa{\string#1}%
172   \endgroup
173   \expandafter\@ifundefined\@gtempa
174     {\def\reserved@a{\newcommand#1}}%
175     {\def\reserved@a{\renewcommand\reserved@a}}%
176   \reserved@a}%

```

(End definition for `\providecommand` and `\provide@command`. These functions are documented on page ??.)

`\CheckCommand` `\CheckCommand` takes the same arguments as `\newcommand`. If the command already exists, with the same definition, then nothing happens, otherwise a warning is issued. Useful for checking the current state before a macro package starts redefining things. Currently two macros are considered to have the same definition if they are the same except for different default arguments. That is, if the old definition was: `\newcommand\xxx[2][a]{(#1)(#2)}` then `\CheckCommand\xxx[2][b]{(#1)(#2)}` would *not* generate a warning, but, for instance `\CheckCommand\xxx[2]{(#1)(#2)}` would.

```
177 \def\CheckCommand{\@star@or@long\checkcommand}
```

`\CheckCommand` is only available in the preamble part of the document.

```
178 \@onlypreamble\CheckCommand
```

```
\checkcommand 179 \def\checkcommand#1#2#{\@check@c#1{#2}}
180 \@onlypreamble\checkcommand
```

(End definition for `\CheckCommand` and `\checkcommand`. These functions are documented on page ??.)

`\@check@c` `\CheckCommand` itself just grabs all the arguments we need, without actually looking for [ optional argument forms. Now define `\reserved@a`. If `\\reserved@a` is then defined, compare it with the “#1” otherwise compare `\reserved@a` with #1.

```
181 \long\def\@check@c#1#2#3{%
182   \expandafter\let\csname\string\reserved@a\endcsname\relax
183   \renewcommand\reserved@a#2{#3}%
184   \@ifundefined{\string\reserved@a}%
185     {\@check@eq#1\reserved@a}%
186     {\expandafter\@check@eq
187       \csname\string#1\expandafter\endcsname
188       \csname\string\reserved@a\endcsname}}
189 \@onlypreamble\@check@c
```

(End definition for `\@check@c`. This function is documented on page ??.)

`\@check@eq` Complain if #1 and #2 are not `\ifx` equal.

```

190 \def\@check@eq#1#2{%
191   \ifx#1#2\else
192     \@latex@warning@no@line
193       {Command \noexpand#1 has
194         changed.\MessageBreak
195         Check if current package is valid}%
196   \fi}
197 \onlypreamble\@check@eq

```

*(End definition for \@check@eq. This function is documented on page ??.)*

`\@gobble` The `\@gobble` macro is used to get rid of its argument.

```

\@gobbletwo 198 \long\def \@gobble #1{}
\@gobblethree 199 \long\def \@gobbletwo #1#2{}
\@gobblefour 200 \long\def \@gobblethree #1#2#3{}
201 \long\def \@gobblefour #1#2#3#4{}

```

*(End definition for \@gobble and others. These functions are documented on page ??.)*

`\@firstofone` Some argument-grabbers.

```

\@firstoftwo 202 \long\def \@firstofone#1{#1}
\@secondoftwo 203 \long\def \@firstoftwo#1#2{#1}
204 \long\def \@secondoftwo#1#2{#2}

```

`\@iden` is another name for `\@firstofone` for compatibility reasons.

```

205 \let\@iden\@firstofone

```

`\@iden` *(End definition for \@firstofone and others. These functions are documented on page ??.)*

`\@thirdofthree` Another grabber now used in the encoding specific section.

```

206 \long\def \@thirdofthree#1#2#3{#3}

```

*(End definition for \@thirdofthree. This function is documented on page ??.)*

`\@expandtwoargs` A macro to totally expand two arguments to another macro

```

207 \def\@expandtwoargs#1#2#3{%
208   \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}

```

*(End definition for \@expandtwoargs. This function is documented on page ??.)*

`\@backslashchar` A category code 12 backslash.

```

209 \edef\@backslashchar{\expandafter\@gobble\string\\}

```

*(End definition for \@backslashchar. This function is documented on page ??.)*

## 1.4 Robust commands and protect

Fragile and robust commands are one of the thornier issues in L<sup>A</sup>T<sub>E</sub>X's commands. Whilst typesetting documents, L<sup>A</sup>T<sub>E</sub>X makes use of many of T<sub>E</sub>X's features, such as arithmetic, defining macros, and setting variables. However, there are (at least) three different occasions when these commands are not safe. These are called 'moving arguments' by L<sup>A</sup>T<sub>E</sub>X, and consist of:

- writing information to a file, such as indexes or tables of contents.
- writing information to the screen.
- inside an `\edef`, `\message`, `\mark`, or other command which evaluates its argument fully.

The method L<sup>A</sup>T<sub>E</sub>X uses for making fragile commands robust is to precede them with `\protect`. This can have one of four possible values:

- `\relax`, for normal typesetting. So `\protect\foo` will execute `\foo`.
- `\string`, for writing to the screen. So `\protect\foo` will write `\foo`.
- `\noexpand`, for writing to a file. So `\protect\foo` will write `\foo` followed by a space.
- `\@unexpandable@protect`, for writing a moving argument to a file. So `\protect\foo` will write `\protect\foo` followed by a space. This value is also used inside `\edefs`, `\marks` and other commands which evaluate their arguments fully. More precisely, whenever the content of an `\edef` or `\xdef` etc. can contain arbitrary user input not under the direct control of the programmer, one should use `\protected@edef` instead of `\edef`, etc., so that `\protect` has a suitable definition and the user input will not break if it contains fragile commands.

`\@unexpandable@protect`

```
210 \def\@unexpandable@protect{\noexpand\protect\noexpand}
```

*(End definition for \@unexpandable@protect. This function is documented on page ??.)*

`\DeclareRobustCommand`  
`\declare@robustcommand`

This is a package-writers command, which has the same syntax as `\newcommand`, but which declares a protected command. It does this by having

```
\DeclareRobustCommand\foo
define \foo to be \protect\foo<space>,
and then use \newcommand\foo<space>.
```

Since the internal command is `\foo<space>`, when it is written to an auxiliary file, it will appear as `\foo`.

We have to be a bit cleverer if we're defining a short command, such as `\_`, in order to make sure that the auxiliary file does not include a space after the command, since `\_ a` and `\_a` aren't the same. In this case we define `\_` to be:

```
\x@protect\_ \protect\_<space>
```

which expands to:

```

\ifx\protect\@typeset@protect\else
  \x@protect@_
\fi
\protect\_<space>

```

Then if `\protect` is `\@typeset@protect` (normally `\relax`) then we just perform `\_<space>`, and otherwise `\x@protect@` gobbles everything up and expands to `\protect\_<space>`.

*Note:* setting `\protect` to any value other than `\relax` whilst in ‘typesetting’ mode will cause commands to go into an infinite loop! In particular, setting `\protect` to `\@empty` will cause `\_` to loop forever. It will also break lots of other things, such as protected `\ifmmodes` inside `\haligns`. If you really have to do such a thing, then please set `\@typeset@protect` to be `\@empty` as well. (This is what the code for `\patterns` does, for example.)

More fun with `\expandafter` and `\csname`.

```

211 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
212 \def\declare@robustcommand#1{%
213   \ifx#1\@undefined\else\ifx#1\relax\else
214     \@latex@info{Redefining \string#1}%
215   \fi\fi
216   \edef\reserved@a{\string#1}%
217   \def\reserved@b{#1}%
218   \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
219   \edef#1{%
220     \ifx\reserved@a\reserved@b
221       \noexpand\x@protect
222       \noexpand#1%
223     \fi
224     \noexpand\protect
225     \expandafter\noexpand\csname
226       \expandafter\@gobble\string#1 \endcsname
227   }%
228   \let\@ifdefinable\@rc@ifdefinable
229   \expandafter\new@command\csname
230     \expandafter\@gobble\string#1 \endcsname
231 }

```

*(End definition for `\DeclareRobustCommand` and `\declare@robustcommand`. These functions are documented on page ??.)*

```

\@x@protect
\x@protect
232 \def\x@protect#1{%
233   \ifx\protect\@typeset@protect\else
234     \x@protect#1%
235   \fi
236 }
237 \def\@x@protect#1\fi#2#3{%
238   \fi\protect#1%
239 }

```

*(End definition for `\@x@protect` and `\x@protect`. These functions are documented on page ??.)*

`\@typeset@protect` We set `\@typeset@protect` to `\relax` rather than `\@empty` to make sure that the protection mechanism stops the look-ahead and expansion performed at the start of `\halign` cells.

240 `\let\@typeset@protect\relax`

(End definition for `\@typeset@protect`. This function is documented on page ??.)

`\set@display@protect` These macros set `\protect` appropriately for typesetting or displaying.

`\set@typeset@protect`

241 `\def\set@display@protect{\let\protect\string}`

242 `\def\set@typeset@protect{\let\protect\@typeset@protect}`

(End definition for `\set@display@protect` and `\set@typeset@protect`. These functions are documented on page ??.)

`\protected@edef` The commands `\protected@edef` and `\protected@xdef` perform ‘safe’ `\edefs` and

`\protected@xdef` `\xdefs`, saving and restoring `\protect` appropriately. For cases where restoring `\protect`

`\unrestored@protected@xdef` doesn’t matter, there’s an ‘unsafe’ `\unrestored@protected@xdef`, useful if you know

`\restore@protect` what you’re doing!

243 `\def\protected@edef{%`

244 `\let\@@protect\protect`

245 `\let\protect\@unexpandable@protect`

246 `\afterassignment\restore@protect`

247 `\edef`

248 `}`

249 `\def\protected@xdef{%`

250 `\let\@@protect\protect`

251 `\let\protect\@unexpandable@protect`

252 `\afterassignment\restore@protect`

253 `\xdef`

254 `}`

255 `\def\unrestored@protected@xdef{%`

256 `\let\protect\@unexpandable@protect`

257 `\xdef`

258 `}`

259 `\def\restore@protect{\let\protect\@@protect}`

(End definition for `\protected@edef` and others. These functions are documented on page ??.)

`\protect` The normal meaning of `\protect`

260 `\set@typeset@protect`

(End definition for `\protect`. This function is documented on page ??.)

`\MakeRobust` This macro makes an existing fragile macro robust, but only if it hasn’t been robust in the past, i.e., it checks for the existence of the macro `\<name>`<sub>␣</sub> and if that exists it assumes that `\<name>` is already robust. In that case either undefine the inner macro first or use `\DeclareRobustCommand` to define it in a robust way directly. We could probably test the top-level definition to have the right kind of structure, but this is somewhat problematical as we then have to distinguish between `\long` macros and others and also take into account that sometimes the top-level is deliberately done manually (like with `\begin`).

The macro firstly checks if the control sequence in question exists at all.

261 `\</2kernel>`

262 `\<latexrelease>\IncludeInRelease{2020/10/01}{\MakeRobust}{\MakeRobust}%`

263 `\<*2kernel | latexrelease>`

264 `\def\MakeRobust#1{%`

265 `\count@=\escapechar`

```

266 \escapechar='\\
267 \@ifundefined{\expandafter\@gobble\string#1}{%
268   \@latex@error{The control sequence '\string#1' is undefined!%
269   \MessageBreak There is nothing here to make robust}%
270   \@eha
271 }%

```

Then we check if the macro is already robust. We do this by testing if the internal name for a robust macro is defined, namely `\foo_`. If it is already defined do nothing, otherwise set `\foo_` equal to `\foo` and redefine `\foo` so that it acts like a macro defined with `\DeclareRobustCommand`. We use `\@kernel@rename@newcommand` to copy `\foo` over to `\foo_`, including a possible default optional argument.

```

272 {%
273   \@ifundefined{\expandafter\@gobble\string#1\space}%
274   {%
275     \expandafter\@kernel@rename@newcommand
276     \csname\expandafter\@gobble\string#1\space\endcsname
277     #1%
278     \edef\reserved@a{\string#1}%
279     \def\reserved@b{#1}%
280     \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
281     \xdef#1{%
282       \ifx\reserved@a\reserved@b
283         \noexpand\x@protect\noexpand#1%
284       \fi
285       \noexpand\protect\expandafter\noexpand
286       \csname\expandafter\@gobble\string#1\space\endcsname}%
287   }%
288   {\@latex@info{The control sequence '\string#1' is already robust}}%
289 }%
290 \escapechar=\count@
291 }%

```

`\@kernel@rename@newcommand`

This macro renames a command, possibly with an optional argument (defined with `\newcommand`) from `#2` to `#1`, by renaming the internal macro `\\#2` to `\\#1` and defining `\\#1` appropriately, then undefining `\\#2` and `\\#2`. The `\afterassignment` trick is to make both definitions in `\@copy@newcommand` global (which are local by default).

In case the macro was defined with `\newcommand` and an optional argument, to replicate exactly the behaviour of `\DeclareRobustCommand` we have to move also the internal `\\foo` to `\\foo_`. In that case, `#1` will be a parameterless macro (`\robust@command@chk@safe` checks that), and `\@if@newcommand` will return true (both defined below in this file). If so, we can use `\@copy@newcommand` rather than plain `\let` to copy the command over. `\@kernel@rename@newcommand` does this test and carries out the renaming.

```

292 \def\@kernel@rename@newcommand#1#2{%
293   \robust@command@chk@safe#2%
294   {\@if@newcommand#2%
295     {\afterassignment\global
296       \global\@copy@newcommand#1#2%
297       \global\let#2\undefined
298       \global\expandafter\let\csname\string#2\endcsname\@undefined}%
299     {\global\let#1=#2}}%
300   {\global\let#1=#2}}

```

```

301 </2ekernel | latexrelease>
302 <latexrelease>\EndIncludeInRelease
303 %
304 <latexrelease>\IncludeInRelease{2019/10/01}{\MakeRobust}{\MakeRobust}%
305 <latexrelease>\def\MakeRobust#1{%
306 <latexrelease> \ifundefined{\expandafter\@gobble\string#1}{%
307 <latexrelease> \@latex@error{The control sequence '\string#1' is undefined!%
308 <latexrelease> \MessageBreak There is nothing here to make robust}%
309 <latexrelease> \@eha
310 <latexrelease> }%
311 <latexrelease> {%
312 <latexrelease> \ifundefined{\expandafter\@gobble\string#1\space}%
313 <latexrelease> {%
314 <latexrelease> \global\expandafter\let\csname
315 <latexrelease> \expandafter\@gobble\string#1\space\endcsname=#1%
316 <latexrelease> \edef\reserved@a{\string#1}%
317 <latexrelease> \def\reserved@b{#1}%
318 <latexrelease> \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
319 <latexrelease> \xdef#1{%
320 <latexrelease> \ifx\reserved@a\reserved@b
321 <latexrelease> \noexpand\x@protect\noexpand#1%
322 <latexrelease> \fi
323 <latexrelease> \noexpand\protect\expandafter\noexpand
324 <latexrelease> \csname\expandafter\@gobble\string#1\space\endcsname}%
325 <latexrelease> }%
326 <latexrelease> {\@latex@info{The control sequence '\string#1' is already robust}}%
327 <latexrelease> }%
328 <latexrelease>}%
329 <latexrelease>\let\@kernel@rename@newcommand\@undefined
330 <latexrelease>\EndIncludeInRelease
331 %
332 <latexrelease>\IncludeInRelease{2015/01/01}{\MakeRobust}{\MakeRobust}%
333 <latexrelease>\def\MakeRobust#1{%
334 <latexrelease> \ifundefined{\expandafter\@gobble\string#1}{%
335 <latexrelease> \@latex@error{The control sequence '\string#1' is undefined!%
336 <latexrelease> \MessageBreak There is nothing here to make robust}%
337 <latexrelease> \@eha
338 <latexrelease> }%
339 <latexrelease> {%
340 <latexrelease> \ifundefined{\expandafter\@gobble\string#1\space}%
341 <latexrelease> {%
342 <latexrelease> \expandafter\let\csname
343 <latexrelease> \expandafter\@gobble\string#1\space\endcsname=#1%
344 <latexrelease> \edef\reserved@a{\string#1}%
345 <latexrelease> \def\reserved@b{#1}%
346 <latexrelease> \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
347 <latexrelease> \xdef#1{%
348 <latexrelease> \ifx\reserved@a\reserved@b
349 <latexrelease> \noexpand\x@protect\noexpand#1%
350 <latexrelease> \fi
351 <latexrelease> \noexpand\protect\expandafter\noexpand
352 <latexrelease> \csname\expandafter\@gobble\string#1\space\endcsname}%
353 <latexrelease> }%
354 <latexrelease> {\@latex@info{The control sequence '\string#1' is already robust}}%

```



```

355 <latexrelease> }%
356 <latexrelease>}%
357 <latexrelease>\let\@kernel@rename@newcommand\@undefined
358 <latexrelease>\EndIncludeInRelease
359 %
360 <latexrelease>\IncludeInRelease{0000/00/00}{\MakeRobust}{\MakeRobust}%
361 <latexrelease>\let\MakeRobust\@undefined
362 <latexrelease>\let\@kernel@rename@newcommand\@undefined
363 <latexrelease>\EndIncludeInRelease
364 (*2ekernel)

```

(End definition for \MakeRobust and \@kernel@rename@newcommand. These functions are documented on page ??.)

**\kernel@make@fragile** The opposite of \MakeRobust except that it doesn't do many checks as it is internal to the kernel. Why does one want such a thing? Only for compatibility reasons if **latexrelease** requests a rollback of the kernel. For this reason we pretend that this command existed in all earlier versions of L<sup>A</sup>T<sub>E</sub>X i.e., we are not rolling it back since we need it precisely then. But we have to get it into the **latexrelease** file so that a roll forward is possible too.

```

365 </2ekernel>
366 (*2ekernel | latexrelease)
367 <latexrelease>\IncludeInRelease{2020/10/01}%
368 <latexrelease> { \kernel@make@fragile } { Undo robustness } %
369 \def\kernel@make@fragile#1{%
370   \ifundefined{\expandafter\@gobble\string#1\space}%

```

If not robust do nothing.

```

371   {}%

```

Otherwise copy \foo<sub>␣</sub> back to \foo. Then use \@kernel@rename@newcommand to check and copy \foo<sub>␣</sub> back to \foo in case the command has an optional argument. If so, also undefine \foo<sub>␣</sub>, and at the end undefine \foo<sub>␣</sub>.

```

372   {%
373     \global\expandafter\let\expandafter #1\csname
374       \expandafter\@gobble\string#1\space\endcsname
375     \expandafter\@kernel@rename@newcommand
376       \csname\expandafter\@gobble\string#1\expandafter\endcsname
377       \csname\expandafter\@gobble\string#1\space\endcsname
378     \global\expandafter\let\csname
379       \expandafter\@gobble\string#1\space\endcsname\@undefined
380   }%
381 }
382 <latexrelease>\EndIncludeInRelease
383 %
384 <latexrelease>\IncludeInRelease{0000/00/00}%
385 <latexrelease> { \kernel@make@fragile } { Undo robustness } %
386 <latexrelease>\def\kernel@make@fragile#1{%
387 <latexrelease> \ifundefined{\expandafter\@gobble\string#1\space}%
388 <latexrelease> {}%
389 <latexrelease> {%
390 <latexrelease> \global\expandafter\let\expandafter #1\csname
391 <latexrelease> \expandafter\@gobble\string#1\space\endcsname
392 <latexrelease> \global\expandafter\let\csname

```

```

393 <latexrelease> \expandafter\@gobble\string#1\space\endcsname\@undefined
394 <latexrelease> }%
395 <latexrelease>}
396 <latexrelease>\EndIncludeInRelease
397 </2ekernel| latexrelease>
398 <*2ekernel>

```

(End definition for \kernel@make@fragile. This function is documented on page ??.)

## 1.5 Acting on robust commands

```

399 </2ekernel>
400 <latexrelease>\IncludeInRelease{2020-10-01}{\robust@command@act}
401 <latexrelease> {Add \robust@command@act}%
402 <*2ekernel| latexrelease>

```

With most document level commands being robust now there is more of a requirement to have a standard way of aliasing (or copying) a command to a new name, for example to save an original definition before changing a command. `\DeclareCommandCopy` is analogous to  $\text{\TeX}$ 's `\let`, except that it copes with the different types of robust commands defined by  $\text{\LaTeX}$ 's mechanisms.

A couple of “types of robustness” are defined by the  $\text{\LaTeX} 2_{\epsilon}$  kernel, namely robust commands defined with `\DeclareRobustCommand` and commands with optional arguments defined with `\newcommand`. However there are other types of robust commands that are frequently used, which are not defined in the  $\text{\LaTeX} 2_{\epsilon}$  kernel, like commands defined with `xparse`'s `\NewDocumentCommand` and `etoolbox`'s `\newrobustcmd`.

In this section we will define a generic extensible machinery to act on robust commands. This code will then be used to test if a command is robust, considered the different types of robustness, and then either copy that definition, if `\DeclareCommandCopy` (or similar) is used, or show the definition of the command, if `\ShowCommand` is used.

`\robust@command@act` The looping machinery is generic and knows nothing about what is to be done for each case. The syntax of the main macro `\robust@command@act` is:

```

\robust@command@act<action-list><robust-cmd>
<fallback-action><act-arg>

```

*<action-list>* is a token list of the form:

```

{<if-type-1> <act-type-1>}
{<if-type-2> <act-type-2>}
...

```

`\robust@command@act` will iterate over the *<action-list>*, evaluating each *<if-type-n><robust-cmd>\iftrue*. If the *<if-type-n>* conditional returns *<>true>*, then *<act-type-n><act-arg>* is executed, and the loop ends. If the conditional returns *<>false>*, then *<if-type-n + 1>* is executed in the same way, until either one of the conditionals return *<>true>*, or the end of the *<action-list>* is reached. If the end is reached, then *<fallback-action><act-arg>* is executed before `\robust@command@act` exits.

`\robust@command@act` will start by using `\robust@command@act@chk@args` to check if the *<robust-cmd>* (#2) is a parameterless (possibly `\protected`) macro. If it is not, the command is not a robust command: these always start with a parameterless user-level macro; in that case, `\robust@command@act@end` is used to short-circuit the process and do the *<fallback-action>* (#3). This first test is necessary because later on we need to be

able to expand the  $\langle robust-cmd \rangle$  without the risk of it Breaking Badly, and as a bonus, this speeds up the process in case we used `\NewCommandCopy` in a “normal” macro.

```

403 \long\def\robust@command@act#1#2#3#4{%
404   \robust@command@chk@safe#2%
405   {\expandafter\robust@command@act@loop
406     \expandafter#2%
407     #1{\@nnil\@nnil}%
408     \robust@command@act@end}%
409   {\robust@command@act@end}%
410   {#3}{#4}}%

```

If `\robust@command@act@chk@args` branched to false, then `\robust@command@act@loop` will loop over the list of items in the  $\langle action-list \rangle$  ( $\#1$ ), and process each item as described earlier. If the  $\langle if-type-n \rangle$  command expands to  $\langle true \rangle$  then `\robust@command@act@do` is used to execute  $\langle act-type-n \rangle$  on the  $\langle act-arg \rangle$ , otherwise the loop resumes with the next item.

```

411 \long\def\robust@command@act@loop#1#2{\robust@command@act@loop@aux#1#2}
412 \long\def\robust@command@act@loop@aux#1#2#3{%
413   \ifx\@nnil#2%
414   \else
415     #2{#1}%
416     {\robust@command@act@do{#3}}%
417     {\expandafter\robust@command@act@loop\expandafter#1}%
418   \fi}
419 \long\def\robust@command@act@do#1%
420   \fi#2%
421   \robust@command@act@end#3#4{%
422   \fi
423   #1#4}

```

If the end is reached and no action was taken, then do  $\langle fallback-action \rangle \langle act-arg \rangle$ .

```

\robust@command@act@end
424 \long\def\robust@command@act@end#1#2{#1#2}

```

```

\robust@command@chk@safe
\robust@command@act@chk@args
425 \long\def\robust@command@chk@safe#1{%
426   \begingroup
427   \escapechar='\\
428   \expandafter\endgroup\expandafter
429   \robust@command@act@chk@args\meaning#1:->\@nnil}
430 \def\robust@command@act@chk@args#1:->#2\@nnil{%
431   \@expl@str@if@eq@nnTF{#1}{macro}%
432   {\@firstoftwo}%
433   {\@expl@str@if@eq@nnTF{#1}{\protected macro}%
434     {\@firstoftwo}%
435     {\@secondoftwo}}}

436 \</2ekernel | latexrelease>
437 \<latexrelease>\EndIncludeInRelease
438 \<latexrelease>\IncludeInRelease{0000-00-00}{\robust@command@act}
439 \<latexrelease> {Add \robust@command@act}%
440 \<latexrelease>\let\robust@command@act\@undefined
441 \<latexrelease>\let\robust@command@act@loop\@undefined
442 \<latexrelease>\let\robust@command@act@loop@aux\@undefined

```

```

443 <latexrelease>\let\robust@command@act@do\@undefined
444 <latexrelease>\let\robust@command@act@end\@undefined
445 <latexrelease>\let\robust@command@chk@safe\@undefined
446 <latexrelease>\let\robust@command@act@chk@args\@undefined
447 <latexrelease>\EndIncludeInRelease
448 <*2ekernel>

```

(End definition for `\robust@command@act` and others. These functions are documented on page ??.)

### 1.5.1 Copying robust commands

```

449 </2ekernel>
450 <latexrelease>\IncludeInRelease{2020-10-01}{\DeclareCommandCopy}
451 <latexrelease> {Add \NewCommandCopy, \RenewCommandCopy, and \DeclareCommandCopy}%
452 <*2ekernel | latexrelease>

```

`\NewCommandCopy` `\NewCommandCopy` starts by checking if `#1` is already defined, and raises an error if so, otherwise the definition is carried out. `\RenewCommandCopy` does (almost) the opposite. `\DeclareCommandCopy` If the command is *not* defined, then an error is raised. But the definition is carried out anyhow, so the behaviour is consistent with `\renewcommand`.

A `\ProvideCommandCopy` isn't defined because it's not reasonably useful. `\provide...` commands mean “define this if there's no other definition”, but copying a command (usually) implies that the command being copied is defined, so `\ProvideCommandCopy` doesn't make a lot of sense. But more importantly, the most common use case of copying a command is to redefine it later, while preserving the old definition, as in:

```

\ProvideCommandCopy \A \B
\renewcommand \B { ... \A ... }

```

then, if `\A` is already defined the first line is skipped, and in this case `\B` won't work as expected.

The three versions call the internal `\declare@commandcopy` with the proper action. `\@firstofone` will carry out the copy. The only case when the copy is not made is the `<false>` case for `\NewCommandCopy`, in which the command already exists and the definition is aborted.

```

453 \def\NewCommandCopy{%
454   \declare@commandcopy
455     {\@firstofone}%
456     {\@firstoftwo\@notdefinable}}
457 \def\RenewCommandCopy{%
458   \declare@commandcopy
459     {\@latexerror{Command \@backslashchar\reserved@a\space undefined}\@ehc
460     \@firstofone}%
461     {\@firstofone}}
462 \def\DeclareCommandCopy{%
463   \declare@commandcopy
464     {\@firstofone}%
465     {\@firstofone}}

```

Start by checking if the command is already defined. The proper action is taken by each specific command above. If all's good, then `\robust@command@act` is called with the proper arguments as described earlier, with `\@declarecommandcopylisthook` as the `<action-list>` and `\declare@commandcopy@let` as the `<fallback-action>`.

`\declare@commandcopy`

```

466 \long\def\declare@commandcopy#1#2#3#4{%
467   \edef\reserved@a{\@expl@cs@to@str@{N#3}}%
468   \@ifundefined\reserved@a{#1}{#2}%
469   {\robust@command@act
470    \@declarecommandcopylisthook#4%
471    \declare@commandcopy@let{#3#4}}}

```

The initial definition of `\@declarecommandcopylisthook` contains the tests for the two types of robust command in the kernel.

```

\@declarecommandcopylisthook
472 \def\@declarecommandcopylisthook{%
473   {\@if@DeclareRobustCommand \@copy@DeclareRobustCommand}%
474   {\@if@newcommand \@copy@newcommand}}

```

The initial definition of `\@declarecommandcopylisthook` contains the tests for the two types of robust command in the kernel.

```

475 \long\def\declare@commandcopy@let#1#2{\let#1=#2\relax}

\declare@commandcopy@let

```

Now the rollback code.

```

476 </2ekernel | latexrelease>
477 <latexrelease>\EndIncludeInRelease
478 <latexrelease>\IncludeInRelease{0000-00-00}{\DeclareCommandCopy}
479 <latexrelease> {Undefine \NewCommandCopy, \RenewCommandCopy, and \DeclareCommandCopy}%
480 <latexrelease>\let\NewCommandCopy\@undefined
481 <latexrelease>\let\RenewCommandCopy\@undefined
482 <latexrelease>\let\DeclareCommandCopy\@undefined
483 <latexrelease>\let\declare@commandcopy\@undefined
484 <latexrelease>\let\@declarecommandcopylisthook\@undefined
485 <latexrelease>\let\declare@commandcopy@let\@undefined
486 <latexrelease>\EndIncludeInRelease
487 <*2ekernel>

```

*(End definition for \NewCommandCopy and others. These functions are documented on page ??.)*

## 1.5.2 Showing robust commands

`\ShowCommand` Most of the machinery defined for `\NewCommandCopy` can be used to show the definition of a robust command, in a similar fashion to `\texdef`. The difference is that after the command's is detected to has a given type of robustness, rather than making a copy, we use a separate routine to show its definition.

With all the machinery in place, `\ShowCommand` itself is quite simple: use `\robust@command@act` to iterate through the `\@showcommandlisthook` list, and if nothing is found, fallback to `\show`.

```

488 </2ekernel>
489 <latexrelease>\IncludeInRelease{2020-10-01}{\ShowCommand}%
490 <latexrelease> {Add \ShowCommand}%
491 <*2ekernel | latexrelease>

492 \long\def\ShowCommand#1{%
493   \robust@command@act
494   \@showcommandlisthook#1%
495   \show#1}

```

The initial definition of `\@showcommandlisthook` contains the same tests as used for copying, but `\@show@...` commands instead of `\@copy@...`. Same as before, it is initialised to cope with `\DeclareRobustCommand` and `\newcommand` with optional arguments.

```

496 \def\@showcommandlisthook{%
497   {\@if@DeclareRobustCommand \@show@DeclareRobustCommand}%
498   {\@if@newcommand \@show@newcommand}}

```

Now the rollback code.

```

499 </2ekernel | latexrelease>
500 <latexrelease>\EndIncludeInRelease
501 <latexrelease>\IncludeInRelease{0000-00-00}{\ShowCommand}
502 <latexrelease> {Undefine \ShowCommand}%
503 <latexrelease>\let\ShowCommand\@undefined
504 <latexrelease>\let\@showcommandlisthook\@undefined
505 <latexrelease>\EndIncludeInRelease
506 <*2ekernel>

```

*(End definition for \ShowCommand and \@showcommandlisthook. These functions are documented on page ??.)*

```

507 </2ekernel>
508 <latexrelease>\IncludeInRelease{2020-10-01}{\@if@DeclareRobustCommand}
509 <latexrelease> {Add \@if@DeclareRobustCommand, \@if@newcommand,
510 <latexrelease>      \@copy@DeclareRobustCommand, \@copy@newcommand,
511 <latexrelease>      \@show@DeclareRobustCommand, \@show@newcommand}%
512 <*2ekernel | latexrelease>

```

### 1.5.3 Commands defined with `\DeclareRobustCommand`

`\@if@DeclareRobustCommand` Now that we provided a generic way to copy one macro to another, we need to define a way to check if a command is one of L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>'s robust types. These tests are heavily based on Heiko's `\LetLtxMacro`, but chopped into separate macros.

`\@if@DeclareRobustCommand` checks if a command `\cmd` was defined by `\DeclareRobustCommand`. The test returns true if the expansion of `\cmd` is exactly `\protect\cmd_`.

```

513 \long\def\@if@DeclareRobustCommand#1{%
514   \begingroup
515     \escapechar='\\
516     \edef\reserved@a{\string#1}%
517     \edef\reserved@b{\detokenize{#1}}%
518     \xdef\@gtempa{%
519       \ifx\reserved@a\reserved@b
520         \noexpand\x@protect
521         \noexpand#1%
522       \fi
523       \noexpand\protect
524       \expandafter\noexpand\csname\@expl@cs@to@str@N#1 \endcsname}%
525   \endgroup
526   \ifx\@gtempa#1\relax
527     \expandafter\@firstoftwo
528   \else
529     \expandafter\@secondoftwo
530   \fi}

```

\@copy@DeclareRobustCommand  
\copy@kernel@robust@command

If a command was defined by \DeclareRobustCommand (that is, \@if@DeclareRobustCommand returns true), then to make a copy of \cmd into \foo we define the latter such that it expands to \protect\foo, then make \foo equal to \cmd.

There is one detail we need to take care of: if a command was defined with \DeclareRobustCommand it may still have an optional argument, in which case there is one more macro layer before the actual definition of the command. We use \@if@newcommand to check that and \@copy@newcommand to do the copying.

```

531 \long\def\@copy@DeclareRobustCommand#1#2{%
532   \begingroup
533   \escapechar='\'
534   \edef\reserved@a{\string#1}%
535   \edef\reserved@b{\detokenize{#1}}%
536   \edef\reserved@a{%
537     \endgroup
538     \def\noexpand#1{%
539       \ifx\reserved@a\reserved@b
540         \noexpand\x@protect
541         \noexpand#1%
542       \fi
543       \noexpand\protect
544       \expandafter\noexpand\csname\@expl@cs@to@str@N#1 \endcsname}%
545     \noexpand\copy@kernel@robust@command
546     \expandafter\noexpand\csname\@expl@cs@to@str@N#1 \endcsname
547     \expandafter\noexpand\csname\@expl@cs@to@str@N#2 \endcsname}%
548     \reserved@a}
549 \long\def\copy@kernel@robust@command#1#2{%
550   \robust@command@chk@safe#2%
551   {\@if@newcommand#2%
552     {\@copy@newcommand}%
553     {\declare@commandcopy@let}}
554   {\declare@commandcopy@let}%
555   #1#2}

```

\@show@DeclareRobustCommand  
\show@kernel@robust@command

Showing the command is pretty simple. This command prints the top-level expansion as TeX's \show would, but with robust macro: rather than just macro:, then a blank line and then \show the inner command. For a macro defined with, say, \DeclareRobustCommand\foo[1]{bar}, it will print:

```

> \foo=robust macro:
->\protect \foo

> \foo =\long macro:
#1->bar.

```

If the inner command is defined with an optional argument, then \@show@newcommand is also used.

The value of \escapechar is deliberately not enforced, so \ShowCommand behaves more like \show.

```

556 \long\def\@show@DeclareRobustCommand#1{%
557   \typeout{> \string#1=robust macro:}%
558   \typeout{->\@expl@cs@replacement@spec@N#1.^^J}%
559   \expandafter\show@kernel@robust@command
560   \csname\@expl@cs@to@str@N#1 \endcsname}

```

```

561 \long\def\show@kernel@robust@command#1{%
562   \robust@command@chk@safe#1%
563   {\@if@newcommand#1%
564     {\@show@newcommand}%
565     {\show}}}%
566   {\show}%
567   #1}

```

(End definition for \if@DeclareRobustCommand and others. These functions are documented on page ??.)

#### 1.5.4 Commands defined with \newcommand (with optional argument)

**\@if@newcommand** A command \cmd (or \cmd<sub>␣</sub>, if it was defined with \DeclareRobustCommand) with an optional argument will expand to \@protected@testopt\cmd\cmd{<opt>}. To check that we look at the first three tokens in the expansion of \cmd, and return true or false accordingly.

This test *requires* that the command be a parameterless macro, otherwise it will not work (and probably break). This is ensured with \robust@command@chk@safe before calling \@if@newcommand.

```

568 \long\def\@if@newcommand#1{%
569   \edef\reserved@a{%
570     \noexpand\@protected@testopt
571     \noexpand#1%
572     \expandafter\noexpand\csname\@backslashchar\@expl@cs@to@str@@N#1\endcsname}%
573   \edef\reserved@b{%
574     \unexpanded\expandafter\expandafter\expandafter
575     {\expandafter\@carcube#1{}{}{}\@nil}}%
576   \ifx\reserved@a\reserved@b
577     \expandafter\@firstoftwo
578   \else
579     \expandafter\@secondoftwo
580   \fi}

```

**\@copy@newcommand** Then, if a command \cmd takes an optional argument, we copy it to \foo by defining the latter to expand to \@protected@testopt\foo\foo{<opt>}.

```

581 \long\def\@copy@newcommand#1#2{%
582   \edef#1{\noexpand\@protected@testopt
583     \noexpand#1%
584     \expandafter\noexpand\csname\@backslashchar\@expl@cs@to@str@@N#1\endcsname
585     \unexpanded\expandafter\expandafter\expandafter
586     {\expandafter\@gobblethree#2}}%
587   \expandafter
588   \let\csname\@backslashchar\@expl@cs@to@str@@N#1\endcsname
589     \csname\@backslashchar\@expl@cs@to@str@@N#2\endcsname}

```

**\@show@newcommand**  
**\@show@newcommand@aux** A command being \shown here is guaranteed to have an optional argument. Start by showing the top-level expansion of the command (using \typeout to avoid TeX asking for interaction and extra context lines), then call \@show@newcommand@aux with the internal command, which contains the actual definition, and with the expansion of the command to extract the default value of the optional argument.

```

590 \long\def\@show@newcommand#1{%
591   \typeout{> \string#1=robust macro:}%

```



```

592 \typeout{->\@expl@cs@replacement@spec@N#1.^^J}%
593 \expandafter\show@newcommand@aux
594 \csname\@backslashchar\@expl@cs@to@str@N#1\expandafter\endcsname
595 \expandafter{#1}}

```

For a macro defined with, say, `\newcommand\foo[1][opt]{bar}`, it will print:

```

> \foo=robust macro:
->\@protected@testopt \foo \foo {opt}.

> \foo=\long macro:
> default #1=opt.
[#1]->bar.

```

If the command was defined with `\DeclareRobustCommand`, then another pair of lines show the top-level expansion `\protect\foo`.

The extra gymnastics with `\showtokens` ensures that `\showtokens` itself, and the internals of this macro aren't showed in the context lines.

```

596 \long\def\show@newcommand@aux#1#2{%
597 \typeout{> \string#1=\@expl@cs@prefix@spec@N#1macro:}%
598 \edef\reserved@a{%
599 default \string##1=\expandafter\detokenize\@gobblethree#2.^^J%
600 \@expl@cs@argument@spec@N#1->\@expl@cs@replacement@spec@N#1}%
601 \showtokens\expandafter\expandafter\expandafter{\expandafter\reserved@a}}

```

Now the rollback code.

```

602 </2ekernel | latexrelease>
603 <latexrelease>\EndIncludeInRelease
604 <latexrelease>\IncludeInRelease{0000-00-00}{\@if@DeclareRobustCommand}
605 <latexrelease> {Undefine \@if@DeclareRobustCommand, \@if@newcommand,
606 <latexrelease> \@copy@DeclareRobustCommand, \@copy@newcommand,
607 <latexrelease> \@show@DeclareRobustCommand, \@show@newcommand}%
608 <latexrelease>\let\@if@DeclareRobustCommand\@undefined
609 <latexrelease>\let\@copy@DeclareRobustCommand\@undefined
610 <latexrelease>\let\@show@DeclareRobustCommand\@undefined
611 <latexrelease>\let\@if@newcommand\@undefined
612 <latexrelease>\let\@copy@newcommand\@undefined
613 <latexrelease>\let\@show@newcommand\@undefined
614 %
615 <latexrelease>\let\copy@kernel@robust@command\@undefined
616 <latexrelease>\let\show@kernel@robust@command\@undefined
617 <latexrelease>\let\@show@newcommand@aux\@undefined
618 <latexrelease>\EndIncludeInRelease
619 <*2ekernel>

```

(End definition for `\@if@newcommand` and others. These functions are documented on page ??.)

## 1.6 Internal defining commands

These commands are used internally to define other L<sup>A</sup>T<sub>E</sub>X commands.

```

\@ifundefined Check if first arg is undefined or \relax and execute second or third arg depending,
620 </2ekernel>
621 <latexrelease>\IncludeInRelease{2018-04-01}{\@ifundefined}

```

```

622 <latexrelease>{Leave commands undefined in \@ifundefined}%
623 <*2ekernel | latexrelease>

```

Version using \ifcsname to avoid defining undefined tokens to \relax. Defined here to simplify using unmatched \fi.

```

624 \def\@ifundefined#1{%
625   \ifcsname#1\endcsname\@ifundefin@d@i\else\@ifundefin@d@ii\fi{#1}}
626 \long\def\@ifundefin@d@i#1\fi#2{\fi
627   \expandafter\ifx\csname #2\endcsname\relax
628     \@ifundefin@d@ii
629   \fi
630   \@secondoftwo}
631 \long\def\@ifundefin@d@ii\fi#1#2#3{\fi #2}

```

Now test of engine.

```

632 \ifx\numexpr\@undefined

```

Classic version (should not be needed as etex is assumed).

```

633 \def\@ifundefined#1{%
634   \expandafter\ifx\csname#1\endcsname\relax
635     \expandafter\@firstoftwo
636   \else
637     \expandafter\@secondoftwo
638   \fi}
639 \else\ifx\directlua\@undefined

```

Use the \ifcsname defined above.

```

640 \else

```

Optimised version for LuaTeX, using \lastnamedcs

```

641 \def\@ifundefined#1{%
642   \ifcsname#1\endcsname
643     \expandafter\ifx\lastnamedcs\relax\else\@ifundefin@d@i\fi
644   \fi
645   \@firstoftwo}
646 \long\def\@ifundefin@d@i#1#2#3#4#5{#1#2#5}
647 \fi
648 \fi
649 </2ekernel | latexrelease>
650 <latexrelease>\EndIncludeInRelease
651 <latexrelease>\IncludeInRelease{0000-00-00}{\@ifundefined}
652 <latexrelease>{Leave commands undefined in \@ifundefined}%
653 <latexrelease>\def\@ifundefined#1{%
654 <latexrelease>   \expandafter\ifx\csname#1\endcsname\relax
655 <latexrelease>     \expandafter\@firstoftwo
656 <latexrelease>   \else
657 <latexrelease>     \expandafter\@secondoftwo
658 <latexrelease>   \fi}
659 <latexrelease>\EndIncludeInRelease
660 <*2ekernel>

```

*(End definition for \@ifundefined. This function is documented on page ??.)*

`\@qend`    The following define `\@qend` and `\@qrelax` to be the strings ‘end’ and ‘relax’ with the characters `\catcoded 12`.

```
661 \edef\@qend{\expandafter\@cdr\string\end\@nil}
662 \edef\@qrelax{\expandafter\@cdr\string\relax\@nil}
```

*(End definition for \@qend and \@qrelax. These functions are documented on page ??.)*

`\@ifnextchar`    `\@ifnextchar` peeks at the following character and compares it with its first argument. If both are the same it executes its second argument, otherwise its third.

```
663 \long\def\@ifnextchar#1#2#3{%
664   \let\reserved@d=#1%
665   \def\reserved@a{#2}%
666   \def\reserved@b{#3}%
667   \futurelet\@let@token\@ifnch}
```

*(End definition for \@ifnextchar. This function is documented on page ??.)*

`\kernel@ifnextchar`    This macro is the kernel version of `\@ifnextchar` which is used in a couple of places to prevent the AMS variant from being used since in some places this produced chaos (for example if an `fd` file is loaded in a random place then the optional argument to `\ProvidesFile` could get printed there instead of being written only in the log file. This happened when there was a space or a newline between the mandatory and optional arguments! It should really be fixed in the `amsmath` package one day, but...

Note that there may be other places in the kernel where this version should be used rather than the original, but variable, version.

```
668 \let\kernel@ifnextchar\@ifnextchar
```

*(End definition for \kernel@ifnextchar. This function is documented on page ??.)*

`\@ifnch`    `\@ifnch` is a tricky macro to skip any space tokens that may appear before the character in question. If it encounters a space token, it calls `xifnch`.

```
669 \def\@ifnch{%
670   \ifx\@let@token\@sptoken
671     \let\reserved@c\@xifnch
672   \else
673     \ifx\@let@token\reserved@d
674       \let\reserved@c\reserved@a
675     \else
676       \let\reserved@c\reserved@b
677     \fi
678   \fi
679   \reserved@c}
```

*(End definition for \@ifnch. This function is documented on page ??.)*

`\@sptoken`    The following code makes `\@sptoken` a space token. It is important here that the control sequence `\:` consists of a non-letter only, so that the following whitespace is significant. Together with the fact that the equal sign in a `\let` may be followed by only one optional space the desired effect is achieved. NOTE: the following hacking must precede the definition of `\:` as math medium space.

```
680 \def\:\{\let\@sptoken= } \: % this makes \@sptoken a space token
```

*(End definition for \@sptoken. This function is documented on page ??.)*

`\@xifnch` In the following definition of `\@xifnch`, `\:` is again used to get a space token as delimiter into the definition.

```
681 \def\:\@xifnch\ \expandafter\def\:\ {\futurelet\@let@token\@ifnch}
```

(End definition for `\@xifnch`. This function is documented on page ??.)

`\@ifstar` The new implementation below avoids passing the *<true code>* Through one more `\def` than the *<false code>*, which previously meant that `#` had to be written as `####` in one argument, but `##` in the other. The `*` is gobbled by `\@firstoftwo`.

```
682 \def\@ifstar#1{\@ifnextchar *\@firstoftwo{#1}}
```

(End definition for `\@ifstar`. This function is documented on page ??.)

`\@dblarg`

`\@xdblarg`

```
683 \long\def\@dblarg#1{\kernel@ifnextchar[{#1}]{\@xdblarg{#1}}
```

```
684 \long\def\@xdblarg#1#2{#1[{#2}]{#2}}
```

(End definition for `\@dblarg` and `\@xdblarg`. These functions are documented on page ??.)

`\@sanitize` The command `\@sanitize` changes the catcode of all special characters except for braces to ‘other’. It can be used for commands like `\index` that want to write their arguments verbatim. Needless to say, this command should only be executed within a group, or chaos will ensue.

```
685 \def\@sanitize{\@makeother\ \@makeother\\\@makeother\$\@makeother\&%
```

```
686 \@makeother\#\@makeother\^\@makeother\_ \@makeother\% \@makeother\~}
```

(End definition for `\@sanitize`. This function is documented on page ??.)

`\@onelevel@sanitize` This makes the whole “meaning” of `#1` (its one-level expansion) into catcode 12 tokens: it could be used in `\DeclareRobustCommand`.

If it is to be used on default float specifiers, this should be done when they are defined.

```
687 \def \@onelevel@sanitize #1{%
688   \edef #1{\expandafter\strip@prefix
689     \meaning #1}%
690 }
```

(End definition for `\@onelevel@sanitize`. This function is documented on page ??.)

`\string@makeletter` Iterates through a string, turning each alphabetic character into a catcode-11 token (partly undoes a `\detokenize`). Useful for `\ifx`-based string comparisons where `\detokenize`-ing the other string would break too much code.

The macro uses `expl3`’s `\@expl@str@map@function@NN` to iterate on the string (without losing spaces) and applies `\@string@makeletter` on each character. The latter checks if character is between `a–z` or `A–Z`, and uses `\@alph` or `\@Alph` to get the corresponding catcode-11 token. Other tokens are passed through unchanged.

```
691 \</2kernel>
692 \<latexrelease>\IncludeInRelease{2020/10/01}{\string@makeletter}
693 \<latexrelease> {Add \string@makeletter}%
694 \<*2kernel | latexrelease>
695 \def\string@makeletter#1{%
696   \@expl@str@map@function@NN#1\@string@makeletter}
697 \def\@string@makeletter#1{%
```

```

698 \char@if@alph{#1}%
699 {\@expl@char@generate@nn{#1}{11}}%
700 {#1}}
701 \def\char@if@alph#1{%
702 \ifnum0\ifnum#1<'A 1\fi\ifnum#1>'z 1\fi
703 \if\ifnum#1>'Z @\fi\ifnum#1<'a @\fi01\fi>0
704 \expandafter\@secondoftwo
705 \else
706 \expandafter\@firstoftwo
707 \fi}
708 </2ekernel|latexrelease>
709 <latexrelease>\EndIncludeInRelease
710 %
711 <latexrelease>\IncludeInRelease{0000/00/00}{\string@makeletter}
712 <latexrelease> {Undefine \string@makeletter}%
713 <latexrelease>\let\string@makeletter\undefined
714 <latexrelease>\let@string@makeletter\undefined
715 <latexrelease>\let\char@if@alph\undefined
716 <latexrelease>\EndIncludeInRelease
717 <*2ekernel>

```

(End definition for \string@makeletter, \@string@makeletter, and \char@if@alph. These functions are documented on page ??.)

`\makeatletter` Make internal control sequences accessible or inaccessible.

`\makeatother` 718 \DeclareRobustCommand\makeatletter{\catcode'\@11\relax}  
719 \DeclareRobustCommand\makeatother{\catcode'\@12\relax}

(End definition for \makeatletter and \makeatother. These functions are documented on page ??.)

## 2 Discretionary Hyphenation

`\-`  
`\@dischyph`

Moved here to be after the definition of `\DeclareRobustCommand`.

The primitive `\-` command adds a discretionary hyphen using the current font's `\hyphenchar`. Monospace fonts are usually declared with `\hyphenchar` set to `-1` to suppress hyphenation.

L<sup>A</sup>T<sub>E</sub>X, from L<sup>A</sup>T<sub>E</sub>X2.09 in 1986 defined `\-` by

```
\def\-\{\discretionary{-}{-}{-}}
```

The following comment was added when these commands were first set up, 19 April 1986:

the `\-` command is redefined to allow it to work in the `\ttfamily` type style, where automatic hyphenation is suppressed by setting `\hyphenchar` to `-1`. The original primitive T<sub>E</sub>X definition is saved as `\@@hyph` just in case anyone needs it.

L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>, between 1993 and 2017, had a comment at this point saying that the definition “would probably change” because the definition always uses `-`. The definition used below was given in comments at this point during time.

In 2017 we finally enabled this definition by default, with the older L<sup>A</sup>T<sub>E</sub>X definition accessible via `latexrelease` as usual.

In Lua<sup>A</sup>T<sub>E</sub>X the primitive definition of `\-` is used directly because it's use of extended hyphenation parameters means that `\-` works correctly even with `\hyphenchar` set to `-1`. This change makes `\-` under Lua<sup>A</sup>T<sub>E</sub>X compatible with language specific hyphenation characters.

Temporary definition of `\@latex@info`, final definition is later.

```

720 \def\@latex@info#1{}
721 </2ekernel>
722 <latexrelease>\IncludeInRelease{2020/10/01}{\-\-}{Use primitive \- in Lua\LaTeX}%
723 <*2ekernel | latexrelease>
724 \ifx\directlua\@undefined
725   \DeclareRobustCommand{\-\-}{%
726     \discretionary{%
727       \char \ifnum\hyphenchar\font<\z@
728         \defaultthyphenchar
729       \else
730         \hyphenchar\font
731       \fi
732     }{}{}%
733   }
734 \else
735   \let\-\- \@@hyph
736 \fi
737 </2ekernel | latexrelease>
738 <latexrelease>\EndIncludeInRelease
739 <latexrelease>\IncludeInRelease{2017/04/15}{\-\-}{Use \hyphenchar in \-\-}%
740 <latexrelease>\DeclareRobustCommand{\-\-}{%
741 <latexrelease> \discretionary{%
742 <latexrelease> \char \ifnum\hyphenchar\font<\z@
743 <latexrelease> \defaultthyphenchar
744 <latexrelease> \else
745 <latexrelease> \hyphenchar\font
746 <latexrelease> \fi
747 <latexrelease> }{}{}%
748 <latexrelease>}
749 <latexrelease>\EndIncludeInRelease
750 <latexrelease>\IncludeInRelease{0000/00/00}{\-\-}{Use \hyphenchar in \-\-}%
751 <latexrelease>\def\-\-\{\discretionary{-}{}{}\}
752 <latexrelease>\EndIncludeInRelease
753 <*2ekernel | latexrelease>
754 \let\@dischyph=\-
755 </2ekernel | latexrelease>
756 <*2ekernel>

```

*(End definition for `\-` and `\@dischyph`. These functions are documented on page ??.)*

Delayed from `ltvers.dtx`

```

757 \newif\if@includeinrelease
758 \@includeinreleasefalse

```

Delayed from `ltplain.dtx`

```

759 </2ekernel>
760 <*2ekernel | latexrelease>
761 <latexrelease>\IncludeInRelease{2019/10/01}%
762 <latexrelease> \allowbreak}{Make various commands robust}%

```

```

763 \MakeRobust\allowbreak
764 \MakeRobust\bigbreak
765 \MakeRobust\break
766 \MakeRobust\dotfill
767 \MakeRobust\frenchspacing
768 \MakeRobust\goodbreak
769 \MakeRobust\hrulefill
770 \MakeRobust\medbreak
771 \MakeRobust\nobreak
772 \MakeRobust\nonfrenchspacing
773 \MakeRobust\obeylines
774 \MakeRobust\obeyspaces
775 \MakeRobust\slash
776 \MakeRobust\smallbreak
777 \MakeRobust\strut
778 \MakeRobust\underbar
779 </2ekernel | latexrelease>
780 <latexrelease>\EndIncludeInRelease
781 <latexrelease>\IncludeInRelease{0000/00/00}%
782 <latexrelease>                {\allowbreak}{Make various commands robust}%
783 <latexrelease>
784 <latexrelease>\kernel@make@fragile\allowbreak
785 <latexrelease>\kernel@make@fragile\bigbreak
786 <latexrelease>\kernel@make@fragile\break
787 <latexrelease>\kernel@make@fragile\dotfill
788 <latexrelease>\kernel@make@fragile\frenchspacing
789 <latexrelease>\kernel@make@fragile\goodbreak
790 <latexrelease>\kernel@make@fragile\hrulefill
791 <latexrelease>\kernel@make@fragile\medbreak
792 <latexrelease>\kernel@make@fragile\nobreak
793 <latexrelease>\kernel@make@fragile\nonfrenchspacing
794 <latexrelease>\kernel@make@fragile\obeylines
795 <latexrelease>\kernel@make@fragile\obeyspaces
796 <latexrelease>\kernel@make@fragile\slash
797 <latexrelease>\kernel@make@fragile\smallbreak
798 <latexrelease>\kernel@make@fragile\strut
799 <latexrelease>\kernel@make@fragile\underbar
800 <latexrelease>
801 <latexrelease>\EndIncludeInRelease
802 <*2ekernel>

```

`\g@addto@macro` Globally add to the end of a macro.

```

803 \long\def\g@addto@macro#1#2{%
804   \begingroup
805     \toks@\expandafter{#1#2}%
806     \xdef#1{\the\toks@}%
807   \endgroup}

```

*(End definition for \g@addto@macro. This function is documented on page ??.)*

```

808 </2ekernel>

```

# File g

## lthooks.dtx

### Contents

## 1 Introduction

Hooks are points in the code of commands or environments where it is possible to add processing code into existing commands. This can be done by different packages that do not know about each other and to allow for hopefully safe processing it is necessary to sort different chunks of code added by different packages into a suitable processing order.

This is done by the packages adding chunks of code (via `\AddToHook`) and labeling their code with some label by default using the package name as a label.

At `\begin{document}` all code for a hook is then sorted according to some rules (given by `\DeclareHookRule`) for fast execution without processing overhead. If the hook code is modified afterwards (or the rules are changed), a new version for fast processing is generated.

Some hooks are used already in the preamble of the document. If that happens then the hook is prepared for execution (and sorted) already at that point.

## 2 Package writer interface

The hook management system is offered as a set of CamelCase commands for traditional  $\text{\LaTeX} 2_{\epsilon}$  packages (and for use in the document preamble if needed) as well as `expl3` commands for modern packages, that use the L3 programming layer of  $\text{\LaTeX}$ . Behind the scenes, a single set of data structures is accessed so that packages from both worlds can coexist and access hooks in other packages.

### 2.1 $\text{\LaTeX} 2_{\epsilon}$ interfaces

#### 2.1.1 Declaring hooks and using them in code

With two exceptions, hooks have to be declared before they can be used. The exceptions are hooks in environments (i.e., executed at `\begin` and `\end`) and hooks run when loading files, e.g. before and after a package is loaded, etc. Their hook names depend on the environment or the file name and so declaring them beforehand is difficult.

---

**`\NewHook`****`\NewHook {<hook>}`**

Creates a new `<hook>`. If this is a hook provided as part of a package it is suggested that the `<hook>` name is always structured as follows: `<package-name>/<hook-name>`. If necessary you can further subdivide the name by adding more `/` parts. If a hook name is already taken, an error is raised and the hook is not created.

The `<hook>` can be specified using the dot-syntax to denote the current package name. See section [2.1.3](#).



---

<code>\NewReversedHook</code>	<code>\NewReversedHook {&lt;hook&gt;}</code>
-------------------------------	----------------------------------------------

---

Like `\NewHook` declares a new  $\langle hook \rangle$ . the difference is that the code chunks for this hook are in reverse order by default (those added last are executed first). Any rules for the hook are applied after the default ordering. See sections 2.3 and 2.4 for further details.

The  $\langle hook \rangle$  can be specified using the dot-syntax to denote the current package name. See section 2.1.3.

---

<code>\NewMirroredHookPair</code>	<code>\NewMirroredHookPair {&lt;hook-1&gt;} {&lt;hook-2&gt;}</code>
-----------------------------------	---------------------------------------------------------------------

---

A shorthand for `\NewHook{<hook-1>}\NewReversedHook{<hook-2>}`.

The  $\langle hooks \rangle$  can be specified using the dot-syntax to denote the current package name. See section 2.1.3.

---

<code>\UseHook</code>	<code>\UseHook {&lt;hook&gt;}</code>
-----------------------	--------------------------------------

---

Execute the hook code inside a command or environment.

Before `\begin{document}` the fast execution code for a hook is not set up, so in order to use a hook there it is explicitly initialized first. As that involves assignments using a hook at those times is not 100% the same as using it after `\begin{document}`.

The  $\langle hook \rangle$  *cannot* be specified using the dot-syntax. A leading . is treated literally.

---

<code>\UseOneTimeHook</code>	<code>\UseOneTimeHook {&lt;hook&gt;}</code>
------------------------------	---------------------------------------------

---

Some hooks are only used (and can be only used) in one place, for example, those in `\begin{document}` or `\end{document}`. Once we have passed that point adding to the hook through a defined  $\langle addto-cmd \rangle$  command (e.g., `\AddToHook` or `\AtBeginDocument`, etc.) would have no effect (as would the use of such a command inside the hook code itself). It is therefore customary to redefine  $\langle addto-cmd \rangle$  to simply process its argument, i.e., essentially make it behave like `@firstofone`.

`\UseOneTimeHook` does that: it records that the hook has been consumed and any further attempt to add to it will result in executing the code to be added immediately.

*FMi: Maybe add an error version as well?*

The  $\langle hook \rangle$  *cannot* be specified using the dot-syntax. A leading . is treated literally.

### 2.1.2 Updating code for hooks

---

<code>\AddToHook</code>	<code>\AddToHook {&lt;hook&gt;}[&lt;label&gt;]{&lt;code&gt;}</code>
-------------------------	---------------------------------------------------------------------

---

Adds `<code>` to the `<hook>` labeled by `<label>`. If the optional argument `<label>` is not provided, if `\AddToHook` is used in a package/class, then the current package/class name is used, otherwise `top-level` is used (see section 2.1.3).

If there already exists code under the `<label>` then the new `<code>` is appended to the existing one (even if this is a reversed hook). If you want to replace existing code under the `<label>`, first apply `\RemoveFromHook`.

The hook doesn't have to exist for code to be added to it. However, if it is not declared later then obviously the added `<code>` will never be executed. This allows for hooks to work regardless of package loading order and enables packages to add to hook of other packages without worrying whether they are actually used in the current document. See section 2.1.5.

The `<hook>` and `<label>` can be specified using the dot-syntax to denote the current package name. See section 2.1.3.

---

<code>\RemoveFromHook</code>	<code>\RemoveFromHook {&lt;hook&gt;}[&lt;label&gt;]</code>
------------------------------	------------------------------------------------------------

---

Removes any code labeled by `<label>` from the `<hook>`. If the optional argument `<label>` is not provided, if `\AddToHook` is used in a package/class, then the current package/class name is used, otherwise `top-level` is used.

If the code for that `<label>` wasn't yet added to the `<hook>`, an order is set so that when some code attempts to add that label, the removal order takes action and the code is not added.

If the optional argument is `*`, then all code chunks are removed. This is rather dangerous as it drops code from other packages one may not know about!

The `<hook>` and `<label>` can be specified using the dot-syntax to denote the current package name. See section 2.1.3.

In contrast to the `voids` relationship between two labels in a `\DeclareHookrule` this is a destructive operation as the labeled code is removed from the hook data structure, whereas the relationship setting can be undone by providing a different relationship later.

A useful application for this declaration inside the document body is when one wants to temporarily add code to hooks and later remove it again, e.g.,

```
\AddToHook{env/quote/before}{\small}
\begin{quote}
  A quote set in a smaller typeface
\end{quote}
...
\RemoveFromHook{env/quote/before}
... now back to normal for further quotes
```

Note that you can't cancel the setting with

```
\AddToHook{env/quote/before}{}
```

because that only "adds" a further empty chunk of code to the hook. Adding `\normalsize` would work but that means the hook then contained `\small\normalsize` which means to font size changes for no good reason.

The above is only needed if one wants to typeset several quotes in a smaller typeface. If the hook is only needed once then `\AddToHookNext` is simpler, because it resets itself after one use.

---

`\AddToHookNext`

---

`\AddToHookNext {<hook>}{<code>}`

Adds `<code>` to the next invocation of the `<hook>`. The code is executed after the normal hook code has finished and it is executed only once, i.e. it is deleted after it was used.

Using the declaration is a global operation, i.e., the code is not lost, even if the declaration is used inside a group and the next invocation happens after the group. If the declaration is used several times before the hook is executed then all code is executed in the order in which it was declared.<sup>2</sup>

It is possible to nest declarations using the same hook (or different hooks), e.g.,

`\AddToHookNext{<hook>}{<code-1>\AddToHookNext{<hook>}{<code-2>}}`

will execute `<code-1>` next time the `<hook>` is used and at that point puts `<code-2>` into the `<hook>` so that it gets executed on following time the hook is run.

A hook doesn't have to exist for code to be added to it. This allows for hooks to work regardless of package loading order. See section 2.1.5.

The `<hook>` can be specified using the dot-syntax to denote the current package name. See section 2.1.3.

### 2.1.3 Hook names and default labels

It is best practice to use `\AddToHook` in packages or classes *without specifying a <label>* because then the package or class name is automatically used, which is helpful if rules are needed, and avoids mistyping the `<label>`.

Using an explicit `<label>` is only necessary in very specific situations, e.g., if you want to add several chunks of code into a single hook and have them placed in different parts of the hook (by providing some rules).

The other case is when you develop a larger package with several sub-packages. In that case you may want to use the same `<label>` throughout the sub-packages in order to avoid that the labels change if you internally reorganize your code.

Except for `\UseHook`, `\UseOneTimeHook`, `\IfHookEmptyTF`, and `\IfHookExistsTF` (and their `expl3` interfaces `\hook_use:n`, `\hook_use_once:n`, `\hook_if_empty:nTF`, and `\hook_if_exist:nTF`), all `<hook>` and `<label>` arguments are processed in the same way: first, spaces are trimmed around the argument, then it is fully expanded until only character tokens remain. If the full expansion of the `<hook>` or `<label>` contains a non-expandable non-character token, a low-level `TeX` error is raised (namely, the `<hook>` is expanded using `TeX`'s `\csname...\endcsname`, as such, Unicode characters are allowed in `<hook>` and `<label>` arguments). The arguments of `\UseHook` and `\UseOneTimeHook` are processed much in the same way except that spaces are not trimmed around the argument, for better performance.

It is not enforced, but highly recommended that the hooks defined by a package, and the `<labels>` used to add code to other hooks contain the package name to easily identify the source of the code chunk and to prevent clashes. This should be the standard practice, so this hook management code provides a shortcut to refer to the current package in the name of a `<hook>` and in a `<label>`. If `<hook>` name or `<label>` consist just of a single dot (`.`), or starts with a dot followed by a slash (`./`) then the dot denotes the `<default label>`

---

<sup>2</sup>There is no mechanism to reorder such code chunks (or delete them).

(usually the current package or class name—see `\DeclareDefaultHookLabel`). A “.” or “./” anywhere else in a  $\langle hook \rangle$  or in  $\langle label \rangle$  is treated literally and is not replaced.

For example, inside the package `mypackage.sty`, the default label is `mypackage`, so the instructions:

```
\NewHook      {./hook}
\AddToHook {./hook}[.]{code}      % Same as \AddToHook{./hook}{code}
\AddToHook {./hook}[./sub]{code}
\DeclareHookRule{begindocument}{.}{before}{babel}
\AddToHook {file/after/foo.tex}{code}
```

are equivalent to:

```
\NewHook      {mypackage/hook}
\AddToHook {mypackage/hook}[mypackage]{code}
\AddToHook {mypackage/hook}[mypackage/sub]{code}
\DeclareHookRule{begindocument}{mypackage}{before}{babel}
\AddToHook {file/after/foo.tex}{code} % unchanged
```

The  $\langle default label \rangle$  is automatically set to the name of the current package or class (using `\@currname`). If `\@currname` is not set (because the hook command is used outside of a package, or the current file wasn’t loaded with `\usepackage` or `\documentclass`), then the `top-level` is used as the  $\langle default label \rangle$ .

This syntax is available in all  $\langle label \rangle$  arguments and most  $\langle hook \rangle$ , both in the L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> interface, and the L<sup>A</sup>T<sub>E</sub>X 3 interface described in section 2.2.

Note, however, that the replacement of . by the  $\langle default label \rangle$  takes place when the hook command is executed, so actions that are somehow executed after the package ends will have the wrong  $\langle default label \rangle$  if the dot-syntax is used. For that reason, this syntax is not available in `\UseHook` (and `\hook_use:n`) because the hook is most of the time used outside of the package file in which it was defined. This syntax is also not available in the hook conditionals `\IfHookEmptyTF` (and `\hook_if_empty:nTF`) and `\IfHookExistsTF` (and `\hook_if_exist:nTF`) because these conditionals are used in some performance-critical parts of the hook management code, and because they are usually used to refer to other package’s hooks, so the dot-syntax doesn’t make much sense.

In some cases, for example in large packages, one may want to separate it in logical parts, but still use the main package name as  $\langle label \rangle$ , then the  $\langle default label \rangle$  can be set using `\DeclareDefaultHookLabel`:

---

<code>\DeclareDefaultHookLabel</code>	<code>\DeclareDefaultHookLabel {<math>\langle default label \rangle</math>}</code>
---------------------------------------	------------------------------------------------------------------------------------

---

Sets the  $\langle default label \rangle$  to be used in  $\langle label \rangle$  arguments. If `\DeclareDefaultHookLabel` is not used in the current package, `\@currname` is used instead. If `\@currname` is not set, the code is assumed to be in the main document, in which case `top-level` is used.

The effect of `\DeclareDefaultHookLabel` holds for the current file, and is reset to the previous value when the file is closed.

#### 2.1.4 Defining relations between hook code

The default assumption is that code added to hooks by different packages is independent and the order in which it is executed is irrelevant. While this is true in many case it is obviously false in many others.

Before the hook management system was introduced packages had to take elaborate precaution to determine if some other package got loaded as well (before or after) and find some ways to alter its behavior accordingly. In addition it was often the user's responsibility to load packages in the right order so that code added to hooks got added in the right order and some cases even altering the loading order wouldn't resolve the conflicts.

With the new hook management system it is now possible to define rules (i.e., relationships) between code chunks added by different packages and explicitly describe in which order they should be processed.

<hr/> <b><code>\DeclareHookRule</code></b> <hr/>	<b><code>\DeclareHookRule {&lt;hook&gt;}{&lt;label1&gt;}{&lt;relation&gt;}{&lt;label2&gt;}</code></b>
	Defines a relation between <code>&lt;label1&gt;</code> and <code>&lt;label2&gt;</code> for a given <code>&lt;hook&gt;</code> . If <code>&lt;hook&gt;</code> is <code>??</code> this defines a default relation for all hooks that use the two labels, i.e., that have chunks of code labeled with <code>&lt;label1&gt;</code> and <code>&lt;label2&gt;</code> . Rules specific to a given hook take precedence over default rules that use <code>??</code> as the <code>&lt;hook&gt;</code> .
	Currently, the supported relations are the following:
	<b>before</b> or <b>&lt;</b> Code for <code>&lt;label1&gt;</code> comes before code for <code>&lt;label2&gt;</code> .
	<b>after</b> or <b>&gt;</b> Code for <code>&lt;label1&gt;</code> comes after code for <code>&lt;label2&gt;</code> .
<b>incompatible-warning</b>	Only code for either <code>&lt;label1&gt;</code> or <code>&lt;label2&gt;</code> can appear for that hook (a way to say that two packages—or parts of them—are incompatible). A warning is raised if both labels appear in the same hook.
<b>incompatible-error</b>	Like <b>incompatible-error</b> but instead of a warning a <code>L<sup>A</sup>T<sub>E</sub>X</code> error is raised, and the code for both labels are dropped from that hook until the conflict is resolved.
<b>voids</b>	Code for <code>&lt;label1&gt;</code> overwrites code for <code>&lt;label2&gt;</code> . More precisely, code for <code>&lt;label2&gt;</code> is dropped for that hook. This can be used, for example if one package is a superset in functionality of another one and therefore wants to undo code in some hook and replace it with its own version.
<b>unrelated</b>	The order of code for <code>&lt;label1&gt;</code> and <code>&lt;label2&gt;</code> is irrelevant. This rule is there to undo an incorrect rule specified earlier.

There can only be a single relation between two labels for a given hook, i.e., a later `\DeclareHookrule` overwrites any previous declaration.

The `<hook>` and `<label>` can be specified using the dot-syntax to denote the current package name. See section 2.1.3.

<hr/> <b><code>\ClearHookRule</code></b> <hr/>	<b><code>\ClearHookRule{&lt;hook&gt;}{&lt;label1&gt;}{&lt;label2&gt;}</code></b>
	Syntactic sugar for saying that <code>&lt;label1&gt;</code> and <code>&lt;label2&gt;</code> are unrelated for the given <code>&lt;hook&gt;</code> .

---

**\DeclareDefaultHookRule**

---

**\DeclareDefaultHookRule**{ $\langle label1 \rangle$ }{ $\langle relation \rangle$ }{ $\langle label2 \rangle$ }

This sets up a relation between  $\langle label1 \rangle$  and  $\langle label2 \rangle$  for all hooks unless overwritten by a specific rule for a hook. Useful for cases where one package has a specific relation to some other package, e.g., is `incompatible` or always needs a special ordering `before` or `after`. (Technically it is just a shorthand for using `\DeclareHookRule` with `??` as the hook name.)

Declaring default rules is only supported in the document preamble.<sup>3</sup>

The  $\langle label \rangle$  can be specified using the dot-syntax to denote the current package name. See section 2.1.3.

### 2.1.5 Querying hooks

Simpler data types, like token lists, have three possible states; they can:

- exist and be empty;
- exist and be non-empty; and
- not exist (in which case emptiness doesn't apply);

Hooks are a bit more complicated: they have four possible states. A hook may exist or not, and either way it may or may not be empty. This means that even a hook that doesn't exist may be non-empty.

This seemingly strange state may happen when, for example, package *A* defines hook `A/foo`, and package *B* adds some code to that hook. However, a document may load package *B* before package *A*, or may not load package *A* at all. In both cases some code is added to hook `A/foo` without that hook being defined yet, thus that hook is said to be non-empty, whereas it doesn't exist. Therefore, querying the existence of a hook doesn't imply its emptiness, neither does the other way around.

A hook is said to be empty when no code was added to it, either to its permanent code pool, or to its “next” token list. The hook doesn't need to be declared to have code added to its code pool. A hook is said to exist when it was declared with `\NewHook` or some variant thereof.

---

**\IfHookEmptyTF** ★

---

**\IfHookEmptyTF** { $\langle hook \rangle$ } { $\langle true code \rangle$ } { $\langle false code \rangle$ }

Tests if the  $\langle hook \rangle$  is empty (*i.e.*, no code was added to it using either `\AddToHook` or `\AddToHookNext`), and branches to either  $\langle true code \rangle$  or  $\langle false code \rangle$  depending on the result.

The  $\langle hook \rangle$  *cannot* be specified using the dot-syntax. A leading `.` is treated literally.

---

<sup>3</sup>Trying to do so, e.g., via `\DeclareHookRule` with `??` has bad side-effects and is not supported (though not explicitly caught for performance reasons).

---

`\IfHookExistsTF` ★

---

`\IfHookExistsTF {<hook>} {<true code>} {<false code>}`

Tests if the `<hook>` exists (if it was created with either `\NewHook`, `\NewReversedHook`, or `\NewMirroredHookPair`), and branches to either `<true code>` or `<false code>` depending on the result.

The existence of a hook usually doesn't mean much from the viewpoint of code that tries to add/remove code from that hook, since package loading order may vary, thus the creation of hooks is asynchronous to adding and removing code from it, so this test should be used sparingly.

Generic hooks are declared at the time code is added to them, so the result of `\hook_if_exist:n` will change once code is added to said hook (unless the hook was previously declared).

The `<hook>` *cannot* be specified using the dot-syntax. A leading `.` is treated literally.

*FMi: Would be helpful if we provide some use cases*

### 2.1.6 Displaying hook code

If one has to adjust the code execution in a hook using a hook rule it is helpful to get some information about the code associated with a hook, its current order and the existing rules.

---

<code>\ShowHook</code>	<code>\ShowHook {⟨hook⟩}</code>
<code>\LogHook</code>	Displays information about the <code>⟨hook⟩</code> such as

---

- the code chunks (and their labels) added to it,
- any rules set up to order them,
- the computed order in which the chunks are executed,
- any code executed on the next invocation only.

`\LogHook` prints the information to the `.log` file, and `\ShowHook` prints them to the terminal/command window and starts `TeX`'s prompt (only in `\errorstopmode`) to wait for user action.

The `⟨hook⟩` can be specified using the dot-syntax to denote the current package name. See section [2.1.3](#).

Suppose a hook `example-hook` whose output of `\ShowHook{example-hook}` is:

```

1  -> The hook 'example-hook':
2  > Code chunks:
3  >   foo -> [code from package 'foo']
4  >   bar -> [from package 'bar']
5  >   baz -> [package 'baz' is here]
6  > Extra code for next invocation:
7  >   -> [one-time code]
8  > Rules:
9  >   foo|baz with relation >
10 >   baz|bar with default relation <
11 > Execution order (after applying rules):
12 >   bar, baz, foo.
```

In the listing above, lines 3 to 5 show the three code chunks added to the hook and their respective labels in the format

`⟨label⟩ -> ⟨code⟩`

Line 7 shows the code chunk for the next execution of the hook in the format

`-> ⟨next-code⟩`

This code will be used and disappear at the next `\UseHook{example-hook}`, in contrast to the chunks mentioned earlier, which can only be removed from that hook by doing `\RemoveFromHook{⟨label⟩}[example-hook]`.

Lines 9 and 10 show the rules declared that affect this hook in the format

`⟨label-1⟩|⟨label-2⟩ with ⟨default?⟩ relation ⟨relation⟩`

which means that the `⟨relation⟩` applies to `⟨label-1⟩` and `⟨label-2⟩`, in that order, as detailed in `\DeclareHookRule`. If the relation is `default` it means that that rule applies to `⟨label-1⟩` and `⟨label-2⟩` in *all* hooks, (unless overridden by a non-default relation).

Finally, line 12 lists the labels in the hook after sorting; that is, in the order they will be executed when the hook is used.



### 2.1.7 Debugging hook code

---

<code>\DebugHooksOn</code>	<code>\DebugHooksOn</code>
----------------------------	----------------------------

---

<code>\DebugHooksOff</code>	
-----------------------------	--

Turn the debugging of hook code on or off. This displays changes made to the hook data structures. The output is rather coarse and not really intended for normal use.

## 2.2 L3 programming layer (expl3) interfaces

This is a quick summary of the L<sup>A</sup>T<sub>E</sub>X3 programming interfaces for use with packages written in `expl3`. In contrast to the L<sup>A</sup>T<sub>E</sub>X<sub>2 $\epsilon$</sub>  interfaces they always use mandatory arguments only, e.g., you always have to specify the  $\langle label \rangle$  for a code chunk. We therefore suggest to use the declarations discussed in the previous section even in `expl3` packages, but the choice is yours.

---

<code>\hook_new:n</code>	<code>\hook_new:n{&lt;hook&gt;}</code>
--------------------------	----------------------------------------

---

<code>\hook_new_reversed:n</code>	<code>\hook_new_pair:nn{&lt;hook-1&gt;}{&lt;hook-2&gt;}</code>
-----------------------------------	----------------------------------------------------------------

---

<code>\hook_new_pair:nn</code>	
--------------------------------	--

Creates a new  $\langle hook \rangle$  with normal or reverse ordering of code chunks. `\hook_new_pair:nn` creates a pair of such hooks with  $\{<hook-2>\}$  being a reversed hook. If a hook name is already taken, an error is raised and the hook is not created.

The  $\langle hook \rangle$  can be specified using the dot-syntax to denote the current package name. See section 2.1.3.

---

<code>\hook_use:n</code>	<code>\hook_use:n {&lt;hook&gt;}</code>
--------------------------	-----------------------------------------

Executes the  $\{<hook>\}$  code followed (if set up) by the code for next invocation only, then empties that next invocation code.

The  $\langle hook \rangle$  *cannot* be specified using the dot-syntax. A leading `.` is treated literally.

---

<code>\hook_use_once:n</code>	<code>\hook_use_once:n {&lt;hook&gt;}</code>
-------------------------------	----------------------------------------------

Changes the  $\{<hook>\}$  status so that from now on any addition to the hook code is executed immediately. Then execute any  $\{<hook>\}$  code already set up.

*FMi: better L3 name?*

The  $\langle hook \rangle$  *cannot* be specified using the dot-syntax. A leading `.` is treated literally.

---

<code>\hook_gput_code:nnn</code>	<code>\hook_gput_code:nnn {&lt;hook&gt;}{&lt;label&gt;}{&lt;code&gt;}</code>
----------------------------------	------------------------------------------------------------------------------

Adds a chunk of  $\langle code \rangle$  to the  $\langle hook \rangle$  labeled  $\langle label \rangle$ . If the label already exists the  $\langle code \rangle$  is appended to the already existing code.

If code is added to an external  $\langle hook \rangle$  (of the kernel or another package) then the convention is to use the package name as the  $\langle label \rangle$  not some internal module name or some other arbitrary string.

The  $\langle hook \rangle$  and  $\langle label \rangle$  can be specified using the dot-syntax to denote the current package name. See section 2.1.3.

<hr/> <hr/>	<code>\hook_gput_next_code:nn</code>	<code>\hook_gput_next_code:nn {&lt;hook&gt;} {&lt;code&gt;}</code>
		Adds a chunk of <i>&lt;code&gt;</i> for use only in the next invocation of the <i>&lt;hook&gt;</i> . Once used it is gone.
		This is simpler than <code>\hook_gput_code:nnn</code> , the code is simply appended to the hook in the order of declaration at the very end, i.e., after all standard code for the hook got executed.
		Thus if one needs to undo what the standard does one has to do that as part of <i>&lt;code&gt;</i> .
		The <i>&lt;hook&gt;</i> can be specified using the dot-syntax to denote the current package name. See section 2.1.3.
<hr/> <hr/>	<code>\hook_gremove_code:nn</code>	<code>\hook_gremove_code:nn {&lt;hook&gt;} {&lt;label&gt;}</code>
		Removes any code for <i>&lt;hook&gt;</i> labeled <i>&lt;label&gt;</i> .
		If the code for that <i>&lt;label&gt;</i> wasn't yet added to the <i>&lt;hook&gt;</i> , an order is set so that when some code attempts to add that label, the removal order takes action and the code is not added.
		If the second argument is <code>*</code> , then all code chunks are removed. This is rather dangerous as it drops code from other packages one may not know about, so think twice before using that!
		The <i>&lt;hook&gt;</i> and <i>&lt;label&gt;</i> can be specified using the dot-syntax to denote the current package name. See section 2.1.3.
<hr/> <hr/>	<code>\hook_gset_rule:nnnn</code>	<code>\hook_gset_rule:nnnn {&lt;hook&gt;} {&lt;label1&gt;} {&lt;relation&gt;} {&lt;label2&gt;}</code>
		Relate <i>&lt;label1&gt;</i> with <i>&lt;label2&gt;</i> when used in <i>&lt;hook&gt;</i> . See <code>\DeclareHookRule</code> for the allowed <i>&lt;relation&gt;</i> s. If <i>&lt;hook&gt;</i> is <code>??</code> a default rule is specified.
		The <i>&lt;hook&gt;</i> and <i>&lt;label&gt;</i> can be specified using the dot-syntax to denote the current package name. See section 2.1.3. The dot-syntax is parsed in both <i>&lt;label&gt;</i> arguments, but it usually makes sense to be used in only one of them.
<hr/> <hr/>	<code>\hook_if_empty_p:n *</code> <code>\hook_if_empty:nTF *</code>	<code>\hook_if_empty:nTF {&lt;hook&gt;} {&lt;true code&gt;} {&lt;false code&gt;}</code>
		Tests if the <i>&lt;hook&gt;</i> is empty (i.e., no code was added to it using either <code>\AddToHook</code> or <code>\AddToHookNext</code> ), and branches to either <i>&lt;true code&gt;</i> or <i>&lt;false code&gt;</i> depending on the result.
		The <i>&lt;hook&gt;</i> <i>cannot</i> be specified using the dot-syntax. A leading <code>.</code> is treated literally.
<hr/> <hr/>	<code>\hook_if_exist_p:n *</code> <code>\hook_if_exist:nTF *</code>	<code>\hook_if_exist:nTF {&lt;hook&gt;} {&lt;true code&gt;} {&lt;false code&gt;}</code>
		Tests if the <i>&lt;hook&gt;</i> exists (if it was created with either <code>\NewHook</code> , <code>\NewReversedHook</code> , or <code>\NewMirroredHookPair</code> ), and branches to either <i>&lt;true code&gt;</i> or <i>&lt;false code&gt;</i> depending on the result.
		The existence of a hook usually doesn't mean much from the viewpoint of code that tries to add/remove code from that hook, since package loading order may vary, thus the creation of hooks is asynchronous to adding and removing code from it, so this test should be used sparingly.
		Generic hooks are declared at the time code is added to them, so the result of <code>\hook_if_exist:n</code> will change once code is added to said hook (unless the hook was previously declared).
		The <i>&lt;hook&gt;</i> <i>cannot</i> be specified using the dot-syntax. A leading <code>.</code> is treated literally.

---

<code>\hook_show:n</code>	<code>\hook_show:n {&lt;hook&gt;}</code>
<code>\hook_log:n</code>	

---

Displays information about the  $\langle hook \rangle$  such as

- the code chunks (and their labels) added to it,
- any rules set up to order them,
- the computed order in which the chunks are executed,
- any code executed on the next invocation only.

`\hook_log:n` prints the information to the `.log` file, and `\hook_show:n` prints them to the terminal/command window and starts  $\text{\TeX}$ 's prompt (only if `\errorstopmode`) to wait for user action.

The  $\langle hook \rangle$  can be specified using the dot-syntax to denote the current package name. See section [2.1.3](#).

---

<code>\hook_debug_on:</code>	<code>\hook_debug_on:</code>
<code>\hook_debug_off:</code>	

---

Turns the debugging of hook code on or off. This displays changes to the hook data.

## 2.3 On the order of hook code execution

Chunks of code for a  $\langle hook \rangle$  under different labels are supposed to be independent if there are no special rules set up that define a relation between the chunks. This means that you can't make assumptions about the order of execution!

Suppose you have the following declarations:

```
\NewHook{myhook}
\AddToHook{myhook}[packageA]{\typeout{A}}
\AddToHook{myhook}[packageB]{\typeout{B}}
\AddToHook{myhook}[packageC]{\typeout{C}}
```

then executing the hook with `\UseHook` will produce the typeout A B C in that order. In other words, the execution order is computed to be `packageA`, `packageB`, `packageC` which you can verify with `\ShowHook{myhook}`:

```
The hook 'myhook':
Code chunks:
  packageA -> \typeout {A}
  packageB -> \typeout {B}
  packageC -> \typeout {C}
Extra code next invocation:
---
Rules:
---
Execution order:
  packageA, packageB, packageC
```

The reason is that the code chunks are internally saved in a property list and the initial order of such a property list is the order in which key-value pairs got added. However, that is only true if nothing other than adding happens!

Suppose, for example, you want to replace the code chunk for `packageA`, e.g.,

```
\RemoveFromHook{myhook}[packageA]
\AddToHook{myhook}[packageA]{\typeout{A alt}}
```

then your order becomes `packageB`, `packageC`, `packageA` because the label got removed from the property list and then re-added (at its end).

While that may not be too surprising, the execution order is also sometimes altered if you add a redundant rule, e.g. if you specify

```
\DeclareHookRule{myhook}{packageA}{before}{packageB}
```

instead of the previous lines we get

```
The hook 'myhook':
Code chunks:
  packageA -> \typeout {A}
  packageB -> \typeout {B}
  packageC -> \typeout {C}
Extra code next invocation:
---
Rules:
  packageA|packageB with relation before
Execution order (after applying rules):
  packageA, packageC, packageB
```

As you can see the code chunks are still in the same order, but in the execution order for the labels `packageB` and `packageC` have swapped places. The reason is that, with the rule there are two orders that satisfy it, and the algorithm for sorting happened to pick a different one compared to the case without rules (where it doesn't run at all as there is nothing to resolve). Incidentally, if we had instead specified the redundant rule

```
\DeclareHookRule{myhook}{packageB}{before}{label-3}
```

the execution order would not have changed.

In summary: it is not possible to rely on the order of execution unless there are rules that partially or fully define the order (in which you can rely on them being fulfilled).

## 2.4 The use of “reversed” hooks

You may have wondered why you can declare a “reversed” hook with `\NewReversedHook` and what that does exactly.

In short: the execution order of a reversed hook (without any rules!) is exactly reversed to the order you would have gotten for a hook declared with `\NewHook`.

This is helpful if you have a pair of hooks where you expect to see code added that involves grouping, e.g., starting an environment in the first and closing that environment in the second hook. To give a somewhat contrived example<sup>4</sup>, suppose there is a package adding the following:

```
\AddToHook{env/quote/before}[package-1]{\begin{itshape}}
\AddToHook{env/quote/after} [package-1]{\end{itshape}}
```

As a result, all quotes will be in italics. Now suppose further that the user wants the quotes also in blue and therefore adds:

---

<sup>4</sup>there are simpler ways to achieve the same effect.

```

\usepackage{color}
\AddToHook{env/quote/before}{\begin{color}{blue}}
\AddToHook{env/quote/after}{\end{color}}

```

Now if the `env/quote/after` hook would be a normal hook we would get the same execution order in both hooks, namely:

```
package-1, top-level
```

(or vice versa) and as a result, would get:

```

\begin{itshape}\begin{color}{blue} ...
\end{itshape}\end{color}

```

and an error message that `\begin{color}` ended by `\end{itshape}`. With `env/quote/after` declared as a reversed hook the execution order is reversed and so all environments are closed in the correct sequence and `\ShowHook` would give us the following output:

```

The hook 'env/quote/after':
Code chunks:
  package-1 -> \end {itshape}
  top-level -> \end {color}
Extra code next invocation:
---
Rules:
---
Execution order (after reversal):
  top-level, package-1

```

The reversal of the execution order happens before applying any rules, so if you alter the order you will probably have to alter it in both hooks, not just in one, but that depends on the use case.

## 2.5 Difference between “normal” and “one-time” hooks

When executing a hook a developer has the choice of using either `\UseHook` or `\UseOneTimeHook` (or their `expl3` equivalents `\hook_use:n` and `\hook_use_once:n`). This choice affects how `\AddToHook` is handled after the hook has been executed for the first time.

With normal hooks adding code via `\AddToHook` means that the code chunk is added to the hook data structure and then used each time `\UseHook` is called.

With one-time hooks it this is handled slightly differently: After `\UseOneTimeHook` has been called, any further attempts to add code to the hook via `\AddToHook` will simply execute the `<code>` immediately.

This has some consequences one needs to be aware of:

- If `<code>` is added to a normal hook after the hook was executed and it is never executed again for one or the other reason, then this new `<code>` will never be executed.
- In contrast if that happens with a one-time hook the `<code>` is executed immediately.

In particular this means that construct such as

```

\AddToHook{myhook}
{ \code-1 \AddToHook{myhook}{\code-2} \code-3 }

```

works for one-time hooks<sup>5</sup> (all three code chunks are executed one after another), but it makes little sense with a normal hook, because with a normal hook the first time `\UseHook{myhook}` is executed it would

- execute `\code-1`,
- then execute `\AddToHook{myhook}{\code-2}` which adds the code chunk `\code-2` to the hook for use on the next invocation,
- and finally execute `\code-3`.

The second time `\UseHook` is called it would execute the above and in addition `\code-2` as that was added as a code chunk to the hook in the meantime. So each time the hook is used another copy of `\code-2` is added and so that code chunk is executed  $\langle \# \text{ of invocations} \rangle - 1$  times.

## 2.6 Private L<sup>A</sup>T<sub>E</sub>X kernel hooks

There are a few places where it is absolutely essential for L<sup>A</sup>T<sub>E</sub>X to function correctly that code is executed in a precisely defined order. Even that could have been implemented with the hook management (by adding various rules to ensure the appropriate ordering with respect to other code added by packages). However, this makes every document unnecessary slow, because there has to be sorting even though the result is predetermined. Furthermore it forces package writers to unnecessarily add such rules if they add further code to the hook (or break L<sup>A</sup>T<sub>E</sub>X).

For that reason such code is not using the hook management, but instead private kernel commands directly before or after a public hook with the following naming convention: `\@kernel@before@hookname` or `\@kernel@after@hookname`. For example, in `\enddocument` you find

```

\UseHook{enddocument}%
\@kernel@after@enddocument

```

which means first the user/package-accessible `enddocument` hook is executed and then the internal kernel hook. As their name indicates these kernel commands should not be altered by third-party packages, so please refrain from that in the interest of stability and instead use the public hook next to it.<sup>6</sup>

## 2.7 Legacy L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> interfaces

L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> offered a small number of hooks together with commands to add to them. They are listed here and are retained for backwards compatibility.

With the new hook management several additional hooks have been added to L<sup>A</sup>T<sub>E</sub>X and more will follow. See the next section for what is already available.

<sup>5</sup>This is sometimes used with `\AtBeginDocument` which is why it is supported.

<sup>6</sup>As with everything in T<sub>E</sub>X there is not enforcement of this rule, and by looking at the code it is easy to find out how the kernel adds to them. The main reason of this section is therefore to say “please don’t do that, this is unconfigurable code!”

---

<code>\AtBeginDocument</code>	<code>\AtBeginDocument [<i>label</i>] {<i>code</i>}</code>
-------------------------------	------------------------------------------------------------

---

If used without the optional argument *label*, it works essentially like before, i.e., it is adding *code* to the hook `begindocument` (which is executed inside `\begin{document}`). However, all code added this way is labeled with the label `top-level` if done outside of a package or class or with the package/class name if called inside such a file.

This way one can add further code to the hook using `\AddToHook` or `\AtBeginDocument` using a different label and explicitly order the code chunks as necessary, e.g., run some code before or after the `top-level` code. When using the optional argument the call is equivalent to running `\AddToHook {begindocument} [label] {code}`.

`\AtBeginDocument` is a wrapper around the `begindocument` hook (see section 2.8.2), which is a one-time hook. As such, after the `begindocument` hook is executed at `\begin{document}` any attempt to add *code* to this hook with `\AtBeginDocument` or with `\AddToHook` will cause that *code* to execute immediately instead. See section 2.5 for more on one-time hooks.

For important packages with known order requirement we may over time add rules to the kernel (or to those packages) so that they work regardless of the loading-order in the document.

---

<code>\AtEndDocument</code>	<code>\AtEndDocument [<i>label</i>] {<i>code</i>}</code>
-----------------------------	----------------------------------------------------------

---

Like `\AtBeginDocument` but for the `enddocument` hook.

---

<code>\AtBeginDvi</code>	<code>\AtBeginDvi [<i>label</i>] {<i>code</i>}</code>
--------------------------	-------------------------------------------------------

---

This hook is discussed in conjunction with the shipout hooks.

The few hooks that existed previously in  $\text{\LaTeX 2}_{\epsilon}$  used internally commands such as `\@begindocumenthook` and packages sometimes augmented them directly rather than working through `\AtBeginDocument`. For that reason there is currently support for this, that is, if the system detects that such an internal legacy hook command contains code it adds it to the new hook system under the label `legacy` so that it doesn't get lost.

However, over time the remaining cases of direct usage need updating because in one of the future release of  $\text{\LaTeX}$  we will turn this legacy support off, as it does unnecessary slow down the processing.

## 2.8 $\text{\LaTeX 2}_{\epsilon}$ commands and environments augmented by hooks

*intro to be written*

### 2.8.1 Generic hooks for all environments

Every environment *env* has now four associated hooks coming with it:

**env/*env*/before** This hook is executed as part of `\begin` as the very first action, in particular prior to starting the environment group. Its scope is therefore not restricted by the environment.

**env/*env*/begin** This hook is executed as part of `\begin` directly in front of the code specific to the environment start (e.g., the second argument of `\newenvironment`). Its scope is the environment body.

`env/⟨env⟩/end` This hook is executed as part of `\end` directly in front of the code specific to the end of the environment (e.g., the third argument of `\newenvironment`).

`env/⟨env⟩/after` This hook is executed as part of `\end` after the code specific to the environment end and after the environment group has ended. Its scope is therefore not restricted by the environment.

The hook is implemented as a reversed hook so if two packages add code to `env/⟨env⟩/before` and to `env/⟨env⟩/after` they can add surrounding environments and the order of closing them happens in the right sequence.

Generic environment hooks are never one-time hooks even with environments that are supposed to appear only once in a document.<sup>7</sup> In contrast to other hooks there is also no need to declare them using `\NewHook`.

The hooks are only executed if `\begin{⟨env⟩}` and `\end{⟨env⟩}` is used. If the environment code is executed via low-level calls to `\⟨env⟩` and `\end⟨env⟩` (e.g., to avoid the environment grouping) they are not available. If you want them available in code using this method, you would need to add them yourself, i.e., write something like

```
\UseHook{env/quote/before}\quote
...
\endquote\UseHook{env/quote/after}
```

to add the outer hooks, etc.

<hr/> <hr/> <code>\BeforeBeginEnvironment</code>	<code>\BeforeBeginEnvironment [⟨label⟩] {⟨code⟩}</code>  This declaration adds to the <code>env/⟨env⟩/before</code> hook using by default the current package or class name as a label or <code>top-level</code> if used in the document directly.
<hr/> <hr/> <code>\AtBeginEnvironment</code>	<code>\AtBeginEnvironment [⟨label⟩] {⟨code⟩}</code>  Like <code>\BeforeBeginEnvironment</code> but adds to the <code>env/⟨env⟩/begin</code> hook.
<hr/> <hr/> <code>\AtEndEnvironment</code>	<code>\AtEndEnvironment [⟨label⟩] {⟨code⟩}</code>  Like <code>\BeforeBeginEnvironment</code> but adds to the <code>env/⟨env⟩/end</code> hook.
<hr/> <hr/> <code>\AfterEndEnvironment</code>	<code>\AfterEndEnvironment [⟨label⟩] {⟨code⟩}</code>  Like <code>\BeforeBeginEnvironment</code> but adds to the <code>env/⟨env⟩/after</code> hook.

## 2.8.2 Hooks provided by `\begin{document}`

Until 2020 `\begin{document}` offered exactly one hook that one could add to using `\AtBeginDocument`. Experiences over the years have shown that this single hook in one place was not enough and as part of adding the general hook management system a number of additional hooks have been added at this point. The places for these hooks have been chosen to provide the same support as offered by external packages, such as `etoolbox` and others that augmented `\document` to gain better control.

Supported are now the following hooks (all of them one-time hooks):

<sup>7</sup>Thus if one adds code to such hooks after the environment has been processed, it will only be executed if the environment appears again and if that doesn't happen the code will never get executed.



**begindocument/before** This hook is executed at the very start of `\document`, one can think of it as a hook for code at the end of the preamble section and this is how it is used by `etoolbox`'s `\AtEndPreamble`.

This is a one-time hook, so after it is executed, all further attempts to add code to it will execute such code immediately (see section 2.5).

**begindocument** This hook is added to when using `\AtBeginDocument` and it is executed after the `.aux` file as be read in and most initialization are done, so they can be altered and inspected by the hook code. It is followed by a small number of further initializations that shouldn't be altered and are therefore coming later.

The hook should not be used to add material for typesetting as we are still in  $\text{\LaTeX}$ 's initialization phase and not in the document body. If such material needs to be added to the document body use the next hook instead.

This is a one-time hook, so after it is executed, all further attempts to add code to it will execute such code immediately (see section 2.5).

**begindocument/end** This hook is executed at the end of the `\document` code in other words at the beginning of the document body. The only command that follows it is `\ignorespaces`.

This is a one-time hook, so after it is executed, all further attempts to add code to it will execute such code immediately (see section 2.5).

The generic hooks executed by `\begin` also exist, i.e., `env/document/before` and `env/document/begin`, but with this special environment it is better use the dedicated one-time hooks above.

### 2.8.3 Hooks provided by `\end{document}`

$\text{\LaTeX}$  2<sub>ε</sub> always provided `\AtEndDocument` to add code to the execution of `\end{document}` just in front of the code that is normally executed there. While this was a big improvement over the situation in  $\text{\LaTeX}$  2.09 it was not flexible enough for a number of use cases and so packages, such as `etoolbox`, `atveryend` and others patched `\enddocument` to add additional points where code could be hooked into.

Patching using packages is always problematical as leads to conflicts (code availability, ordering of patches, incompatible patches, etc.). For this reason a number of additional hooks have been added to the `\enddocument` code to allow packages to add code in various places in a controlled way without the need for overwriting or patching the core code.

Supported are now the following hooks (all of them one-time hooks):

**enddocument** The hook associated with `\AtEndDocument`. It is immediately called at the beginning of `\enddocument`.

When this hook is executed there may be still unprocessed material (e.g., floats on the deferlist) and the hook may add further material to be typeset. After it, `\clearpage` is called to ensure that all such material gets typeset. If there is nothing waiting the `\clearpage` has no effect.

This is a one-time hook, so after it is executed, all further attempts to add code to it will execute such code immediately (see section 2.5).

**enddocument/afterlastpage** As the name indicates this hook should not receive code that generates material for further pages. It is the right place to do some final housekeeping and possibly write out some information to the `.aux` file (which is still open at this point to receive data). It is also the correct place to set up any testing code to be run when the `.aux` file is re-read in the next step.

After this hook has been executed the `.aux` file is closed for writing and then read back in to do some tests (e.g., looking for missing references or duplicated labels, etc.).

This is a one-time hook, so after it is executed, all further attempts to add code to it will execute such code immediately (see section 2.5).

**enddocument/afteraux** At this point, the `.aux` file has been reprocessed and so this is a possible place for final checks and display of information to the user. However, for the latter you might prefer the next hook, so that your information is displayed after the (possibly longish) list of files if that got requested via `\listfiles`.

This is a one-time hook, so after it is executed, all further attempts to add code to it will execute such code immediately (see section 2.5).

**enddocument/info** This hook is meant to receive code that write final information messages to the terminal. It follows immediately after the previous hook (so both could have been combined, but then packages adding further code would always need to also supply an explicit rule to specify where it should go.

This hook already contains some code added by the kernel (under the labels `kernel/filelist` and `kernel/warnings`), namely the list of files when `\listfiles` has been used and the warnings for duplicate labels, missing references, font substitutions etc.

This is a one-time hook, so after it is executed, all further attempts to add code to it will execute such code immediately (see section 2.5).

**enddocument/end** Finally, this hook is executed just in front of the final call to `\@@end`.

This is a one-time hook, so after it is executed, all further attempts to add code to it will execute such code immediately (see section 2.5). is it even possible to add code after this one?

There is also the hook `shipout/lastpage`. This hook is executed as part of the last `\shipout` in the document to allow package to add final `\special`'s to that page. Where this hook is executed in relation to those from the above list can vary from document to document. Furthermore to determine correctly which of the `\shipouts` is the last one, `LATEX` needs to be run several times, so initially it might get executed on the wrong page. See section 2.8.4 for where to find the details.

It is in also possible to use the generic `env/document/end` hook which is executed by `\end`, i.e., just in front of the first hook above. Note however that the other generic `\end` environment hook, i.e., `env/document/after` will never get executed, because by that time `LATEX` has finished the document processing.

#### 2.8.4 Hooks provided `\shipout` operations

There are several hooks and mechanisms added to `LATEX`'s process of generating pages. These are documented in `ltshipout-doc.pdf` or with code in `ltshipout-code.pdf`.

## 2.8.5 Hooks provided by file loading operations

There are several hooks added to L<sup>A</sup>T<sub>E</sub>X's process of loading file via its high-level interfaces such as `\input`, `\include`, `\usepackage`, etc. These are documented in `ltfilehook-doc.pdf` or with code in `ltfilehook-code.pdf`.

## 2.8.6 Hooks provided in NFSS commands

In languages that need to support for more than one script in parallel (and thus several sets of fonts), e.g., Latin and Japanese fonts, NFSS font commands, such as `\sffamily`, need to switch both the Latin family to “Sans Serif” and in addition alter a second set of fonts.

To support this several NFSS have hooks in which such support can be added.

**rmfamily** After `\rmfamily` has done its initial checks and prepared a any font series update this hook is executed and only afterwards `\selectfont`.

**sffamily** Like the `rmfamily` hook but for the `\sffamily` command.

**ttfamily** Like the `rmfamily` hook but for the `\ttfamily` command.

**normalfont** The `\normalfont` command resets font encoding family series and shape to their document defaults. It then executes this hook and finally calls `\selectfont`.

**expand@font@defaults** The internal `\expand@font@defaults` command expands and saves the current defaults for the meta families (rm/sf/tt) and the meta series (bf/md). If the NFSS machinery has been augmented, e.g., for Chinese or Japanese fonts, then further defaults may need to be set at this point. This can be done in this hook which is executed at the end of this macro.

**bfseries/defaults, bfseries** If the `\bfdefault` was explicitly changed by the user its new value is used to set the bf series defaults for the meta families (rm/sf/tt) when `\bfseries` is called. In the `bfseries/defaults` hook further adjustments can be made in this case. This hook is only executed if such a change is detected. In contrast the `bfseries` hook is always executed just before `\selectfont` is called to change to the new series.

**mdseries/defaults, mdseries** These two hooks are like the previous ones but used in `\mdseries` command.

# 3 The Implementation

## 3.1 Loading further extensions

```
1 <@@=hook>
```

At the moment the whole module rolls back in one go, but if we make any modifications in later releases this will then need splitting.

```
2 <*2ekernel | latexrelease>
```

```
3 <latexrelease> \IncludeInRelease{2020/10/01}%
```

```
4 <latexrelease> \NewHook{The hook management}%
```

```
5 \ExplSyntaxOn
```

## 3.2 Debugging

`\g__hook_debug_bool` Holds the current debugging state.

```
6 \bool_new:N \g__hook_debug_bool
```

*(End definition for \g\_\_hook\_debug\_bool.)*

`\hook_debug_on:` Turns debugging on and off by redefining `\__hook_debug:n`.

`\hook_debug_off:`

`\__hook_debug:n`

`\__hook_debug_gset:`

```
7 \cs_new_eq:NN \__hook_debug:n \use_none:n
8 \cs_new_protected:Npn \hook_debug_on:
9 {
10   \bool_gset_true:N \g__hook_debug_bool
11   \__hook_debug_gset:
12 }
13 \cs_new_protected:Npn \hook_debug_off:
14 {
15   \bool_gset_false:N \g__hook_debug_bool
16   \__hook_debug_gset:
17 }
18 \cs_new_protected:Npn \__hook_debug_gset:
19 {
20   \cs_gset_protected:Npx \__hook_debug:n ##1
21   { \bool_if:NT \g__hook_debug_bool {##1} }
22 }
```

*(End definition for \hook\_debug\_on: and others. These functions are documented on page 110.)*

## 3.3 Borrowing from internals of other kernel modules

`\__hook_str_compare:nn` Private copy of `\__str_if_eq:nn`

```
23 \cs_new_eq:NN \__hook_str_compare:nn \__str_if_eq:nn
```

*(End definition for \\_\_hook\_str\_compare:nn.)*

## 3.4 Declarations

`\l__hook_tmpa_bool` Scratch boolean used throughout the package.

```
24 \bool_new:N \l__hook_tmpa_bool
```

*(End definition for \l\_\_hook\_tmpa\_bool.)*

`\l__hook_return_tl` Scratch variables used throughout the package.

`\l__hook_tmpa_tl`

`\l__hook_tmpb_tl`

```
25 \tl_new:N \l__hook_return_tl
26 \tl_new:N \l__hook_tmpa_tl
27 \tl_new:N \l__hook_tmpb_tl
```

*(End definition for \l\_\_hook\_return\_tl, \l\_\_hook\_tmpa\_tl, and \l\_\_hook\_tmpb\_tl.)*

`\g__hook_all_seq` In a few places we need a list of all hook names ever defined so we keep track if them in this sequence.

```
28 \seq_new:N \g__hook_all_seq
```

*(End definition for \g\_\_hook\_all\_seq.)*

`\g__hook_removal_list_prop` A token list to hold delayed removals.  
`29 \tl_new:N \g__hook_removal_list_tl`  
*(End definition for \g\_\_hook\_removal\_list\_prop.)*

`\l__hook_cur_hook_tl` Stores the name of the hook currently being sorted.  
`30 \tl_new:N \l__hook_cur_hook_tl`  
*(End definition for \l\_\_hook\_cur\_hook\_tl.)*

`\l__hook_work_prop` A property list holding a copy of the `\g__hook_{hook}_code_prop` of the hook being sorted to work on, so that changes don't act destructively on the hook data structure.  
`31 \prop_new:N \l__hook_work_prop`  
*(End definition for \l\_\_hook\_work\_prop.)*

`\g__hook_execute_immediately_prop` List of hooks that from now on should not longer receive code.  
`32 \prop_new:N \g__hook_execute_immediately_prop`  
*(End definition for \g\_\_hook\_execute\_immediately\_prop.)*

`\g__hook_used_prop` All hooks that receive code (for use in debugging display).  
`33 \prop_new:N \g__hook_used_prop`  
*(End definition for \g\_\_hook\_used\_prop.)*

`\g__hook_hook_curr_name_tl` Default label used for hook commands, and a stack to keep track of packages within  
`\g__hook_name_stack_seq` packages.  
`34 \tl_new:N \g__hook_hook_curr_name_tl`  
`35 \seq_new:N \g__hook_name_stack_seq`  
*(End definition for \g\_\_hook\_hook\_curr\_name\_tl and \g\_\_hook\_name\_stack\_seq.)*

`\__hook_tmp:w` Temporary macro for generic usage.  
`36 \cs_new_eq:NN \__hook_tmp:w ?`  
*(End definition for \\_\_hook\_tmp:w.)*

`\tl_gremove_once:Nx` Some variants of `expl3` functions.  
`\tl_show:x`  
`\tl_log:x`  
`37 \cs_generate_variant:Nn \tl_gremove_once:Nn { Nx }`  
`38 \cs_generate_variant:Nn \tl_show:n { x }`  
`39 \cs_generate_variant:Nn \tl_log:n { x }`  
*(End definition for \tl\_gremove\_once:Nx, \tl\_show:x, and \tl\_log:x. These functions are documented on page ??.)*

`\s__hook_mark` Scan mark used for delimited arguments.  
`40 \scan_new:N \s__hook_mark`  
*(End definition for \s\_\_hook\_mark.)*

### 3.5 Providing new hooks

`\g__hook_..._code_prop` Hooks have a  $\langle name \rangle$  and for each hook we have to provide a number of data structures. These are

`\__hook~...`

`\__hook_next~...`

`\g__hook_⟨name⟩_code_prop` A property list holding the code for the hook in separate chunks. The keys are by default the package names that add code to the hook, but it is possible for packages to define other keys.

`\g__hook_⟨name⟩_rule_⟨label1⟩|⟨label2⟩_tl` A token list holding the relation between  $\langle label1 \rangle$  and  $\langle label2 \rangle$  in the  $\langle name \rangle$ . The  $\langle labels \rangle$  are lexically (reverse) sorted to ensure that two labels always point to the same token list. For global rules, the  $\langle name \rangle$  is ??.

`\__hook ⟨name⟩` The code that is actually executed when the hook is called in the document is stored in this token list. It is constructed from the code chunks applying the information. This token list is named like that so that in case of an error inside the hook, the reported token list in the error is shorter, and to make it simpler to normalize hook names in `\__hook_make_name:n`.

`\g__hook_⟨name⟩_reversed_tl` Some hooks are “reversed”. This token list stores a – for such hook so that it can be identified. The – character is used because  $\langle reversed \rangle 1$  is +1 for normal hooks and –1 for reversed ones.

`\__hook_next ⟨name⟩` Finally there is extra code (normally empty) that is used on the next invocation of the hook (and then deleted). This can be used to define some special behavior for a single occasion from within the document. This token list follows the same naming scheme than the main `\__hook ⟨name⟩` token list. It is called `\__hook_next ⟨name⟩` rather than `\__hook next_⟨name⟩` because otherwise a hook whose name is `next_⟨name⟩` would clash with the next code-token list of the hook called  $\langle name \rangle$ .

(End definition for `\g__hook_..._code_prop`, `\__hook~...`, and `\__hook_next~...`)

**`\hook_new:n`** The `\hook_new:n` declaration declare a new hook and expects the hook  $\langle name \rangle$  as its argument, e.g., `begindocument`.

```

41 \cs_new_protected:Npn \hook_new:n #1
42   { \__hook_normalize_hook_args:Nn \__hook_new:n {#1} }
43 \cs_new_protected:Npn \__hook_new:n #1
44   {

```

We check for one of the internal data structures and if it already exists we complain.

```

45   \hook_if_exist:nTF {#1}
46     { \msg_error:nnn { hooks } { exists } {#1} }

```

Otherwise we add the hook name to the list of all hooks and allocate the necessary data structures for the new hook.

```

47   {
48     \seq_gput_right:Nn \g__hook_all_seq {#1}

```

This is only used by the actual code of the current hook, so declare it normally:

```

49     \tl_new:c { __hook~#1 }

```

Now ensure that the base data structure for the hook exists:

```

50     \__hook_declare:n {#1}

```

The `\g__hook_{hook}_labels_clist` holds the sorted list of labels (once it got sorted). This is used only for debugging.

```
51 \clist_new:c {g__hook_#1_labels_clist}
```

Some hooks should reverse the default order of code chunks. To signal this we have a token list which is empty for normal hooks and contains a `-` for reversed hooks.

```
52 \tl_new:c { g__hook_#1_reversed_tl }
```

The above is all in L3 convention, but we also provide an interface to legacy  $\text{\LaTeX} 2_{\epsilon}$  hooks of the form `\@...hook`, e.g., `\@begindocumenthook`. There have been a few of them and they have been added to using `\g@addto@macro`. If there exists such a macro matching the name of the new hook, i.e., `\@{hook-name}hook` and it is not empty then we add its contents as a code chunk under the label `legacy`.

**Warning: this support will vanish in future releases!**

```
53 \__hook_include_legacy_code_chunk:n {#1}
54 }
55 }
```

(End definition for `\hook_new:n`. This function is documented on page 108.)

`\__hook_declare:n` This function declares the basic data structures for a hook without actually declaring the hook itself. This is needed to allow adding to undeclared hooks. Here it is unnecessary to check whether both variables exist, since both are declared at the same time (either both exist, or neither).

```
56 \cs_new_protected:Npn \__hook_declare:n #1
57 {
58   \__hook_if_exist:nF {#1}
59   {
60     \prop_new:c { g__hook_#1_code_prop }
61     \tl_new:c { __hook_next~#1 }
62   }
63 }
```

(End definition for `\__hook_declare:n`.)

`\hook_new_reversed:n` Declare a new hook. The default ordering of code chunks is reversed, signaled by setting `\__hook_new_reversed:n` the token list to a minus sign.

```
64 \cs_new_protected:Npn \hook_new_reversed:n #1
65 { \__hook_normalize_hook_args:Nn \__hook_new_reversed:n {#1} }
66 \cs_new_protected:Npn \__hook_new_reversed:n #1
67 {
68   \__hook_new:n {#1}
```

If the hook already exists the above will generate an error message, so the next line should be executed (but it is — too bad).

```
69 \tl_gset:cn { g__hook_#1_reversed_tl } { - }
70 }
```

(End definition for `\hook_new_reversed:n` and `\__hook_new_reversed:n`. This function is documented on page 108.)

`\hook_new_pair:nn` A shorthand for declaring a normal and a (matching) reversed hook in one go.

```
71 \cs_new_protected:Npn \hook_new_pair:nn #1#2
72 { \hook_new:n {#1} \hook_new_reversed:n {#2} }
```

(End definition for `\hook_new_pair:nn`. This function is documented on page 108.)

`\_hook_include_legacy_code_chunk:n`

The L<sup>A</sup>T<sub>E</sub>X legacy concept for hooks uses with hooks the following naming scheme in the code: `\@...hook`.

If this macro is not empty we add it under the label `legacy` to the current hook and then empty it globally. This way packages or classes directly manipulating commands such as `\@begindocumenthook` still get their hook data added.

**Warning: this support will vanish in future releases!**

```
73 \cs_new_protected:Npn \_hook_include_legacy_code_chunk:n #1
74 {
```

If the `expl3` code is run with checking on then assigning or using non L3 names such as `\@enddocumenthook` with `expl3` functions will trigger warnings so we run this code with debugging explicitly suspended.

```
75 \debug_suspend:
```

If the macro doesn't exist (which is the usual case) then nothing needs to be done.

```
76 \tl_if_exist:cT { @#1hook }
```

Of course if the legacy hook exists but is empty, there is no need to add anything under `legacy` the legacy label.

```
77 {
78   \tl_if_empty:cF { @#1hook }
79   {
80     \exp_args:Nnnv \_hook_hook_gput_code_do:nnn {#1}
81     { legacy } { @#1hook }
```

Once added to the hook, we need to clear it otherwise it might get added again later if the hook data gets updated.

```
82   \tl_gclear:c { @#1hook }
83   }
84 }
85 \debug_resume:
86 }
```

(End definition for `\_hook_include_legacy_code_chunk:n`.)

### 3.6 Parsing a label

`\_hook_parse_label_default:n`

This macro checks if a label was given (not `\c_novalue_tl`), and if so, tries to parse the label looking for a leading `.` to replace for `\@currname`. Otherwise `\_hook_currname_or_default:n` is used to pick `\@currname` or the fallback value.

The default `top-level` is hard-coded here. It once was an argument, but it's no longer needed.

*PhO: can't remember why*

```
87 \cs_new:Npn \_hook_parse_label_default:n #1
88 {
89   \tl_if_novalue:nTF {#1}
90   { \_hook_currname_or_default:n { top-level } }
91   {
92     \tl_trim_spaces_apply:nN {#1}
93     \_hook_parse_dot_label:nn { top-level }
94   }
95 }
```



(End definition for `\_hook_parse_label_default:n`.)

`\_hook_parse_dot_label:nn` Start by checking if the label is empty, which raises an error, and uses the fallback value.  
`\_hook_parse_dot_label:nw` If not, split the label at a `.`, if any, and check if no tokens are before the `.`, or if the  
`\_hook_parse_dot_label_cleanup:w` only character is a `.`. If these requirements are fulfilled, the leading `.` is replaced with  
`\_hook_parse_dot_label_aux:nw` `\_hook_currname_or_default:n`. Otherwise the label is returned unchanged.

```

96 \cs_new:Npn \_hook_parse_dot_label:nn #1 #2
97 {
98   \tl_if_empty:NTF {#1}
99   {
100     \msg_expandable_error:nnn { hooks } { empty-label } {#2}
101     #2
102   }
103   {
104     \str_if_eq:nnTF {#1} { . }
105     { \_hook_currname_or_default:n {#2} }
106     { \_hook_parse_dot_label:nw {#2} #1 ./ \s__hook_mark }
107   }
108 }
109 \cs_new:Npn \_hook_parse_dot_label:nw #1 #2 ./ #3 \s__hook_mark
110 {
111   \tl_if_empty:NTF {#2}
112   { \_hook_parse_dot_label_aux:nw {#1} #3 \s__hook_mark }
113   {
114     \tl_if_empty:NTF {#3}
115     { \_hook_make_name:n {#2} }
116     { \_hook_parse_dot_label_cleanup:w #2 ./ #3 \s__hook_mark }
117   }
118 }
119 \cs_new:Npn \_hook_parse_dot_label_cleanup:w #1 ./ \s__hook_mark {#1}
120 \cs_new:Npn \_hook_parse_dot_label_aux:nw #1 #2 ./ \s__hook_mark
121 { \_hook_currname_or_default:n {#1} / \_hook_make_name:n {#2} }

```

(End definition for `\_hook_parse_dot_label:nn` and others.)

`\_hook_currname_or_default:n` Uses `\g__hook_hook_curr_name_tl` if it is set, otherwise tries `\@currname`. If neither is set, uses the fallback value `#1` (usually top-level).

```

122 \cs_new:Npn \_hook_currname_or_default:n #1
123 {
124   \tl_if_empty:NTF \g__hook_hook_curr_name_tl
125   {
126     \tl_if_empty:NTF \@currname
127     { \_hook_make_name:n {#1} }
128     { \@currname }
129   }
130   { \g__hook_hook_curr_name_tl }
131 }

```

(End definition for `\_hook_currname_or_default:n`.)

`\_hook_make_name:n` Provides a standard sanitisation of a hook's name. It uses `\cs:w` to build a control  
`\_hook_make_name:w` sequence out of the hook name, then uses `\cs_to_str:N` to get the string representation of that, without the escape character. `\cs:w`-based expansion is used instead of `e`-based because Unicode characters don't behave well inside `\expanded`. The macro adds the

`\__hook~` prefix to the hook name to reuse the hook’s code token list to build the csname and avoid leaving “public” control sequences defined (as `\relax`) in TeX’s memory.

```

132 \cs_new:Npn \__hook_make_name:n #1
133 {
134   \exp_after:wN \exp_after:wN \exp_after:wN \__hook_make_name:w
135   \exp_after:wN \token_to_str:N \cs:w \__hook~ #1 \cs_end:
136 }
137 \exp_last_unbraced:NNNNo
138 \cs_new:Npn \__hook_make_name:w #1 \tl_to_str:n { \__hook~ } { }
```

(End definition for `\__hook_make_name:n` and `\__hook_make_name:w`.)

```

\__hook_normalize_hook_args:Nn
\__hook_normalize_hook_args:Nnn
\__hook_normalize_hook_rule_args:Nnnnn
\__hook_normalize_hook_args_aux:Nn
```

Standard route for normalising hook and label arguments. The main macro does the entire operation within a group so that csnames made by `\__hook_make_name:n` are wiped off before continuing. This means that this function cannot be used for `\hook_`-use:n!

```

139 \cs_new_protected:Npn \__hook_normalize_hook_args_aux:Nn #1 #2
140 {
141   \group_begin:
142   \use:e
143   {
144     \group_end:
145     \exp_not:N #1 #2
146   }
147 }
148 \cs_new_protected:Npn \__hook_normalize_hook_args:Nn #1 #2
149 {
150   \__hook_normalize_hook_args_aux:Nn #1
151   { { \__hook_parse_label_default:n {#2} } }
152 }
153 \cs_new_protected:Npn \__hook_normalize_hook_args:Nnn #1 #2 #3
154 {
155   \__hook_normalize_hook_args_aux:Nn #1
156   {
157     { \__hook_parse_label_default:n {#2} }
158     { \__hook_parse_label_default:n {#3} }
159   }
160 }
161 \cs_new_protected:Npn \__hook_normalize_hook_rule_args:Nnnnn #1 #2 #3 #4 #5
162 {
163   \__hook_normalize_hook_args_aux:Nn #1
164   {
165     { \__hook_parse_label_default:n {#2} }
166     { \__hook_parse_label_default:n {#3} }
167     { \tl_trim_spaces:n {#4} }
168     { \__hook_parse_label_default:n {#5} }
169   }
170 }
```

(End definition for `\__hook_normalize_hook_args:Nn` and others.)

```

\hook_gput_code:nnn
\__hook_gput_code:nnn
\__hook_gput_code:nxv
\__hook_hook_gput_code_do:nnn
```

With `\hook_gput_code:nnn{<hook>}{<label>}{<code>}` a chunk of `<code>` is added to an existing `<hook>` labeled with `<label>`.

```

171 \cs_new_protected:Npn \hook_gput_code:nnn #1 #2
```

```

172 { \__hook_normalize_hook_args:Nnn \__hook_gput_code:nnn {#1} {#2} }
173 \cs_new_protected:Npn \__hook_gput_code:nnn #1 #2 #3
174 {

```

First check if the hook was used as a one-time hook:

```

175 \prop_if_in:NnTF \g__hook_execute_immediately_prop {#1}
176 {#3}
177 {

```

Then check if the current  $\langle hook \rangle / \langle label \rangle$  pair was marked for removal, in which case  $\backslash\_hook\_unmark\_removal:nn$  is used to remove that mark (once). This may happen when a package removes code from another package which was not yet loaded: the removal order is stored, and at this stage it is executed by not adding to the hook.

```

178 \__hook_if_marked_removal:nnTF {#1} {#2}
179 { \__hook_unmark_removal:nn {#1} {#2} }
180 {

```

If no removal is queued, we are free to add. Start by checking if the hook exists.

```

181 \hook_if_exist:nTF {#1}

```

If so we simply add (or append) the new code to the property list holding different chunks for the hook. At  $\backslash\begin{document}$  this is then sorted into a token list for fast execution.

```

182 {
183 \__hook_hook_gput_code_do:nnn {#1} {#2} {#3}

```

However, if there is an update within the document we need to alter this execution code which is done by  $\backslash\_hook\_update\_hook\_code:n$ . In the preamble this does nothing.

```

184 \__hook_update_hook_code:n {#1}
185 }

```

If the hook does not exist, however, before giving up try to declare it as a generic hook, if its name matches one of the valid patterns.

```

186 { \__hook_try_declaring_generic_hook:nnn {#1} {#2} {#3} }
187 }
188 }
189 }
190 \cs_generate_variant:Nn \__hook_gput_code:nnn { nxv }

```

This macro will unconditionally add a chunk of code to the given hook.

```

191 \cs_new_protected:Npn \__hook_hook_gput_code_do:nnn #1 #2 #3
192 {

```

However, first some debugging info if debugging is enabled:

```

193 \__hook_debug:n{\iow_term:x{****~ Add~ to~
194 \hook_if_exist:nF {#1} { undeclared~ }
195 hook~ #1~ (#2)
196 \on@line\space <~~ \tl_to_str:n{#3}} }

```

Then try to get the code chunk labeled #2 from the hook. If there's code already there, then append #3 to that, otherwise just put #3.

```

197 \prop_get:cnNTF { g__hook_#1_code_prop } {#2} \l__hook_return_tl
198 {
199 \prop_gput:cno { g__hook_#1_code_prop } {#2}
200 { \l__hook_return_tl #3 }
201 }
202 { \prop_gput:cnn { g__hook_#1_code_prop } {#2} {#3} }
203 }

```

(End definition for `\hook_gput_code:nnn`, `\__hook_gput_code:nnn`, and `\__hook_hook_gput_code_do:nnn`. This function is documented on page 108.)

`\__hook_gput_undeclared_hook:nnn`

Often it may happen that a package *A* defines a hook `foo`, but package *B*, that adds code to that hook, is loaded before *A*. In such case we need to add code to the hook before its declared.

```
204 \cs_new_protected:Npn \__hook_gput_undeclared_hook:nnn #1 #2 #3
205 {
206   \__hook_declare:n {#1}
207   \__hook_hook_gput_code_do:nnn {#1} {#2} {#3}
208 }
```

(End definition for `\__hook_gput_undeclared_hook:nnn`.)

`\__hook_try_declaring_generic_hook:nnn`

These entry-level macros just pass the arguments along to the common `\__hook_try_declaring_generic_hook:nNNnn` with the right functions to execute when some action is to be taken.

The wrapper `\__hook_try_declaring_generic_hook:nnn` then defers `\hook_gput_code:nnn` if the generic hook was declared, or to `\__hook_gput_undeclared_hook:nnn` otherwise (the hook was tested for existence before, so at this point if it isn't generic, it doesn't exist).

The wrapper `\__hook_try_declaring_generic_next_hook:nn` for next-execution hooks does the same: it defers the code to `\hook_gput_next_code:nn` if the generic hook was declared, or to `\__hook_gput_next_do:nn` otherwise.

```
209 \cs_new_protected:Npn \__hook_try_declaring_generic_hook:nnn #1
210 {
211   \__hook_try_declaring_generic_hook:nNNnn {#1}
212   \hook_gput_code:nnn \__hook_gput_undeclared_hook:nnn
213 }
214 \cs_new_protected:Npn \__hook_try_declaring_generic_next_hook:nn #1
215 {
216   \__hook_try_declaring_generic_hook:nNNnn {#1}
217   \hook_gput_next_code:nn \__hook_gput_next_do:nn
218 }
```

`\__hook_try_declaring_generic_hook:nNNnn` now splits the hook name at the first / (if any) and first checks if it is a file-specific hook (they require some normalization) using `\__hook_if_file_hook:wTF`. If not then check it is one of a predefined set for generic names. We also split off the second component to see if we have to make a reversed hook. In either case the function returns  $\langle true \rangle$  for a generic hook and  $\langle false \rangle$  in other cases.

`\__hook_try_declaring_generic_hook:nNNnn`  
`\hook_try_declaring_generic_hook_split:nNNnn`  
`\__hook_try_declaring_generic_hook:wnTF`

```
219 \cs_new_protected:Npn \__hook_try_declaring_generic_hook:nNNnn #1
220 {
221   \__hook_if_file_hook:wTF #1 / / \s__hook_mark
222   {
223     \exp_args:Ne \__hook_try_declaring_generic_hook_split:nNNnn
224     { \exp_args:Ne \__hook_file_hook_normalize:n {#1} }
225   }
226   { \__hook_try_declaring_generic_hook_split:nNNnn {#1} }
227 }
228 \cs_new_protected:Npn \__hook_try_declaring_generic_hook_split:nNNnn #1 #2 #3
229 {
230   \__hook_try_declaring_generic_hook:wnTF #1 / / / \scan_stop: {#1}
231   { #2 }
```

```

232     { #3 } {#1}
233   }
234 \prg_new_protected_conditional:Npnn \__hook_try_declaring_generic_hook:wn
235   #1 / #2 / #3 / #4 \scan_stop: #5 { TF }
236   {
237     \tl_if_empty:nTF {#2}
238     { \prg_return_false: }
239     {
240       \prop_if_in:NnTF \c__hook_generics_prop {#1}
241       {
242         \hook_if_exist:nF {#5} { \hook_new:n {#5} }

```

After having declared the hook we check the second component (for file hooks) or the third component for environment hooks) and if it is on the list of components for which we should have declared a reversed hook we alter the hook data structure accordingly.

```

243       \prop_if_in:NnTF \c__hook_generics_reversed_ii_prop {#2}
244       { \tl_gset:cn { g__hook_#5_reversed_tl } { - } }
245       {
246         \prop_if_in:NnTF \c__hook_generics_reversed_iii_prop {#3}
247         { \tl_gset:cn { g__hook_#5_reversed_tl } { - } }
248       }

```

Now that we know that the hook is declared we can add the code to it.

```

249       \prg_return_true:
250     }
251     { \prg_return_false: }
252   }
253 }

```

(End definition for `\__hook_try_declaring_generic_hook:nnn` and others.)

`\__hook_if_file_hook_p:w` `\__hook_if_file_hook:wTF` checks if the argument is a valid file-specific hook (not, for example, `file/before`, but `file/before/foo.tex`). If it is a file-specific hook, then it executes the *⟨true⟩* branch, otherwise *⟨false⟩*.

A file-specific hook is `file/⟨position⟩/⟨name⟩`. If any of these parts don't exist, it is a general file hook or not a file hook at all, so the conditional evaluates to *⟨false⟩*. Otherwise, it checks that the first part is `file` and that the *⟨position⟩* is in the `\c__hook_generics_file_prop`.

A property list is used here to avoid having to worry with catcodes, because `expl3`'s file name parsing turns all characters into catcode-12 tokens, which might differ from hand-input letters.

```

254 \prg_new_conditional:Npnn \__hook_if_file_hook:w
255   #1 / #2 / #3 \s__hook_mark { TF }
256   {
257     \str_if_eq:nnTF {#1} { file }
258     {
259       \bool_lazy_or:nnTF
260       { \tl_if_empty_p:n {#3} }
261       { \str_if_eq_p:nn {#3} { / } }
262       { \prg_return_false: }
263       {
264         \prop_if_in:NnTF \c__hook_generics_file_prop {#2}
265         { \prg_return_true: }
266         { \prg_return_false: }

```

```

267     }
268   }
269   { \prg_return_false: }
270 }

```

(End definition for `\__hook_if_file_hook:wTF`.)

`\__hook_file_hook_normalize:n` When a file-specific hook is found, before being declared it is lightly normalized by `\__hook_file_hook_normalize:n`. The current implementation just replaces two consecutive slashes (//) by a single one, to cope with simple cases where the user did something like `\def\input@path{./mypath/}`, in which case a hook would have to be `\AddToHook{file/after/./mypath//file.tex}`.

```

271 \cs_new:Npn \__hook_file_hook_normalize:n #1
272 { \__hook_strip_double_slash:n {#1} }
273 \cs_new:Npn \__hook_strip_double_slash:n #1
274 { \__hook_strip_double_slash:w #1 // \s__hook_mark }
275 \cs_new:Npn \__hook_strip_double_slash:w #1 // #2 \s__hook_mark
276 {
277   \tl_if_empty:nTF {#2}
278   {#1}
279   { \__hook_strip_double_slash:w #1 / #2 \s__hook_mark }
280 }

```

(End definition for `\__hook_file_hook_normalize:n`, `\__hook_strip_double_slash:n`, and `\__hook_strip_double_slash:w`.)

`\c__hook_generics_prop` Property list holding the generic names. We don't provide any user interface to this as this is meant to be static.

**env** The generic hooks used in `\begin` and `\end`.

**file** The generic hooks used when loading a file

```

281 \prop_const_from_keyval:Nn \c__hook_generics_prop
282   {env=,file=,package=,class=,include=}

```

(End definition for `\c__hook_generics_prop`.)

`\c__hook_generics_reversed_ii_prop` Some of the generic hooks are supposed to use reverse ordering, these are the following (only the second or third sub-component is checked):

```

\c__hook_generics_reversed_iii_prop
\c__hook_generics_file_prop
283 \prop_const_from_keyval:Nn \c__hook_generics_reversed_ii_prop {after=,end=}
284 \prop_const_from_keyval:Nn \c__hook_generics_reversed_iii_prop {after=}
285 \prop_const_from_keyval:Nn \c__hook_generics_file_prop {before=,after=}

```

(End definition for `\c__hook_generics_reversed_ii_prop`, `\c__hook_generics_reversed_iii_prop`, and `\c__hook_generics_file_prop`.)

`\hook_gremove_code:nn` With `\hook_gremove_code:nn{<hook>}{<label>}` any code for `<hook>` stored under `<label>` is removed.

```

286 \cs_new_protected:Npn \hook_gremove_code:nn #1 #2
287 { \__hook_normalize_hook_args:Nnn \__hook_gremove_code:nn {#1} {#2} }
288 \cs_new_protected:Npn \__hook_gremove_code:nn #1 #2
289 {

```

First check that the hook code pool exists. `\hook_if_exist:nTF` isn't used here because it should be possible to remove code from a hook before its defined (see section 2.1.5).

```

290   \__hook_if_exist:nTF {#1}

```

Then remove the chunk and run `\__hook_update_hook_code:n` so that the execution token list reflects the change if we are after `\begin{document}`.

```

291 {
292   \str_if_eq:nnTF {#2} {*}
293   { \prop_gclear:c { g__hook_#1_code_prop } }
294   {

```

Check if the label being removed exists in the code pool. If it does, just call `\__hook_gremove_code_do:nn` to do the removal, otherwise mark it to be removed.

```

295       \prop_get:cnNTF { g__hook_#1_code_prop } {#2} \l__hook_return_tl
296       { \__hook_gremove_code_do:nn }
297       { \__hook_mark_removal:nn }
298       {#1} {#2}
299   }

```

Finally update the code, if the hook exists.

```

300   \hook_if_exist:nT {#1}
301   { \__hook_update_hook_code:n {#1} }
302 }

```

If the code pool for this hook doesn't exist it means that nothing tried to add to it before, so we just queue this removal order for later.

```

303 { \__hook_mark_removal:nn {#1} {#2} }
304 }

```

```

\__hook_gremove_code_do:nn
305 \cs_new_protected:Npn \__hook_gremove_code_do:nn #1 #2
306 { \prop_gremove:cn { g__hook_#1_code_prop } {#2} }

```

(End definition for `\hook_gremove_code:nn`, `\__hook_gremove_code:nn`, and `\__hook_gremove_code_do:nn`. This function is documented on page 109.)

`\__hook_mark_removal:nn` Marks  $\langle label \rangle$  (#2) to be removed from  $\langle hook \rangle$  (#1). The number of removals should be fairly small, and `\tl_gremove_once:Nx` is fairly efficient even for longer token lists, so we use a single global token list, rather than one for each hook.

A hand-crafted token list is used here because property lists don't hold repeated items, so multiple usages of `\__hook_mark_removal:nn` would be cancelled by a single `\__hook_unmark_removal:nn`.

```

307 \cs_new_protected:Npn \__hook_mark_removal:nn #1 #2
308 {
309   \tl_gput_right:Nx \g__hook_removal_list_tl
310   { \__hook_removal_tl:nn {#1} {#2} }
311 }

```

(End definition for `\__hook_mark_removal:nn`.)

`\__hook_unmark_removal:nn` Unmarks  $\langle label \rangle$  (#2) to be removed from  $\langle hook \rangle$  (#1). `\tl_gremove_once:Nx` is used rather than `\tl_gremove_all:Nx` so that two additions are needed to cancel two marked removals, rather than only one.

```

312 \cs_new_protected:Npn \__hook_unmark_removal:nn #1 #2
313 {
314   \tl_gremove_once:Nx \g__hook_removal_list_tl
315   { \__hook_removal_tl:nn {#1} {#2} }
316 }

```

(End definition for `\_hook_unmark_removal:nn`.)

`\_hook_if_marked_removal:nnTF` Checks if the `\g\_hook_removal_list_tl` contains the current  $\langle label \rangle$  (#2) and  $\langle hook \rangle$  (#1).

```

317 \prg_new_protected_conditional:Npnn \_hook_if_marked_removal:nn #1 #2 { TF }
318 {
319   \exp_args:NNx \tl_if_in:NnTF \g\_hook_removal_list_tl
320   { \_hook_removal_tl:nn {#1} {#2} }
321   { \prg_return_true: } { \prg_return_false: }
322 }

```

(End definition for `\_hook_if_marked_removal:nnTF`.)

`\_hook_removal_tl:nn` Builds a token list with #1 and #2 which can only be matched by #1 and #2. The  $\&$ <sub>4</sub> anchors a removal, so that #1 can't be mistaken by #2 and vice versa, and the two \$<sub>3</sub> delimit the two arguments

```

323 \cs_new:Npn \_hook_removal_tl:nn #1 #2
324 { & \tl_to_str:n {#2} $ \tl_to_str:n {#1} $ }

```

(End definition for `\_hook_removal_tl:nn`.)

`\g\_hook_??_code_prop` Initially these variables simply used an empty “label” name (not two question marks).  
`\_hook~??` This was a bit unfortunate, because then l3doc complains about `__` in the middle of a  
`\g\_hook_??_reversed_tl` command name when trying to typeset the documentation. However using a “normal” name such as `default` has the disadvantage of that being not really distinguishable from a real hook name. I now have settled for `??` which needs some gymnastics to get it into the csname, but since this is used a lot things should be fast, so this is not done with `c` expansion in the code later on.

`\_hook~??` isn't used, but it has to be defined to trick the code into thinking that `??` is actually a hook.

```

325 \prop_new:c {g\_hook_??_code_prop}
326 \prop_new:c {\_hook~??}

```

Default rules are always given in normal ordering (never in reversed ordering). If such a rule is applied to a reversed hook it behaves as if the rule is reversed (e.g., `after` becomes `before`) because those rules are applied first and then the order is reversed.

```

327 \tl_new:c {g\_hook_??_reversed_tl}

```

(End definition for `\g\_hook_??_code_prop`, `\_hook~??`, and `\g\_hook_??_reversed_tl`.)

### 3.7 Setting rules for hooks code

`\hook_gset_rule:nnnn`  
`\_hook_gset_rule:nnnn`

*FMi: needs docu correction given new implementation*

With `\hook_gset_rule:nnnn{<hook>}{<label1>}{<relation>}{<label2>}` a relation is defined between the two code labels for the given  $\langle hook \rangle$ . The special hook `??` stands for *any* hook describing a default rule.

```

328 \cs_new_protected:Npn \hook_gset_rule:nnnn #1#2#3#4
329 {
330   \_hook_normalize_hook_rule_args:Nnnnn \_hook_gset_rule:nnnn
331   {#1} {#2} {#3} {#4}
332 }
333 \cs_new_protected:Npn \_hook_gset_rule:nnnn #1#2#3#4
334 {

```



First we ensure the basic data structure of the hook exists:

```
335 \__hook_declare:n {#1}
```

Then we clear any previous relationship between both labels.

```
336 \__hook_rule_gclear:nnn {#1} {#2} {#4}
```

Then we call the function to handle the given rule. Throw an error if the rule is invalid.

```
337 \debug_suspend:
338 \cs_if_exist_use:ctf { __hook_rule_#3_gset:nnn }
339 {
340   {#1} {#2} {#4}
341   \__hook_update_hook_code:n {#1}
342 }
343 { \msg_error:nnnnnn { hooks } { unknown-rule }
344   {#1} {#2} {#3} {#4} }
345 \debug_resume:
346 }
```

(End definition for `\hook_gset_rule:nnnn` and `\__hook_gset_rule:nnnn`. This function is documented on page 109.)

```
\__hook_rule_before_gset:nnn
\__hook_rule_after_gset:nnn
\__hook_rule_<_gset:nnn
\__hook_rule_>_gset:nnn
```

Then we add the new rule. We need to normalize the rules here to allow for faster processing later. Given a pair of labels  $l_A$  and  $l_B$ , the rule  $l_A > l_B$  is the same as  $l_B < l_A$  only presented differently. But by normalizing the forms of the rule to a single representation, say,  $l_B < l_A$ , reduces the time spent looking for the rules later considerably.

Here we do that normalization by using `\(pdf)strcmp` to lexically sort labels  $l_A$  and  $l_B$  to a fixed order. This order is then enforced every time these two labels are used together.

Here we use `\__hook_label_pair:nn {<hook>} {<lA>} {<lB>}` to build a string  $l_B|l_A$  with a fixed order, and use `\__hook_label_ordered:nnTF` to apply the correct rule to the pair of labels, depending if it was sorted or not.

```
347 \cs_new_protected:Npn \__hook_rule_before_gset:nnn #1#2#3
348 {
349   \tl_gset:cx { g__hook_#1_rule_ \__hook_label_pair:nn {#2} {#3} _tl }
350   { \__hook_label_ordered:nnTF {#2} {#3} { < } { > } }
351 }
352 \cs_new_eq:cN { __hook_rule_<_gset:nnn } \__hook_rule_before_gset:nnn
353 \cs_new_protected:Npn \__hook_rule_after_gset:nnn #1#2#3
354 {
355   \tl_gset:cx { g__hook_#1_rule_ \__hook_label_pair:nn {#3} {#2} _tl }
356   { \__hook_label_ordered:nnTF {#3} {#2} { < } { > } }
357 }
358 \cs_new_eq:cN { __hook_rule_>_gset:nnn } \__hook_rule_after_gset:nnn
```

(End definition for `\__hook_rule_before_gset:nnn` and others.)

```
\__hook_rule_voids_gset:nnn
```

This rule removes (clears, actually) the code from label #3 if label #2 is in the hook #1.

```
359 \cs_new_protected:Npn \__hook_rule_voids_gset:nnn #1#2#3
360 {
361   \tl_gset:cx { g__hook_#1_rule_ \__hook_label_pair:nn {#2} {#3} _tl }
362   { \__hook_label_ordered:nnTF {#2} {#3} { -> } { <- } }
363 }
```

(End definition for `\__hook_rule_voids_gset:nnn`.)

`\_hook_rule_incompatible-error_gset:nnn` These relations make an error/warning if labels #2 and #3 appear together in hook #1.

`\_hook_rule_incompatible-warning_gset:nnn`

```

364 \cs_new_protected:cpn { \_hook_rule_incompatible-error_gset:nnn } #1#2#3
365 { \tl_gset:cn { g\_hook\_#1\_rule\_ \_hook\_label\_pair:nn {#2} {#3} \tl } { xE } }
366 \cs_new_protected:cpn { \_hook_rule_incompatible-warning_gset:nnn } #1#2#3
367 { \tl_gset:cn { g\_hook\_#1\_rule\_ \_hook\_label\_pair:nn {#2} {#3} \tl } { xW } }

(End definition for \_hook_rule_incompatible-error_gset:nnn and \_hook_rule_incompatible-warning_gset:nnn.)

```

`\_hook_rule_unrelated_gset:nnn` Undo a setting. `\_hook_rule_unrelated_gset:nnn` doesn't need to do anything, since we use `\_hook_rule_gclear:nnn` before setting any rule.

`\_hook_rule_gclear:nnn`

```

368 \cs_new_protected:Npn \_hook_rule_unrelated_gset:nnn #1#2#3 { }
369 \cs_new_protected:Npn \_hook_rule_gclear:nnn #1#2#3
370 { \cs_undefine:c { g\_hook\_#1\_rule\_ \_hook\_label\_pair:nn {#2} {#3} \tl } }

(End definition for \_hook_rule_unrelated_gset:nnn and \_hook_rule_gclear:nnn.)

```

`\_hook_label_pair:nn` Ensure that the lexically greater label comes first.

```

371 \cs_new:Npn \_hook_label_pair:nn #1#2
372 {
373   \if_case:w \_hook_str_compare:nn {#1} {#2} \exp_stop_f:
374     #1 | #1 % 0
375   \or:   #1 | #2 % +1
376   \else: #2 | #1 % -1
377   \fi:
378 }

(End definition for \_hook_label_pair:nn.)

```

`\_hook_label_ordered_p:nn` Check that labels #1 and #2 are in the correct order (as returned by `\_hook_label_pair:nn`) and if so return true, else return false.

`\_hook_label_ordered:nnTF`

```

379 \prg_new_conditional:Npnn \_hook_label_ordered:nn #1#2 { TF }
380 {
381   \if_int_compare:w \_hook_str_compare:nn {#1} {#2} > 0 \exp_stop_f:
382     \prg_return_true:
383   \else
384     \prg_return_false:
385   \fi:
386 }

(End definition for \_hook_label_ordered:nnTF.)

```

`\_hook_if_label_case:nnnnn` To avoid doing the string comparison twice in `\_hook_initialize_single:NNNn` (once with `\str_if_eq:nn` and again with `\_hook_label_ordered:nn`), we use a three-way branching macro that will compare #1 and #2 and expand to `\use_i:nnn` if they are equal, `\use_ii:nn` if #1 is lexically greater, and `\use_iii:nn` otherwise.

```

387 \cs_new:Npn \_hook_if_label_case:nnnnn #1#2
388 {
389   \cs:w use_
390   \if_case:w \_hook_str_compare:nn {#1} {#2}
391     i \or: ii \else: iii \fi: :nnn
392   \cs_end:
393 }

(End definition for \_hook_if_label_case:nnnnn.)

```

`\__hook_update_hook_code:n` Before `\begin{document}` this does nothing, in the body it reinitializes the hook code using the altered data.

```
394 \cs_new_eq:NN \__hook_update_hook_code:n \use_none:n
```

(End definition for `\__hook_update_hook_code:n`.)

`\__hook_initialize_all:` Initialize all known hooks (at `\begin{document}`), i.e., update the fast execution token lists to hold the necessary code in the right order.

```
395 \cs_new_protected:Npn \__hook_initialize_all: {
```

First we change `\__hook_update_hook_code:n` which so far was a no-op to now initialize one hook. This way any later updates to the hook will run that code and also update the execution token list.

```
396 \cs_gset_eq:NN \__hook_update_hook_code:n \__hook_initialize_hook_code:n
```

Now we loop over all hooks that have been defined and update each of them.

```
397 \__hook_debug:n { \prop_gc_clear:N \g__hook_used_prop }
398 \seq_map_inline:Nn \g__hook_all_seq
399 {
400   \__hook_update_hook_code:n {##1}
401 }
```

If we are debugging we show results hook by hook for all hooks that have data.

```
402 \__hook_debug:n
403 { \iow_term:x{^^JAll~ initialized~ (non-empty)~ hooks:}
404   \prop_map_inline:Nn \g__hook_used_prop
405   { \iow_term:x{^^J~ ##1~ ->~
406     \exp_not:v {__hook-##1}~ }
407   }
408 }
```

After all hooks are initialized we change the “use” to just call the hook code and not initialize it (as it was done in the preamble.

```
409 \cs_gset_eq:NN \hook_use:n \__hook_use_initialized:n
410 \cs_gset_eq:NN \__hook_preamble_hook:n \use_none:n
411 }
```

(End definition for `\__hook_initialize_all:.`)

`\__hook_initialize_hook_code:n` Initializing or reinitializing the fast execution hook code. In the preamble this is selectively done in case a hook gets used and at `\begin{document}` this is done for all hooks and afterwards only if the hook code changes.

```
412 \cs_new_protected:Npn \__hook_initialize_hook_code:n #1
413 {
414   \debug_suspend:
415   \__hook_debug:n{ \iow_term:x{^^JUpdate~ code~ for~ hook~
416     '##1' \on@line :^^J} }
```

This does the sorting and the updates. First thing we do is to check if a legacy hook macro exists and if so we add it to the hook under the label `legacy`. This might make the hook non-empty so we have to do this before the then following test.

```
417 \__hook_include_legacy_code_chunk:n {##1}
```

If there aren't any code chunks for the current hook, there is no point in even starting the sorting routine so we make a quick test for that and in that case just update `\__hook <hook>` to hold the next code. If there are code chunks we call `\__hook_initialize_single:NNn` and pass to it ready made csnames as they are needed several times inside. This way we save a bit on processing time if we do that up front.

```

418 \hook_if_exist:nT {#1}
419 {
420   \prop_if_empty:cTF {g__hook_#1_code_prop}
421   { \tl_gset:co { __hook~#1 }
422     { \cs:w __hook_next~#1 \cs_end: } }
423 }
```

By default the algorithm sorts the code chunks and then saves the result in a token list for fast execution by adding the code one after another using `\tl_gput_right:NV`. When we sort code for a reversed hook, all we have to do is to add the code chunks in the opposite order into the token list. So all we have to do in preparation is to change two definitions used later on.

```

424 \__hook_if_reversed:nTF {#1}
425 { \cs_set_eq:NN \__hook_tl_gput:NV \tl_gput_left:NV
426   \cs_set_eq:NN \__hook_clist_gput:NV \clist_gput_left:NV }
427 { \cs_set_eq:NN \__hook_tl_gput:NV \tl_gput_right:NV
428   \cs_set_eq:NN \__hook_clist_gput:NV \clist_gput_right:NV }
```

When sorting, some relations (namely voids) need to act destructively on the code property lists to remove code that shouldn't appear in the sorted hook token list, so we temporarily save the old code property list so that it can be restored later.

```

429 \prop_set_eq:Nc \l__hook_work_prop { g__hook_#1_code_prop }
430 \__hook_initialize_single:cccn
431 { __hook~#1 } { __hook_next~#1 }
432 { g__hook_#1_labels_clist } {#1}
```

For debug display we want to keep track of those hooks that actually got code added to them, so we record that in plist. We use a plist to ensure that we record each hook name only once, i.e., we are only interested in storing the keys and the value is arbitrary.

```

433 \__hook_debug:n{ \exp_args:NNx \prop_gput:Nnn
434                 \g__hook_used_prop {#1}{ }
435 }
436 }
437 \debug_resume:
438 }
```

(End definition for `\__hook_initialize_hook_code:n`.)

`\__hook_tl_csnames:n` It is faster to pass a single token and expand it when necessary than to pass a bunch of character tokens around.

*FMi: note to myself: verify*

```

439 \cs_new:Npn \__hook_tl_csnames:n #1 { l__hook_label_#1_tl }
440 \cs_new:Npn \__hook_seq_csnames:n #1 { l__hook_label_#1_seq }
```

(End definition for `\__hook_tl_csnames:n` and `\__hook_seq_csnames:n`.)

`\l__hook_labels_seq` For the sorting I am basically implementing Knuth's algorithm for topological sorting as given in TAOCP volume 1 pages 263–266. For this algorithm we need a number of local variables:

```

\l__hook_labels_int
\l__hook_front_tl
\l__hook_rear_tl
\l__hook_label_0_tl
```

File g: lthooks.dtx

- List of labels used in the current hook to label code chunks:

```
441 \seq_new:N \l__hook_labels_seq
```

- Number of labels used in the current hook. In Knuth’s algorithm this is called  $N$ :

```
442 \int_new:N \l__hook_labels_int
```

- The sorted code list to be build is managed using two pointers one to the front of the queue and one to the rear. We model this using token list pointers. Knuth calls them  $F$  and  $R$ :

```
443 \tl_new:N \l__hook_front_tl
```

```
444 \tl_new:N \l__hook_rear_tl
```

- The data for the start of the queue is kept in this token list, it corresponds to what Don calls `QLINK[0]` but since we aren’t manipulating individual words in memory it is slightly differently done:

```
445 \tl_new:c { \__hook_tl_csname:n { 0 } }
```

(End definition for `\l__hook_labels_seq` and others.)

```
\__hook_initialize_single:NNNn
\__hook_initialize_single:cccn
```

`\__hook_initialize_single:NNNn` implements the sorting of the code chunks for a hook and saves the result in the token list for fast execution (#3). The arguments are  $\langle hook-code-plist \rangle$ ,  $\langle hook-code-tl \rangle$ ,  $\langle hook-next-code-tl \rangle$ ,  $\langle hook-ordered-labels-clist \rangle$  and  $\langle hook-name \rangle$  (the latter is only used for debugging—the  $\langle hook-rule-plist \rangle$  is accessed using the  $\langle hook-name \rangle$ ).

The additional complexity compared to Don’s algorithm is that we do not use simple positive integers but have arbitrary alphanumeric labels. As usual Don’s data structures are chosen in a way that one can omit a lot of tests and I have mimicked that as far as possible. The result is a restriction I do not test for at the moment: a label can’t be equal to the number 0!

*FMi: Needs checking for, just in case*

```
446 \cs_new_protected:Npn \__hook_initialize_single:NNNn #1#2#3#4
447 {
```

Step T1: Initialize the data structure ...

```
448 \seq_clear:N \l__hook_labels_seq
```

```
449 \int_zero:N \l__hook_labels_int
```

Store the name of the hook:

```
450 \tl_set:Nn \l__hook_cur_hook_tl {#4}
```

We loop over the property list holding the code and record all labels listed there. Only rules for those labels are of interest to us. While we are at it we count them (which gives us the  $N$  in Knuth’s algorithm). The prefix `label_` is added to the variables to ensure that labels named `front`, `rear`, `labels`, or `return` don’t interact with our code.

```
451 \prop_map_inline:Nn \l__hook_work_prop
452 {
453   \int_incr:N \l__hook_labels_int
454   \seq_put_right:Nn \l__hook_labels_seq {##1}
455   \tl_set:cn { \__hook_tl_csname:n {##1} }{0}
456   \seq_clear_new:c { \__hook_seq_csname:n {##1} }
457 }
```

Steps T2 and T3: Sort the relevant rules into the data structure...

This loop constitutes a square matrix of the labels in `\l__hook_work_prop` in the vertical and the horizontal directions. However since the rule  $l_A \langle rel \rangle l_B$  is the same as  $l_B \langle rel \rangle^{-1} l_A$  we can cut the loop short at the diagonal of the matrix (*i.e.*, when both labels are equal), saving a good amount of time. The way the rules were set up (see the implementation of `\__hook_rule_before_gset:nnn` above) ensures that we have no rule in the ignored side of the matrix, and all rules are seen. The rules are applied in `\__hook_apply_label_pair:nnn`, which takes the properly-ordered pair of labels as argument.

```

458 \prop_map_inline:Nn \l__hook_work_prop
459 {
460   \prop_map_inline:Nn \l__hook_work_prop
461   {
462     \__hook_if_label_case:nnnnn {##1} {####1}
463     { \prop_map_break: }
464     { \__hook_apply_label_pair:nnn {##1} {####1} }
465     { \__hook_apply_label_pair:nnn {####1} {##1} }
466     {#4}
467   }
468 }

```

Take a breath and take a look at the data structures that have been set up:

```

469 \__hook_debug:n { \__hook_debug_label_data:N \l__hook_work_prop }

```

Step T4:

```

470 \tl_set:Nn \l__hook_rear_tl { 0 }
471 \tl_set:cn { \__hook_tl_csname:n { 0 } } { 0 }
472 \seq_map_inline:Nn \l__hook_labels_seq
473 {
474   \int_compare:nNnT { \cs:w \__hook_tl_csname:n {##1} \cs_end: } = 0
475   {
476     \tl_set:cn { \__hook_tl_csname:n { \l__hook_rear_tl } } {##1}
477     \tl_set:Nn \l__hook_rear_tl {##1}
478   }
479 }
480 \tl_set_eq:Nc \l__hook_front_tl { \__hook_tl_csname:n { 0 } }
481 \tl_gclear:N #1
482 \clist_gclear:N #3

```

The whole loop combines steps T5–T7:

```

483 \bool_while_do:nn { ! \str_if_eq_p:Vn \l__hook_front_tl { 0 } }
484 {

```

This part is step T5:

```

485   \int_decr:N \l__hook_labels_int
486   \prop_get:NVN \l__hook_work_prop \l__hook_front_tl \l__hook_return_tl
487   \__hook_tl_gput:NV #1 \l__hook_return_tl
488   \__hook_clist_gput:NV #3 \l__hook_front_tl
489   \__hook_debug:n{ \iow_term:x{Handled~ code~ for~ \l__hook_front_tl} }

```

This is step T6 except that we don't use a pointer  $P$  to move through the successors, but instead use `##1` of the mapping function.

```

490   \seq_map_inline:cn { \__hook_seq_csname:n { \l__hook_front_tl } }
491   {

```

```

492         \tl_set:cx { \__hook_tl_csname:n {##1} }
493         { \int_eval:n
494           { \cs:w \__hook_tl_csname:n {##1} \cs_end: - 1 }
495         }
496       \int_compare:nNnT
497       { \cs:w \__hook_tl_csname:n {##1} \cs_end: } = 0
498       {
499         \tl_set:cn { \__hook_tl_csname:n { \l__hook_rear_tl } } {##1}
500         \tl_set:Nn \l__hook_rear_tl {##1}
501       }
502     }

```

and step T7:

```

503     \tl_set_eq:Nc \l__hook_front_tl
504     { \__hook_tl_csname:n { \l__hook_front_tl } }

```

This is step T8: If we haven't moved the code for all labels (i.e., if `\l__hook_labels_int` is still greater than zero) we have a loop and our partial order can't be flattened out.

```

505   }
506   \int_compare:nNnF \l__hook_labels_int = 0
507   {
508     \iow_term:x{=====}
509     \iow_term:x{Error:~ label~ rules~ are~ incompatible:}

```

This is not really the information one needs in the error case but will do for now ...

*FMi: fix*

```

510     \__hook_debug_label_data:N \l__hook_work_prop
511     \iow_term:x{=====}
512   }

```

After we have added all hook code to #1 we finish it off with adding extra code for a one time execution. That is stored in #2 but is normally empty.

```

513     \tl_gput_right:Nn #1 {#2}
514   }

515   \cs_generate_variant:Nn \__hook_initialize_single:NNNn {ccc}

```

(End definition for `\__hook_initialize_single:NNNn`.)

`\__hook_tl_gput:NV` These append either on the right (normal hook) or on the left (reversed hook). This is setup up in `\__hook_initialize_hook_code:n`, elsewhere their behavior is undefined.

```

516 \cs_new:Npn \__hook_tl_gput:NV { \ERROR }
517 \cs_new:Npn \__hook_clist_gput:NV { \ERROR }

```

(End definition for `\__hook_tl_gput:NV` and `\__hook_clist_gput:NV`.)

`\__hook_apply_label_pair:nnn` This is the payload of steps T2 and T3 executed in the loop described above. This macro assumes #1 and #2 are ordered, which means that any rule pertaining the pair #1 and #2 is `\g__hook_⟨hook⟩_rule_#1|#2_tl`, and not `\g__hook_⟨hook⟩_rule_#2|#1_tl`. This also saves a great deal of time since we only need to check the order of the labels once.

The arguments here are `⟨label1⟩`, `⟨label2⟩`, `⟨hook⟩`, and `⟨hook-code-plist⟩`. We are about to apply the next rule and enter it into the data structure. `\__hook_apply_label_pair:nnn` will just call `\__hook_label_if_exist_apply:nnnF` for the `⟨hook⟩`, and if no rule is found, also try the `⟨hook⟩` name ?? denoting a default hook rule.

`\__hook_label_if_exist_apply:nnnF` will check if the rule exists for the given hook, and if so call `\__hook_apply_rule:nnn`.

```
518 \cs_new_protected:Npn \__hook_apply_label_pair:nnn #1#2#3
519 {
```

Extra complication: as we use default rules and local hook specific rules we first have to check if there is a local rule and if that exist use it. Otherwise check if there is a default rule and use that.

```
520   \__hook_label_if_exist_apply:nnnF {#1} {#2} {#3}
521   {
```

If there is no hook-specific rule we check for a default one and use that if it exists.

```
522       \__hook_label_if_exist_apply:nnnF {#1} {#2} { ?? } { }
523   }
524 }
```

```
525 \cs_new_protected:Npn \__hook_label_if_exist_apply:nnnF #1#2#3
526 {
527   \if_cs_exist:w g__hook_ #3 _rule_ #1 | #2 _tl \cs_end:
```

What to do precisely depends on the type of rule we have encountered. If it is a `before` rule it will be handled by the algorithm but other types need to be managed differently. All this is done in `\__hook_apply_rule:nnnN`.

```
528   \__hook_apply_rule:nnn {#1} {#2} {#3}
529   \exp_after:wN \use_none:n
530   \else:
531     \use:nn
532   \fi:
533 }
```

(End definition for `\__hook_apply_label_pair:nnn` and `\__hook_label_if_exist_apply:nnnF`.)

`\__hook_apply_rule:nnn` This is the code executed in steps T2 and T3 while looping through the matrix This is part of step T3. We are about to apply the next rule and enter it into the data structure. The arguments are  $\langle label1 \rangle$ ,  $\langle label2 \rangle$ ,  $\langle hook-name \rangle$ , and  $\langle hook-code-plist \rangle$ .

```
534 \cs_new_protected:Npn \__hook_apply_rule:nnn #1#2#3
535 {
536   \cs:w __hook_apply_
537   \cs:w g__hook_#3_reversed_tl \cs_end: rule_
538   \cs:w g__hook_ #3 _rule_ #1 | #2 _tl \cs_end: :nnn \cs_end:
539   {#1} {#2} {#3}
540 }
```

(End definition for `\__hook_apply_rule:nnn`.)

`\__hook_apply_rule_<:nnn` The most common cases are `<` and `>` so we handle that first. They are relations  $\prec$  and  $\succ$  in TAOCP, and they dictate sorting.

`\__hook_apply_rule_>:nnn`

```
541 \cs_new_protected:cpn { __hook_apply_rule_<:nnn } #1#2#3
542 {
543   \__hook_debug:n { \__hook_msg_pair_found:nnn {#1} {#2} {#3} }
544   \tl_set:cx { \__hook_tl_csname:n {#2} }
545   { \int_eval:n{ \cs:w \__hook_tl_csname:n {#2} \cs_end: + 1 } }
546   \seq_put_right:cn{ \__hook_seq_csname:n {#1} }{#2}
547 }
548 \cs_new_protected:cpn { __hook_apply_rule_>:nnn } #1#2#3
549 {
```



```

550 \__hook_debug:n { \__hook_msg_pair_found:nnn {#1} {#2} {#3} }
551 \tl_set:cx { \__hook_tl_csname:n {#1} }
552 { \int_eval:n{ \cs:w \__hook_tl_csname:n {#1} \cs_end: + 1 } }
553 \seq_put_right:cn{ \__hook_seq_csname:n {#2} }{#1}
554 }

```

(End definition for \\_\_hook\_apply\_rule\_<:nnn and \\_\_hook\_apply\_rule\_>:nnn.)

\\_\_hook\_apply\_rule\_xE:nnn These relations make two labels incompatible within a hook. xE makes raises an error if  
\\_\_hook\_apply\_rule\_xW:nnn the labels are found in the same hook, and xW makes it a warning.

```

555 \cs_new_protected:cpn { \__hook_apply_rule_xE:nnn } #1#2#3
556 {
557   \__hook_debug:n { \__hook_msg_pair_found:nnn {#1} {#2} {#3} }
558   \msg_error:nnnnnn { hooks } { labels-incompatible }
559   {#1} {#2} {#3} { 1 }
560   \use:c { \__hook_apply_rule_>:nnn } {#1} {#2} {#3}
561   \use:c { \__hook_apply_rule_<:nnn } {#1} {#2} {#3}
562 }
563 \cs_new_protected:cpn { \__hook_apply_rule_xW:nnn } #1#2#3
564 {
565   \__hook_debug:n { \__hook_msg_pair_found:nnn {#1} {#2} {#3} }
566   \msg_warning:nnnnnn { hooks } { labels-incompatible }
567   {#1} {#2} {#3} { 0 }
568 }

```

(End definition for \\_\_hook\_apply\_rule\_xE:nnn and \\_\_hook\_apply\_rule\_xW:nnn.)

\\_\_hook\_apply\_rule\_>:nnn If we see -> we have to drop code for label #3 and carry on. We could do a little better  
\\_\_hook\_apply\_rule\_<:nnn and drop everything for that label since it doesn't matter where we sort in the empty  
code. However that would complicate the algorithm a lot with little gain.<sup>8</sup> So we still  
unnecessarily try to sort it in and depending on the rules that might result in a loop that  
is otherwise resolved. If that turns out to be a real issue, we can improve the code.

Here the code is removed from \l\_\_hook\_cur\_hook\_tl rather than #3 because the  
latter may be ??, and the default hook doesn't store any code. Removing from \l\_\_-  
hook\_cur\_hook\_tl makes default rules -> and <- work properly.

```

569 \cs_new_protected:cpn { \__hook_apply_rule_>:nnn } #1#2#3
570 {
571   \__hook_debug:n
572   {
573     \__hook_msg_pair_found:nnn {#1} {#2} {#3}
574     \iow_term:x{--->~ Drop~ '#2'~ code~ from~
575     \iow_char:N \ g__hook_ \l__hook_cur_hook_tl _code_prop ~
576     because~ of~ '#1' }
577   }
578   \prop_put:Nnn \l__hook_work_prop {#2} { }
579 }
580 \cs_new_protected:cpn { \__hook_apply_rule_<:nnn } #1#2#3
581 {
582   \__hook_debug:n
583   {
584     \__hook_msg_pair_found:nnn {#1} {#2} {#3}

```

<sup>8</sup>This also has the advantage that the result of the sorting doesn't change which might otherwise  
(for unrelated chunks) if we aren't careful.

```

585 \iow_term:x{--->~ Drop~ '#1'~ code~ from~
586 \iow_char:N \ \ g__hook_ \l__hook_cur_hook_tl _code_prop ~
587 because~ of~ '#2' }
588 }
589 \prop_put:Nnn \l__hook_work_prop {#1} { }
590 }

```

(End definition for \\_\_hook\_apply\_rule\_->:nnn and \\_\_hook\_apply\_rule\_-<:nnn.)

```

\__hook_apply_rule_-<:nnn
\__hook_apply_rule_->:nnn
\__hook_apply_rule_-<~:nnn
\__hook_apply_rule_->:nnn
\__hook_apply_rule_x:nnn

```

Reversed rules.

```

591 \cs_new_eq:cc { __hook_apply_rule_-<:nnn } { __hook_apply_rule_->:nnn }
592 \cs_new_eq:cc { __hook_apply_rule_->:nnn } { __hook_apply_rule_-<:nnn }
593 \cs_new_eq:cc { __hook_apply_rule_-<~:nnn } { __hook_apply_rule_->~:nnn }
594 \cs_new_eq:cc { __hook_apply_rule_->~:nnn } { __hook_apply_rule_-<~:nnn }
595 \cs_new_eq:cc { __hook_apply_rule_xE:nnn } { __hook_apply_rule_xE:nnn }
596 \cs_new_eq:cc { __hook_apply_rule_xW:nnn } { __hook_apply_rule_xW:nnn }

```

(End definition for \\_\_hook\_apply\_rule\_-<:nnn and others.)

```
\__hook_msg_pair_found:nnn
```

A macro to avoid moving this many tokens around.

```

597 \cs_new_protected:Npn \__hook_msg_pair_found:nnn #1#2#3
598 {
599 \iow_term:x{~ \str_if_eq:nnTF {#3} {??} {default} {~normal} ~
600 rule~ \__hook_label_pair:nn {#1} {#2}:~
601 \use:c { g__hook_#3_rule_ \__hook_label_pair:nn {#1} {#2} _tl } ~
602 found}
603 }

```

(End definition for \\_\_hook\_msg\_pair\_found:nnn.)

```
\__hook_debug_label_data:N
```

```

604 \cs_new_protected:Npn \__hook_debug_label_data:N #1 {
605 \iow_term:x{Code~ labels~ for~ sorting:}
606 \iow_term:x{~ \seq_use:Nnnn\l__hook_labels_seq {~and~}{,~}{~and~} }
607 \iow_term:x{^J Data~ structure~ for~ label~ rules:}
608 \prop_map_inline:Nn #1
609 {
610 \iow_term:x{~ ##1~ =~ \tl_use:c{ \__hook_tl_csname:n {##1} }~ ->~
611 \seq_use:cnnn{ \__hook_seq_csname:n {##1} }{~>~}{~>~}{~>~}
612 }
613 }
614 \iow_term:x{}
615 }

```

(End definition for \\_\_hook\_debug\_label\_data:N.)

```

\hook_show:n
\hook_log:n

```

This writes out information about the hook given in its argument onto the .log file and the terminal, if \show\_hook:n is used. Internally both share the same structure, except that at the end, \hook\_show:n triggers T<sub>E</sub>X's prompt.

```

\__hook_log_line:x
\__hook_log_line_indent:x
\__hook_log:nN

```

```

616 \cs_new_protected:Npn \hook_log:n #1
617 {
618 \cs_set_eq:NN \__hook_log_cmd:x \iow_log:x
619 \__hook_normalize_hook_args:Nn \__hook_log:nN {#1} \tl_log:x
620 }
621 \cs_new_protected:Npn \hook_show:n #1

```

```

622 {
623   \cs_set_eq:NN \__hook_log_cmd:x \iow_term:x
624   \__hook_normalize_hook_args:Nn \__hook_log:nN {#1} \tl_show:x
625 }
626 \cs_new_protected:Npn \__hook_log_line:x #1
627 { \__hook_log_cmd:x { >~#1 } }
628 \cs_new_protected:Npn \__hook_log_line_indent:x #1
629 { \__hook_log_cmd:x { >~\@spaces #1 } }
630 \cs_new_protected:Npn \__hook_log:nN #1 #2
631 {
632   \__hook_preamble_hook:n {#1}
633   \__hook_log_cmd:x { ^^J ->~The~hook~'#1': }
634   \hook_if_exist:nF {#1}
635   { \__hook_log_line:x { is~not~declared! } }
636   \__hook_if_exist:nTF {#1}
637   {
638     \__hook_log_line:x { Code~chunks: }
639     \prop_if_empty:cTF { g__hook_#1_code_prop }
640     { \__hook_log_line_indent:x { --- } }
641     {
642       \prop_map_inline:cn { g__hook_#1_code_prop }
643       { \__hook_log_line_indent:x { ##1~>~\tl_to_str:n {##2} } }
644     }
645     \__hook_log_line:x { Extra~code~for~next~invocation:}
646     \__hook_log_line_indent:x
647     {
648       \tl_if_empty:cTF { __hook_next~#1 }
649       { --- }

```

If the token list is not empty we want to display it but without the first tokens (the code to clear itself) so we call a helper command to get rid of them.

```

650       { ->~ \exp_args:Nv \__hook_log_next_code:n { __hook_next~#1 } }
651     }

```

Loop through the rules in a hook and for every rule found, print it. If no rule is there, print ---. The boolean `\l__hook_tmpa_bool` here indicates if the hook has no rules.

```

652   \__hook_log_line:x { Rules: }
653   \bool_set_true:N \l__hook_tmpa_bool
654   \__hook_list_rules:nm {#1}
655   {
656     \bool_set_false:N \l__hook_tmpa_bool
657     \__hook_log_line_indent:x
658     {
659       ##2~ with~
660       \str_if_eq:nnT {##3} {??} { default~ }
661       relation~ ##1
662     }
663   }
664   \bool_if:NT \l__hook_tmpa_bool
665   { \__hook_log_line_indent:x { --- } }

```

When the hook is declared (that is, the sorting algorithm is applied to that hook) and not empty

```

666 \bool_lazy_and:nnTF
667   { \hook_if_exist_p:n {#1} }
668   { ! \hook_if_empty_p:n {#1} }
669   {
670     \__hook_log_line:x
671     {
672       Execution~order
673       \bool_if:NTF \l__hook_tmpa_bool
674       { \__hook_if_reversed:nT {#1} { ~(after~reversal) } }
675       { ~(after~
676         \__hook_if_reversed:nT {#1} { reversal~and~ }
677         applying~rules)
678       } :
679     }
680     #2 % \tl_show:n
681     {
682       \@spaces
683       \clist_if_empty:cTF { g__hook_#1_labels_clist }
684       { --- }
685       { \clist_use:cn {g__hook_#1_labels_clist} { ,~ } }
686     }
687   }
688   {
689     #2
690     {
691       Hook~ \hook_if_exist:nTF {#1}
692       {code~pool~empty} {not~declared}
693     }
694   }
695 }
696 { #2 { The~hook~is~empty. } }
697 }

```

To display the code for next invocation only (i.e., from `\AddToHookNext` we have to remove the first two tokens at the front which are `\tl_gclear:N` and the token list to clear.

```

698 \cs_new:Npn \__hook_log_next_code:n #1
699   { \exp_args:No \tl_to_str:n { \use_none:nn #1 } }
\__hook_log_next_code:n

```

(End definition for `\hook_show:n` and others. These functions are documented on page 110.)

```

\__hook_list_rules:nn
\__hook_list_one_rule:nnn
\__hook_list_if_rule_exists:nnmF

```

This macro takes a *hook* and an *inline function* and loops through each pair of *labels* in the *hook*, and if there is a relation between this pair of *labels*, the *inline function* is executed with `#1 = <relation>`, `#2 = <label1>|<label2>`, and `#3 = <hook>` (the latter may be the argument `#1` to `\__hook_list_rules:nn`, or `??` if it is a default rule).

```

700 \cs_new_protected:Npn \__hook_list_rules:nn #1 #2
701   {
702     \cs_set_protected:Npn \__hook_tmp:w ##1 ##2 ##3 {#2}
703     \prop_map_inline:cn { g__hook_#1_code_prop }
704     {
705       \prop_map_inline:cn { g__hook_#1_code_prop }
706       {
707         \__hook_if_label_case:nnnnn {##1} {####1}
708         { \prop_map_break: }

```

```

709         { \_hook_list_one_rule:nnn {##1} {####1} }
710         { \_hook_list_one_rule:nnn {####1} {##1} }
711           {#1}
712       }
713   }
714 }

```

These two are quite similar to `\_hook_apply_label_pair:nnn` and `\_hook_label_if_exist_apply:nnnF`, respectively, but rather than applying the rule, they pass it to the *(inline function)*.

```

715 \cs_new_protected:Npn \_hook_list_one_rule:nnn #1#2#3
716 {
717   \_hook_list_if_rule_exists:nnnF {#1} {#2} {#3} { }
718   { \_hook_list_if_rule_exists:nnnF {#1} {#2} { ?? } { } }
719 }
720 \cs_new_protected:Npn \_hook_list_if_rule_exists:nnnF #1#2#3
721 {
722   \if_cs_exist:w g\_hook_ #3 _rule_ #1 | #2 _tl \cs_end:
723   \exp_args:Nv \_hook_tmp:w
724   { g\_hook_ #3 _rule_ #1 | #2 _tl } { #1 | #2 } {#3}
725   \fi:
726 }

```

(End definition for `\_hook_list_rules:nn`, `\_hook_list_one_rule:nnn`, and `\_hook_list_if_rule_exists:nnnF`.)

`\_hook_debug_print_rules:n` A shorthand for debugging that prints similar to `\prop_show:N`.

```

727 \cs_new_protected:Npn \_hook_debug_print_rules:n #1
728 {
729   \iow_term:n { The~hook~#1~contains~the~rules: }
730   \cs_set_protected:Npn \_hook_tmp:w ##1
731   {
732     \_hook_list_rules:nn {#1}
733     {
734       \iow_term:x
735       {
736         > ##1 {####2} ##1 => ##1 {####1}
737         \str_if_eq:nnT {####3} {??} { ~(default) }
738       }
739     }
740   }
741   \exp_args:No \_hook_tmp:w { \use:nn { ~ } { ~ } }
742 }

```

(End definition for `\_hook_debug_print_rules:n`.)

### 3.8 Specifying code for next invocation

`\hook_gput_next_code:nn`

```

%!!!!\hook_gput_next_code:nn 743 \cs_new_protected:Npn \hook_gput_next_code:nn #1
\_hook_gput_next_do:nn 744 { \_hook_normalize_hook_args:Nn \_hook_gput_next_code:nn {#1} }
\_hook_gput_next_do:Nnn 745 \cs_new_protected:Npn \_hook_gput_next_code:nn #1 #2
\_hook_clear_next:n 746 {
747   \debug_suspend:

```

```

748 \__hook_declare:n {#1}
749 \hook_if_exist:nTF {#1}
750 { \__hook_gput_next_do:nn {#1} {#2} }
751 { \__hook_try_declaring_generic_next_hook:nn {#1} {#2} }
752 \debug_resume:
753 }
754 \cs_new_protected:Npn \__hook_gput_next_do:nn #1
755 {
756 \exp_args:Nc \__hook_gput_next_do:Nnn
757 { \__hook_next~#1 } {#1}
758 }

```

First check if the “next code” token list is empty: if so we need to add a `\tl_gclear:c` to clear it, so the code lasts for one usage only. The token list is cleared early so that nested usages don’t get lost. `\tl_gclear:c` is used instead of `\tl_gclear:N` in case the hook is used in an expansion-only context, so the token list doesn’t expand before `\tl_gclear:N`: that would make an infinite loop. Also in case the main code token list is empty, the hook code has to be updated to add the next execution token list.

```

759 \cs_new_protected:Npn \__hook_gput_next_do:Nnn #1 #2
760 {
761 \tl_if_empty:cT { \__hook~#2 }
762 { \__hook_update_hook_code:n {#2} }
763 \tl_if_empty:NT #1
764 { \tl_gset:Nn #1 { \__hook_clear_next:n {#2} } }
765 \tl_gput_right:Nn #1
766 }
767 \cs_new_protected:Npn \__hook_clear_next:n #1
768 { \cs_gset_eq:cN { \__hook_next~#1 } \c_empty_tl }

```

(End definition for `\hook_gput_next_code:nn` and others. This function is documented on page 109.)

### 3.9 Using the hook

<pre> \hook_use:n \__hook_use_initialized:n \__hook_use_undefined:w \__hook_use_end: \__hook_preamble_hook:n </pre>	<p><code>\hook_use:n</code> as defined here is used in the preamble, where hooks aren’t initialized by default. <code>\__hook_use_initialized:n</code> is also defined, which is the non-<code>\protected</code> version for use within the document. Their definition is identical, except for the <code>\__hook_preamble_hook:n</code> (which wouldn’t hurt in the expandable version, but it would be an unnecessary extra expansion).</p>
---------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

`\__hook_use_initialized:n` holds the expandable definition while in the preamble. `\__hook_preamble_hook:n` initializes the hook in the preamble, and is redefined to `\use_none:n` at `\begin{document}`.

Both versions do the same internally: check if the hook exist as given, and if so use it as quickly as possible. If it doesn’t exist, the a call to `\__hook_use:wn` checks for file hooks.

At `\begin{document}`, all hooks are initialized, and any change in them causes an update, so `\hook_use:n` can be made expandable. This one is better not protected so that it can expand into nothing if containing no code. Also important in case of generic hooks that we do not generate a `\relax` as a side effect of checking for a `cname`. In contrast to the  $\TeX$  low-level `\cname ... \endcname` construct `\tl_if_exist:c` is careful to avoid this.

```

769 \cs_new_protected:Npn \hook_use:n #1
770 {

```

```

771 \tl_if_exist:cTF { __hook~#1 }
772 {
773   \__hook_preamble_hook:n {#1}
774   \cs:w __hook~#1 \cs_end:
775 }
776 { \__hook_use:wn #1 / \s__hook_mark {#1} }
777 }
778 \cs_new:Npn \__hook_use_initialized:n #1
779 {
780   \if_cs_exist:w __hook~#1 \cs_end:
781   \else:
782     \__hook_use_undefined:w
783   \fi:
784   \cs:w __hook~#1 \__hook_use_end:
785 }
786 \cs_new:Npn \__hook_use_undefined:w #1 #2 __hook~#3 \__hook_use_end:
787 {
788   #1 % fi
789   \__hook_use:wn #3 / \s__hook_mark {#3}
790 }
791 \cs_new_protected:Npn \__hook_preamble_hook:n #1
792 { \__hook_initialize_hook_code:n {#1} }
793 \cs_new_eq:NN \__hook_use_end: \cs_end:

```

(End definition for `\hook_use:n` and others. This function is documented on page 108.)

`\__hook_use:wn` `\__hook_use:wn` does a quick check to test if the current hook is a file hook: those need a special treatment. If it is not, the hook does not exist. If it is, then `\__hook_try_file_hook:n` is called, and checks that the current hook is a file-specific hook using `\__hook_if_file_hook:wTF`. If it's not, then it's a generic file/ hook and is used if it exist.

If it is a file-specific hook, it passes through the same normalization as during declaration, and then it is used if defined. `\__hook_if_exist_use:n` checks if the hook exist, and calls `\__hook_preamble_hook:n` if so, then uses the hook.

```

794 \cs_new:Npn \__hook_use:wn #1 / #2 \s__hook_mark #3
795 {
796   \str_if_eq:nnTF {#1} { file }
797   { \__hook_try_file_hook:n {#3} }
798   { } % Hook doesn't exist
799 }
800 \cs_new_protected:Npn \__hook_try_file_hook:n #1
801 {
802   \__hook_if_file_hook:wTF #1 / / \s__hook_mark
803   {
804     \exp_args:Ne \__hook_if_exist_use:n
805     { \exp_args:Ne \__hook_file_hook_normalize:n {#1} }
806   }
807   { \__hook_if_exist_use:n {#1} } % file/ generic hook (e.g. file/before)
808 }
809 \cs_new_protected:Npn \__hook_if_exist_use:n #1
810 {
811   \tl_if_exist:cT { __hook~#1 }
812   {
813     \__hook_preamble_hook:n {#1}

```

```

814         \cs:w __hook~#1 \cs_end:
815     }
816 }

```

(End definition for `\__hook_use:wn`, `\__hook_try_file_hook:n`, and `\__hook_if_exist_use:n`.)

**`\hook_use_once:n`** For hooks that can and should be used only once we have a special use command that remembers the hook name in `\g__hook_execute_immediately_prop`. This has the effect that any further code added to the hook is executed immediately rather than stored in the hook.

The code needs some gymnastics to prevent space trimming from the hook name, since `\hook_use:n` and `\hook_use_once:n` are documented to not trim spaces.

*PhO: Should this raise an error if the hook doesn't exist?*

```

817 \cs_new_protected:Npn \hook_use_once:n #1
818 {
819     \tl_if_exist:cT { __hook~#1 }
820     {
821         \tl_set:Nn \l__hook_return_tl {#1}
822         \__hook_normalize_hook_args:Nn \__hook_use_once_store:n
823         { \l__hook_return_tl }
824         \hook_use:n {#1}
825     }
826 }
827 \cs_new_protected:Npn \__hook_use_once_store:n #1
828 { \prop_gput:Nnn \g__hook_execute_immediately_prop {#1} { } }

```

(End definition for `\hook_use_once:n`. This function is documented on page 108.)

### 3.10 Querying a hook

Simpler data types, like token lists, have three possible states; they can exist and be empty, exist and be non-empty, and they may not exist, in which case emptiness doesn't apply (though `\tl_if_empty:N` returns false in this case).

Hooks are a bit more complicated: they have four possible states. A hook may exist or not, and either way it may or may not be empty (even a hook that doesn't exist may be non-empty).

A hook is said to be empty when no code was added to it, either to its permanent code pool, or to its “next” token list. The hook doesn't need to be declared to have code added to its code pool (it may happen that a package *A* defines a hook `foo`, but it's loaded after package *B*, which adds some code to that hook. In this case it is important that the code added by package *B* is remembered until package *A* is loaded).

A hook is said to exist when it was declared with `\hook_new:n` or some variant thereof.

**`\hook_if_empty_p:n`** Test if a hook is empty (that is, no code was added to that hook). A hook being empty means that *both* its `\g__hook_⟨hook⟩_code_prop` and its `\__hook_next ⟨hook⟩` are empty.

**`\hook_if_empty:nTF`**

```

829 \prg_new_conditional:Npnn \hook_if_empty:n #1 { p , T , F , TF }
830 {
831     \__hook_if_exist:nTF {#1}
832     {

```



```

833     \bool_lazy_and:nnTF
834     { \prop_if_empty_p:c { g__hook_#1_code_prop } }
835     { \tl_if_empty_p:c { __hook_next~#1 } }
836     { \prg_return_true: }
837     { \prg_return_false: }
838   }
839   { \prg_return_true: }
840 }

```

(End definition for `\hook_if_empty:nTF`. This function is documented on page 109.)

**`\hook_if_exist_p:n`** A canonical way to test if a hook exists. A hook exists if the token list that stores the sorted code for that hook, `\__hook <hook>`, exists. The property list `\g__hook-<hook>_code_prop` cannot be used here because often it is necessary to add code to a hook without knowing if such hook was already declared, or even if it will ever be (for example, in case the package that defines it isn't loaded).

**`\hook_if_exist:nTF`**

```

841 \prg_new_conditional:Npnn \hook_if_exist:n #1 { p , T , F , TF }
842 {
843   \tl_if_exist:cTF { __hook~#1 }
844   { \prg_return_true: }
845   { \prg_return_false: }
846 }

```

(End definition for `\hook_if_exist:nTF`. This function is documented on page 109.)

**`\__hook_if_exist_p:n`** An internal check if the hook has already been declared with `\__hook_declare:n`. This means that the hook was already used somehow (a code chunk or rule was added to it), but it still wasn't declared with `\hook_new:n`.

**`\__hook_if_exist:nTF`**

```

847 \prg_new_conditional:Npnn \__hook_if_exist:n #1 { p , T , F , TF }
848 {
849   \prop_if_exist:cTF { g__hook_#1_code_prop }
850   { \prg_return_true: }
851   { \prg_return_false: }
852 }

```

(End definition for `\__hook_if_exist:nTF`.)

**`\__hook_if_reversed_p:n`** An internal conditional that checks if a hook is reversed.

**`\__hook_if_reversed:nTF`**

```

853 \prg_new_conditional:Npnn \__hook_if_reversed:n #1 { p , T , F , TF }
854 {
855   \if_int_compare:w \cs:w g__hook_#1_reversed_tl \cs_end: 1 < 0 \exp_stop_f:
856   \prg_return_true:
857   \else:
858   \prg_return_false:
859   \fi:
860 }

```

(End definition for `\__hook_if_reversed:nTF`.)

### 3.11 Messages

```

861 \msg_new:nnnn { hooks } { labels-incompatible }
862 {
863   Labels~‘#1’~and~‘#2’~are~incompatible
864   \str_if_eq:nnF {#3} {??} { ~in-hook~‘#3’ } .~
865   \int_compare:nNnTF {#4} = { 1 }
866   { The~ code~ for~ both~ labels~ will~ be~ dropped. }
867   { You~ may~ see~ errors~ later. }
868 }
869 { LaTeX~found~two~incompatible~labels~in~the~same~hook.~
870   This~indicates~an~incompatibility~between~packages. }

871 \msg_new:nnnn { hooks } { exists }
872 { Hook~‘#1’~ has~ already~ been~ declared. }
873 { There~ already~ exists~ a~ hook~ declaration~ with~ this~
874   name.\\
875   Please~ use~ a~ different~ name~ for~ your~ hook.}

876 \msg_new:nnn { hooks } { empty-label }
877 { Empty~code~label~\msg_line_context:..Using~‘#1’~instead. }

878 \msg_new:nnnn { hooks } { unknown-rule }
879 { Unknown~ relationship~ ‘#3’~
880   between~ labels~ ‘#2’~ and~ ‘#4’~
881   \str_if_eq:nnF {#1} {??} { ~in-hook~‘#1’ } .~
882   Perhaps~ a~ misspelling?
883 }
884 {
885   The~ relation~ used~ not~ known~ to~ the~ system.~ Allowed~ values~ are~
886   ‘before’~ or~ ‘<’,~
887   ‘after’~ or~ ‘>’,~
888   ‘incompatible-warning’,~
889   ‘incompatible-error’,~
890   ‘voids’~ or~
891   ‘unrelated’.
892 }

893 \msg_new:nnn { hooks } { should-not-happen }
894 {
895   ERROR!~This~should~not~happen.~#1 \\
896   Please~report~at~https://github.com/latex3/latex2e.
897 }

```

### 3.12 L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> package interface commands

**\NewHook**      Declaring new hooks ...

**\NewReversedHook**      { m }{ \hook\_new:n {#1} }

**\NewMirroredHookPair**      { m }{ \hook\_new\_reversed:n {#1} }

                    { mm }{ \hook\_new\_pair:nn {#1}{#2} }

(End definition for \NewHook, \NewReversedHook, and \NewMirroredHookPair. These functions are documented on page 99.)

**\AddToHook**

```

901 \NewDocumentCommand \AddToHook { m o +m }
902 { \hook_gput_code:nnn {#1} {#2} {#3} }

```

(End definition for `\AddToHook`. This function is documented on page 101.)

#### `\AddToHookNext`

```
903 \NewDocumentCommand \AddToHookNext { m +m }
904   { \hook_gput_next_code:nn {#1} {#2} }
```

(End definition for `\AddToHookNext`. This function is documented on page 102.)

#### `\RemoveFromHook`

```
905 \NewDocumentCommand \RemoveFromHook { m o }
906   { \hook_gremove_code:nn {#1} {#2} }
```

(End definition for `\RemoveFromHook`. This function is documented on page 101.)

#### `\DeclareDefaultHookLabel`

```
\__hook_curr_name_push:n
  \__hook_curr_name_pop:
```

The token list `\g__hook_hook_curr_name_tl` stores the name of the current package/file to be used as label for hooks. Providing a consistent interface is tricky, because packages can be loaded within packages, and some packages may not use `\DeclareDefaultHookLabel` to change the default label (in which case `\@currname` is used, if set).

To pull that off, we keep a stack that contains the default label for each level of input. The bottom of the stack contains the default label for the top-level. Since the string `top-level` is hardcoded, here this item of the stack is empty. Also, since we're in an input level, add `lthooks` to the stack as well. This stack should never go empty. An empty entry is added to the stack to account for the `top-level`. The item is empty so that the hard-coded default is used, but a call to `\DeclareDefaultHookLabel` will change it if needed.

```
907 \seq_gpush:Nn \g__hook_name_stack_seq { }
```

Two commands keep track of the stack: when a file is input, `\__hook_curr_name_push:n` pushes an (empty by default) label to the stack:

```
908 \cs_new_protected:Npn \__hook_curr_name_push:n #1
909   {
910     \seq_gpush:Nn \g__hook_name_stack_seq {#1}
911     \tl_gset:Nn \g__hook_hook_curr_name_tl {#1}
912   }
913 %
```

and when an input is over, the topmost item of the stack is popped, since the label will not be used again, and `\g__hook_hook_curr_name_tl` is updated to the now topmost item of the stack:

```
914 \cs_new_protected:Npn \__hook_curr_name_pop:
915   {
916     \seq_gpop:NN \g__hook_name_stack_seq \l__hook_return_tl
917     \seq_get:NNTF \g__hook_name_stack_seq \l__hook_return_tl
918     { \tl_gset_eq:NN \g__hook_hook_curr_name_tl \l__hook_return_tl }
919     {
920       \msg_error:nnn { hooks } { should-not-happen }
921       { Tried~to~pop~from~an~empty~default~label~stack. }
922     }
923   }
```

The token list `\g__hook_hook_curr_name_tl` is but a mirror of the top of the stack. Now define a wrapper that replaces the top of the stack with the argument, and updates `\g__hook_hook_curr_name_tl` accordingly.

```
924 \NewDocumentCommand \DeclareDefaultHookLabel { m }
925 {
926   \seq_gpop:NN \g__hook_name_stack_seq \l__hook_return_tl
927   \__hook_curr_name_push:n {#1}
928 }
```

(End definition for `\DeclareDefaultHookLabel`, `\__hook_curr_name_push:n`, and `\__hook_curr_name_pop:`. This function is documented on page 103.)

**`\UseHook`** Avoid the overhead of `xparse` and its protection that we don't want here (since the hook should vanish without trace if empty)!

**`\UseOneTimeHook`**

```
929 \cs_new:Npn \UseHook { \hook_use:n }
930 \cs_new:Npn \UseOneTimeHook { \hook_use_once:n }
```

(End definition for `\UseHook` and `\UseOneTimeHook`. These functions are documented on page 100.)

**`\ShowHook`**

**`\LogHook`**

```
931 \cs_new_protected:Npn \ShowHook { \hook_show:n }
932 \cs_new_protected:Npn \LogHook { \hook_log:n }
```

(End definition for `\ShowHook` and `\LogHook`. These functions are documented on page 107.)

**`\DebugHooksOn`**

**`\DebugHooksOff`**

```
933 \cs_new_protected:Npn \DebugHooksOn { \hook_debug_on: }
934 \cs_new_protected:Npn \DebugHooksOff { \hook_debug_off: }
```

(End definition for `\DebugHooksOn` and `\DebugHooksOff`. These functions are documented on page 108.)

**`\DeclareHookRule`**

```
935 \NewDocumentCommand \DeclareHookRule { m m m m }
936 { \hook_gset_rule:nnnn {#1}{#2}{#3}{#4} }
```

(End definition for `\DeclareHookRule`. This function is documented on page 104.)

**`\DeclareDefaultHookRule`** This declaration is only supported before `\begin{document}`.

```
937 \NewDocumentCommand \DeclareDefaultHookRule { m m m }
938 { \hook_gset_rule:nnnn {??}{#1}{#2}{#3} }
939 \@onlypreamble\DeclareDefaultHookRule
```

(End definition for `\DeclareDefaultHookRule`. This function is documented on page 105.)

**`\ClearHookRule`** A special setup rule that removes an existing relation. Basically `@@_rule_gclear:nnn` plus fixing the property list for debugging.

*FMi: Need an L3 interface, or maybe it should get dropped?*

```
940 \NewDocumentCommand \ClearHookRule { m m m }
941 { \hook_gset_rule:nnnn {#1}{#2}{unrelated}{#3} }
```

(End definition for `\ClearHookRule`. This function is documented on page 104.)

`\IfHookExistsTF` Here we avoid the overhead of `xparse`, since `\IfHookEmptyTF` is used in `\end` (that is, every L<sup>A</sup>T<sub>E</sub>X environment). As a further optimisation, use `\let` rather than `\def` to avoid one expansion step.

```
942 \cs_new_eq:NN \IfHookExistsTF \hook_if_exist:nTF
943 \cs_new_eq:NN \IfHookEmptyTF \hook_if_empty:nTF
```

(End definition for `\IfHookExistsTF` and `\IfHookEmptyTF`. These functions are documented on page 106.)

5

### 3.13 Internal commands needed elsewhere

Here we set up a few horrible (but consistent) L<sup>A</sup>T<sub>E</sub>X<sub>2 $\epsilon$</sub>  names to allow for internal commands to be used outside this module. We have to unset the `@@` since we want double “at” sign in place of double underscores.

```
944 <@@=>
```

```
\@expl@@@initialize@all@@
```

```
\@expl@@@hook@curr@name@push@@n
\@expl@@@hook@curr@name@pop@@
```

```
945 \cs_new_eq:NN \@expl@@@initialize@all@@
946     \__hook_initialize_all:
947 \cs_new_eq:NN \@expl@@@hook@curr@name@push@@n
948     \__hook_curr_name_push:n
949 \cs_new_eq:NN \@expl@@@hook@curr@name@pop@@
950     \__hook_curr_name_pop:
```

(End definition for `\@expl@@@initialize@all@@`, `\@expl@@@hook@curr@name@push@@n`, and `\@expl@@@hook@curr@name@pop@@`. These functions are documented on page ??.)

```
951 \ExplSyntaxOff
```

Rolling back here doesn’t undefine the interface commands as they may be used in packages without rollback functionality. So we just make them do nothing which may or may not work depending on the code usage.

```
952 </2ekernel | latexrelease>
953 <latexrelease>\EndIncludeInRelease
954 <latexrelease>\IncludeInRelease{0000/00/00}%
955 <latexrelease>          {\NewHook}{The hook management}%
956 <latexrelease>
957 <latexrelease>\def\NewHook#1{}
958 <latexrelease>\def\NewReversedHook#1{}
959 <latexrelease>\def\NewMirroredHookPair#1#2{}
960 <latexrelease>
961 <latexrelease>\long\def\AddToHookNext#1#2{}
962 <latexrelease>
963 <latexrelease>\def\AddToHook#1{\@gobble\AddToHook@args}
964 <latexrelease>\providecommand\@gobble\AddToHook@args[2] [] {}
965 <latexrelease>
966 <latexrelease>\def\RemoveFromHook#1{\@gobble\RemoveFromHook@arg}
967 <latexrelease>\providecommand\@gobble\RemoveFromHook@arg[1] [] {}
968 <latexrelease>
969 <latexrelease>\def \UseHook          #1{}
970 <latexrelease>\def \UseOneTimeHook #1{}
971 <latexrelease>\def \ShowHook #1{}
```

```

972 <latexrelease>\let \DebugHooksOn \@empty
973 <latexrelease>\let \DebugHooksOff \@empty
974 <latexrelease>
975 <latexrelease>\def \DeclareHookRule #1#2#3#4{}
976 <latexrelease>\def \DeclareDefaultHookRule #1#2#3{}
977 <latexrelease>\def \ClearHookRule #1#2#3{}

If the hook management is not provided we make the test for existence false and the test
for empty true in the hope that this is most of the time reasonable. If not a package
would need to guard against running in an old kernel.

978 <latexrelease>\long\def \IfHookExistsTF #1#2#3{#3}
979 <latexrelease>\long\def \IfHookEmptyTF #1#2#3{#2}
980 <latexrelease>
981 <latexrelease>\EndIncludeInRelease

```

# File h

## lalloc.dtx

### 1 Counters

This section deals with counter and other variable allocation.

`1 \langle *2ekernel\rangle`

The following are from plain T<sub>E</sub>X:

`\z@` A zero dimen or number. It's more efficient to write `\parindent\z@` than `\parindent 0pt`.

`\@ne` The number 1.

`\m@ne` The number  $-1$ .

`\tw@` The number 2.

`\sixt@@n` The number 16.

`\@m` The number 1000.

`\@MM` The number 20000.

`\@xxxii` The constant 32.

`2 \chardef\@xxxii=32`

*(End definition for \@xxxii. This function is documented on page ??.)*

`\@Mi` Constants 10001–10004.

`\@Mii` `3 \mathchardef\@Mi=10001`

`\@Miii` `4 \mathchardef\@Mii=10002`

`\@Miv` `5 \mathchardef\@Miii=10003`

`6 \mathchardef\@Miv=10004`

*(End definition for \@Mi and others. These functions are documented on page ??.)*

`\@tempcnta` Scratch count registers used by L<sup>A</sup>T<sub>E</sub>X kernel commands.

`\@tempcntb` `7 \newcount\@tempcnta`

`8 \newcount\@tempcntb`

*(End definition for \@tempcnta and \@tempcntb. These functions are documented on page ??.)*

`\if@tempswa` General boolean switch used by L<sup>A</sup>T<sub>E</sub>X kernel commands.

`9 \newif\if@tempswa`

*(End definition for \if@tempswa. This function is documented on page ??.)*

`\@tempdima` Scratch dimen registers used by L<sup>A</sup>T<sub>E</sub>X kernel commands.

`\@tempdimb` `10 \newdimen\@tempdima`

`\@tempdimc` `11 \newdimen\@tempdimb`

`12 \newdimen\@tempdimc`

*(End definition for \@tempdima, \@tempdimb, and \@tempdimc. These functions are documented on page ??.)*

**\@tempboxa** Scratch box register used by L<sup>A</sup>T<sub>E</sub>X kernel commands.

<sup>13</sup> \newbox\@tempboxa

*(End definition for \@tempboxa. This function is documented on page ??.)*

**\@tempskipa** Scratch skip registers used by L<sup>A</sup>T<sub>E</sub>X kernel commands.

**\@tempskipb** <sup>14</sup> \newskip\@tempskipa

<sup>15</sup> \newskip\@tempskipb

*(End definition for \@tempskipa and \@tempskipb. These functions are documented on page ??.)*

**\@temptokena** Scratch token register used by L<sup>A</sup>T<sub>E</sub>X kernel commands.

<sup>16</sup> \newtoks\@temptokena

*(End definition for \@temptokena. This function is documented on page ??.)*

**\@flushglue** Glue used for \right- & \leftskip = 0pt plus 1fil

<sup>17</sup> \newskip\@flushglue \@flushglue = 0pt plus 1fil

*(End definition for \@flushglue. This function is documented on page ??.)*

<sup>18</sup> </2kernel>



# File i

## ltnctrl.dtx

### 1 Program control structure

This section defines a number of control structure macros, such as while-loops and for-loops.

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```

1 \*2kernel)
2 \message{control,}

\@whilenum TEST \do {BODY}
\@whiledim TEST \do {BODY} : These implement the loop
    while TEST do BODY od
    where TEST is a TeX \ifnum or \ifdim test, respectively.
    They are optimized for the normal case of TEST initially false.

\@whilesw SWITCH \fi {BODY} : Implements the loop
    while SWITCH do BODY od
    Optimized for normal case of SWITCH initially false.

\@for NAME := LIST \do {BODY} : Assumes that LIST expands to A1,A2,
    ... ,An .
    Executes BODY n times, with NAME = Ai on the i-th iteration.
    Optimized for the normal case of n = 1. Works for n=0.

\@tfor NAME := LIST \do {BODY}
    if, before expansion, LIST = T1 ... Tn where each Ti is a
    token or {...}, then executes BODY n times, with NAME = Ti
    on the i-th iteration. Works for n=0.

NOTES: 1. These macros use no \@temp sequences.
        2. These macros do not work if the body contains anything that
        looks syntactically to TeX like an improperly balanced \if
        \else \fi.

\@whilenum TEST \do {BODY} ==
BEGIN
    if TEST
    then BODY
        \@iwhilenum{TEST \relax BODY}
    END

\@iwhilenum {TEST BODY} ==
BEGIN
    if TEST
    then BODY
        \@nextwhile = def(\@iwhilenum)

```

```

        else \@nextwhile = def(\@whilenoop)
      fi
      \@nextwhile {TEST BODY}
    END

\@whilesw SWITCH \fi {BODY} ==
BEGIN
  if SWITCH
    then BODY
      \@iwhilesw {SWITCH BODY}\fi
    fi
  END

\@iwhilesw {SWITCH BODY} \fi ==
BEGIN
  if SWITCH
    then BODY
      \@nextwhile = def(\@iwhilesw)
    else \@nextwhile = def(\@whileswnoop)
    fi
    \@nextwhile {SWITCH BODY} \fi
  END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

```

\@whilenoop
\@whilenum 3 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
\@iwhilenum 4 #2\relax}\fi}
5 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
6 \else\expandafter\@gobble\fi{#1}}

```

*(End definition for \@whilenoop, \@whilenum, and \@iwhilenum. These functions are documented on page ??.)*

```

\@whiledim
\@iwhiledim 7 \long\def\@whiledim#1\do #2{\ifdim #1\relax#2\@iwhiledim{#1\relax#2}\fi}
8 \long\def\@iwhiledim#1{\ifdim #1\expandafter\@iwhiledim
9 \else\expandafter\@gobble\fi{#1}}

```

*(End definition for \@whiledim and \@iwhiledim. These functions are documented on page ??.)*

```

\@whileswnoop
\@whilesw 10 \long\def\@whilesw#1\fi#2{#1#2\@iwhilesw{#1#2}\fi\fi}
\@iwhilesw 11 \long\def\@iwhilesw#1\fi{#1\expandafter\@iwhilesw
12 \else\@gobbletwo\fi{#1}\fi}

```

(End definition for `\@whilesnoop`, `\@whilesw`, and `\@iwhilesw`. These functions are documented on page ??.)

Historical *TEX* 2.09 comments (not necessarily accurate any more):

```
\@for NAME := LIST \do {BODY} ==
  BEGIN \@forloop expand(LIST),\@nil,\@nil \@@ NAME {BODY} END
```

```
\@forloop CAR, CARCDR, CDRCDR \@@ NAME {BODY} ==
  BEGIN
    NAME = CAR
    if def(NAME) = def(\@nnil)
      else BODY;
      NAME = CARCDR
      if def(NAME) = def(\@nnil)
        else BODY
        \@iforloop CDRCDR \@@ NAME \do {BODY}
      fi
    fi
  END
```

```
\@iforloop CAR, CDR \@@ NAME {BODY} =
  NAME = CAR
  if def(NAME) = def(\@nnil)
    then \@nextwhile = def(\@fornoop)
    else BODY ;
    \@nextwhile = def(\@iforloop)
  fi
  \@nextwhile name cdr {body}
```

```
\@tfor NAME := LIST \do {BODY}
  = \@tforloop LIST \@nil \@@ NAME {BODY}
```

```
\@tforloop car cdr \@@ name {body} =
  name = car
  if def(name) = def(\@nnil)
    then \@nextwhile == \@fornoop
    else body ;
    \@nextwhile == \@forloop
  fi
  \@nextwhile name cdr {body}
```

End of historical *TEX* 2.09 comments.

`\@nnil`

```
13 \def\@nnil{\@nil}
```

(End definition for `\@nnil`. This function is documented on page ??.)

`\@empty`

```
14 \def\@empty{}
```

(End definition for `\@empty`. This function is documented on page ??.)

```

\@fornoop
15 \long\def\@fornoop#1\@@#2#3{}

(End definition for \@fornoop. This function is documented on page ??.)

\@for
16 \long\def\@for#1:=#2\do#3{%
17   \expandafter\def\expandafter\@fortmp\expandafter{#2}%
18   \ifx\@fortmp\@empty \else
19     \expandafter\@forloop#2,\@nil,\@nil\@@#1{#3}\fi}

(End definition for \@for. This function is documented on page ??.)

\@forloop
20 \long\def\@forloop#1,#2,#3\@@#4#5{\def#4{#1}\ifx #4\@nnil \else
21   #5\def#4{#2}\ifx #4\@nnil \else#5\@iforloop #3\@@#4{#5}\fi\fi}

(End definition for \@forloop. This function is documented on page ??.)

\@iforloop
22 \long\def\@iforloop#1,#2\@@#3#4{\def#3{#1}\ifx #3\@nnil
23   \expandafter\@fornoop \else
24   #4\relax\expandafter\@iforloop\fi#2\@@#3{#4}}

(End definition for \@iforloop. This function is documented on page ??.)

\@tfor
25 \def\@tfor#1:={\@tf@r#1 }
26 \long\def\@tf@r#1#2\do#3{\def\@fortmp{#2}\ifx\@fortmp\space\else
27   \@tforloop#2\@nil\@nil\@@#1{#3}\fi}
28 \long\def\@tforloop#1#2\@@#3#4{\def#3{#1}\ifx #3\@nnil
29   \expandafter\@fornoop \else
30   #4\relax\expandafter\@tforloop\fi#2\@@#3{#4}}

(End definition for \@tfor. This function is documented on page ??.)

\@break@tfor Break out of a \@tfor loop. This should be called inside the scope of an \if. See
\@iffileonpath for an example.
31 \long\def\@break@tfor#1\@@#2#3{\fi\fi}

(End definition for \@break@tfor. This function is documented on page ??.)

\@removeelement Removes an element from a comma-separated list and puts it into a control se-
quence, called as \@removeelement{<element>}{<list>}{<cs>}. Due to the implemen-
tation method the <element> is not allowed to contain braces.
32 \def\@removeelement#1#2#3{%
33   \def\reserved@a##1,#1,##2\reserved@a{##1,##2\reserved@b}%
34   \def\reserved@b##1,\reserved@b##2\reserved@b{%
35     \ifx,##1\@empty\else##1\fi}%
36   \edef#3{%
37     \expandafter\reserved@b\reserved@a,#2,\reserved@b,#1,\reserved@a}}

(End definition for \@removeelement. This function is documented on page ??.)
38 </2kernel>

```

# File j

## lterror.dtx

### 1 Error handling and tracing

This section defines L<sup>A</sup>T<sub>E</sub>X's error commands.

```
1 <*2kernel>
```

The ‘2kernel’ code ensures that a `\usepackage{autoerr}` is essentially ignored if a ‘full’ format is being used that has the error messages already in the format.

These days we don't support autoloading approach any longer, but this part bit is kept in case it is used in old documents.

```
2 \expandafter\let\csname ver@autoerr.sty\endcsname\fmtversion
```

#### 1.1 General commands

**\MessageBreak** This command prints a new-line inside a message, followed by a continuation line begun with `\@msg@continuation`. Normally it is defined to be `\relax`, but inside messages, it is let to `\@message@break`.

```
3 \let\MessageBreak\relax
```

*(End definition for \MessageBreak. This function is documented on page ??.)*

**\GenericInfo** This takes two arguments: a continuation and a message, and sends the result to the log file.

```
4 \DeclareRobustCommand{\GenericInfo}[2]{%
5   \begingroup
6     \def\MessageBreak{^^J#1}%
7     \set@display@protect
8     \immediate\write\m@ne{#2\on@line.}%
9   \endgroup
10 }
```

*(End definition for \GenericInfo. This function is documented on page ??.)*

**\GenericWarning** This takes two arguments: a continuation and a message, and sends the result to the screen.

```
11 \DeclareRobustCommand{\GenericWarning}[2]{%
12   \begingroup
13     \def\MessageBreak{^^J#1}%
14     \set@display@protect
15     \immediate\write\@unused{^^J#2\on@line.^^J}%
16   \endgroup
17 }
```

*(End definition for \GenericWarning. This function is documented on page ??.)*

`\GenericError` This macro takes four arguments: a continuation, an error message, where to go for further information, and the help information. It displays the error message, and sets the error help (the result of typing `h` to the prompt), and does a horrible hack to turn the last context line (which by default is the only context line) into just three dots. This could be made more efficient.

```

18 \bgroup
19 \lccode'\@=' \ %
20 \lccode'\~=' \ %
21 \lccode'\}=' \ %
22 \lccode'\{=' \ %
23 \lccode'\T=' \T%
24 \lccode'\H=' \H%
25 \catcode'\ =11\relax%
26 \lowercase{%
27 \egroup%
```

Unfortunately  $\text{\TeX}$  versions older than 3.141 have a bug which means that `^^J` does not force a linebreak in `\message` and `\errmessage` commands. So for these old  $\text{\TeX}$ 's we use `\typeout` to produce the message, and then have an empty `\errmessage` command. This causes an extra line of the form

.

To appear on the terminal, but if you do not like it, you can always upgrade your  $\text{\TeX}$ ! In order for your format to use this version, you must define the macro `\@TeXversion` to be the version number, e.g., 3.14 of the underlying  $\text{\TeX}$ . See the comments in `ltdircheck.dtx`.

```

28 \dimen@ifx\@TeXversion\@undefined4\else\@TeXversion\fi\p@%
29 \ifdim\dimen@>3.14\p@%
    First the 'standard case'.
30 \DeclareRobustCommand{\GenericError}[4]{%
31 \begingroup%
32 \immediate\write\@unused{}%
33 \def\MessageBreak{^^J}%
34 \set@display@protect%
35 \edef%
36 % %<-----do not delete this space!----->%
37 \@err@
38 {{#4}}%
39 \errhelp
40 % %<-----do not delete this space!----->%
41 \@err@
42 \let
43 % %<-----do not delete this space!----->%
44 \@err@
45 \@empty
46 \def\MessageBreak{^^J#1}%
47 \def~{\errmessage{%
48 #2.^^J^^J%
49 #3^^J%
50 Type H <return> for immediate help%
51 % %<-----do not delete this space!----->%
52 \@err@
```

```

53 }}%
54 ~%
55 \endgroup}%
56 \else%
    Secondly the version for old TEX's.
57 \DeclareRobustCommand{\GenericError}[4]{%
58 \begingroup%
59 \immediate\write\@unused{}%
60 \def\MessageBreak{^^J}%
61 \set@display@protect%
62 \edef%
63 %    %<-----do not delete this space!----->%
64 \@err@
65 {{#4}}%
66 \errhelp
67 %    %<-----do not delete this space!----->%
68 \@err@
69 \let
70 %    %<-----do not delete this space!----->%
71 \@err@
72 \errmessage
73 \def\MessageBreak{^^J#1}%
74 \def~{\typeout{! %
75 #2.^^J^^J%
76 #3^^J%
77 Type H <return> for immediate help.}%
78 %    %<-----do not delete this space!----->%
79 \@err@
80 {}}%
81 ~%
82 \endgroup}%
83 \fi}%

```

(End definition for `\GenericError`. This function is documented on page ??.)

<code>\PackageError</code> <code>\PackageWarning</code> <code>\PackageWarningNoLine</code> <code>\PackageInfo</code> <code>\ClassError</code> <code>\ClassWarning</code> <code>\ClassWarningNoLine</code> <code>\ClassInfo</code>	<p>These commands are intended for use by package and class writers, to give information to authors. The syntax is:</p> <pre> \PackageError{&lt;package&gt;}{&lt;error&gt;}{&lt;help&gt;} \PackageWarning{&lt;package&gt;}{&lt;warning&gt;} \PackageWarningNoLine{&lt;package&gt;}{&lt;warning&gt;} \PackageInfo{&lt;package&gt;}{&lt;info&gt;} </pre>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

and similarly for classes. The `Error` commands print the `<error>` message, and present the interactive prompt; if the author types `h`, then the `<help>` information is displayed. The `Warning` commands produce a warning but do not present the interactive prompt. The `WarningNoLine` commands do the same, but don't print the input line number. The `Info` commands write the message to the `log` file. Within the messages, the command `\MessageBreak` can be used to break a line, `\protect` can be used to protect command names, and `\space` is a space, for example:

```

\newcommand{\foo}{F00}
\PackageWarning{ethel}{%
  Your hovercraft is full of eels,\MessageBreak
  and \protect\foo\space is \foo}

```

produces:

```

Package ethel warning: Your hovercraft is full of eels,
(ethel)                and \foo is F00 on input line 54.

```

```

84 \gdef\PackageError#1#2#3{%
85   \GenericError{%
86     (#1)\@spaces\@spaces\@spaces\@spaces
87   }{%
88     Package #1 Error: #2%
89   }{%
90     See the #1 package documentation for explanation.%
91   }{#3}%
92 }
93 \def\PackageWarning#1#2{%
94   \GenericWarning{%
95     (#1)\@spaces\@spaces\@spaces\@spaces
96   }{%
97     Package #1 Warning: #2%
98   }%
99 }
100 \def\PackageWarningNoLine#1#2{%
101   \PackageWarning{#1}{#2\@gobble}%
102 }
103 \def\PackageInfo#1#2{%
104   \GenericInfo{%
105     (#1) \@spaces\@spaces\@spaces
106   }{%
107     Package #1 Info: #2%
108   }%
109 }
110 \gdef\ClassError#1#2#3{%
111   \GenericError{%
112     (#1) \space\@spaces\@spaces\@spaces
113   }{%
114     Class #1 Error: #2%
115   }{%
116     See the #1 class documentation for explanation.%
117   }{#3}%
118 }
119 \def\ClassWarning#1#2{%
120   \GenericWarning{%
121     (#1) \space\@spaces\@spaces\@spaces
122   }{%
123     Class #1 Warning: #2%
124   }%
125 }
126 \def\ClassWarningNoLine#1#2{%

```



```

127   \ClassWarning{#1}{#2\@gobble}%
128 }
129 \def\ClassInfo#1#2{%
130   \GenericInfo{%
131     (#1) \space\space\@spaces\@spaces
132   }{%
133     Class #1 Info: #2%
134   }%
135 }

```

(End definition for \PackageError and others. These functions are documented on page ??.)

```

\@latex@error Errors and other info, for use in the LATEX core.
\@latex@warning
\@latex@warning@no@line
\@latex@info
\@latex@info@no@line
136 \gdef\@latex@error#1#2{%
137   \GenericError{%
138     \space\space\space\@spaces\@spaces\@spaces
139   }{%
140     LaTeX Error: #1%
141   }{%
142     See the LaTeX manual or LaTeX Companion for explanation.%
143   }{#2}%
144 }
145 \def\@latex@warning#1{%
146   \GenericWarning{%
147     \space\space\space\@spaces\@spaces\@spaces
148   }{%
149     LaTeX Warning: #1%
150   }%
151 }
152 \def\@latex@warning@no@line#1{%
153   \@latex@warning{#1\@gobble}}
154 \def\@latex@info#1{%
155   \GenericInfo{%
156     \@spaces\@spaces\@spaces
157   }{%
158     LaTeX Info: #1%
159   }%
160 }
161 \def\@latex@info@no@line#1{%
162   \@latex@info{#1\@gobble}}

```

\@font@warning and \@font@info are defined later since they have to be redefined by the tracefnt package.

```

def\@font@warning#1{%
  \GenericWarning{%
    {(font)\@spaces\@spaces}%
    {Font Warning: #1}%
  }
}
def\@font@info#1{%
  \GenericInfo{%
    (font)\space\@spaces
  }{%

```

```

    Font Info: #1%
  }%
}

```

*(End definition for \@latex@error and others. These functions are documented on page ??.)*

**\c@errorcontextlines** **\errorcontextlines** as a L<sup>A</sup>T<sub>E</sub>X counter, so that it may be manipulated with **\setcounter** (once it is defined :-)

```

163 \let\c@errorcontextlines\errorcontextlines
164 \c@errorcontextlines=-1

```

*(End definition for \c@errorcontextlines. This function is documented on page ??.)*

**\on@line** The message ‘ on input line *n*’.

```

165 \def\on@line{ on input line \the\inputlineno}

```

*(End definition for \on@line. This function is documented on page ??.)*

**\@warning** Older L<sup>A</sup>T<sub>E</sub>X messages. For the moment, these **\let** to the new message commands. They may be changed later, once only obsolete packages and classes contain them.

```

\@warning \let\@warning\@latex@warning
\@warning \let\@warning\@latex@warning@no@line
\@latexerr \global\let\@latexerr\@latex@error

```

*(End definition for \@warning, \@warning, and \@latexerr. These functions are documented on page ??.)*

**\@spaces** Four spaces.

```

169 \def\@spaces{\space\space\space\space}

```

*(End definition for \@spaces. This function is documented on page ??.)*

## 1.2 Specific errors

**\@eha** The more common error help messages.

```

\@ehb 170 \gdef\@eha{%
\@ehc 171 Your command was ignored.\MessageBreak
\@ehd 172 Type \space I <command> <return> \space to replace it %
173 with another command,\MessageBreak
174 or \space <return> \space to continue without it.}
175 \gdef\@ehb{%
176 You've lost some text. \space \@ehc}
177 \gdef\@ehc{%
178 Try typing \space <return> %
179 \space to proceed.\MessageBreak
180 If that doesn't work, type \space X <return> \space to quit.}
181 \gdef\@ehd{%
182 You're in trouble here. \space \@ehc}

```

*(End definition for \@eha and others. These functions are documented on page ??.)*

**\@notdefinable** Error message generated in \@ifdefinable from calls to one of the commands \newcommand, \newlength or \newtheorem specifying an already-defined command name or one that begins \end....

```

183 \gdef\@notdefinable{%
184   \@latex@error{%
185     Command \@backslashchar\reserved@a\space
186     already defined.\MessageBreak
187     Or name \@backslashchar\@qend... illegal,
188     see p.192 of the manual}\@eha}

```

(End definition for \@notdefinable. This function is documented on page ??.)

**\@nolnerr** Generated by \newline and \\ when called in vertical mode.

```

189 \gdef\@nolnerr{%
190   \@latex@error{There's no line here to end}\@eha}

```

(End definition for \@nolnerr. This function is documented on page ??.)

**\@nocounterr** Generated by \setcounter, \addtocounter or \newcounter if applied to an undefined counter <cnt>.

Obsolete error message generated in L<sup>A</sup>T<sub>E</sub>X2.09 by \setcounter, \addtocounter or \newcounter for undefined counter. DO NOT use for L<sup>A</sup>T<sub>E</sub>X2<sub>ε</sub> it MIGHT vanish! Use \@nocounterr{<cnt>} instead.

```

191 \gdef\@nocounterr#1{%
192   \@latex@error{No counter '#1' defined}\@eha}
193 \gdef\@nocnterr{\@nocounterr?}

```

(End definition for \@nocounterr and \@nocnterr. These functions are documented on page ??.)

**\@ctrerr** Called when trying to print the value of a counter numbered by letters that's greater than 26.

```

194 \gdef\@ctrerr{%
195   \@latex@error{Counter too large}\@ehb}

```

(End definition for \@ctrerr. This function is documented on page ??.)

**\@nodocument** Error produced if paragraphs are typeset in the preamble.

```

196 \gdef\@nodocument{%
197   \@latex@error{Missing \protect\begin{document}}\@ehd}

```

(End definition for \@nodocument. This function is documented on page ??.)

**\@badend** Called by \end that doesn't match its \begin. RmS 1992/08/24: added code to \@badend to display position of non-matching \begin. FMi 1993/01/14: missing space added.

```

198 \gdef\@badend#1{%
199   \@latex@error{\protect\begin{\@currenvir}\@currenvline
200     \space ended by \protect\end{#1}}\@eha}

```

(End definition for \@badend. This function is documented on page ??.)

**\@badmath** Called by \[, \], \( or \) when used in wrong mode.

```

201 \gdef\@badmath{%
202   \@latex@error{Bad math environment delimiter}\@eha}

```

(End definition for `\@badmath`. This function is documented on page ??.)

**`\@toodeep`** Called by a list environment nested more than six levels deep, or an enumerate or itemize nested more than four levels.

```
203 \gdef\@toodeep{%  
204   \latex@error{Too deeply nested}\@ehd}
```

(End definition for `\@toodeep`. This function is documented on page ??.)

**`\@badpoptabs`** Called by `\endtabbing` when not enough `\poptabs` have occurred, or by `\poptabs` when too many have occurred.

```
205 \gdef\@badpoptabs{%  
206   \latex@error{\protect\pushtabs\space and \protect\poptabs  
207     \space don't match}\@ehd}
```

(End definition for `\@badpoptabs`. This function is documented on page ??.)

**`\@badtab`** Called by `\>`, `\+`, `\-` or `\<` when stepping to an undefined tab.

```
208 \gdef\@badtab{%  
209   \latex@error{Undefined tab position}\@ehd}
```

(End definition for `\@badtab`. This function is documented on page ??.)

**`\@preamerr`** This error is special: it appears in places where we normally have to `\protect` expansions. However, to prevent a protection of the error message itself (which would result in the message getting printed not issued on the terminal) we need to locally reset `\protect` to `\relax`.

```
210 \gdef\@preamerr#1{%  
211   \begingroup  
212     \let\protect\relax  
213     \latex@error{\ifcase #1 Illegal character\or  
214       Missing @-exp\or Missing p-arg\fi\space  
215       in array arg}\@ehd  
216   \endgroup}
```

(End definition for `\@preamerr`. This function is documented on page ??.)

**`\@badlinearg`** Occurs in `\line` and `\vector` command when a bad slope argument is encountered.

```
217 \gdef\@badlinearg{%  
218   \latex@error{%  
219     Bad \protect\line\space or \protect\vector  
220     \space argument}\@ehb}
```

(End definition for `\@badlinearg`. This function is documented on page ??.)

**`\@parmoderr`** Occurs in a float environment or a `\marginpar` when encountered in inner vertical mode.

```
221 \gdef\@parmoderr{%  
222   \latex@error{Not in outer par mode}\@ehb}
```

(End definition for `\@parmoderr`. This function is documented on page ??.)

**`\@fltovf`** Occurs in float environment or `\marginpar` when there are no more free boxes for storing floats.

```
223 \gdef\@fltovf{%  
224   \latex@error{Too many unprocessed floats}\@ehb}
```

*(End definition for \@fltovf. This function is documented on page ??.)*

**\@latexbug** Occurs in output routine. This is bad news.

```
225 \gdef\@latexbug{%  
226   \@latex@error{This may be a LaTeX bug}{Call for help}}
```

*(End definition for \@latexbug. This function is documented on page ??.)*

**\@badcrerr** This error was removed and replaced by **\@nolnerr**.

```
227 %\def\@badcrerr {\@latex@error{Bad use of \protect\\}\@ehc}
```

*(End definition for \@badcrerr. This function is documented on page ??.)*

**\@noitemerr** **\addvspace** or **\addpenalty** was called when not in vmode. Probably caused by a missing **\item**.

```
228 \gdef\@noitemerr{%  
229   \@latex@error{Something's wrong--perhaps a missing %  
230     \protect\item}\@ehc}
```

*(End definition for \@noitemerr. This function is documented on page ??.)*

**\@notprerr** A command that can be used only in the preamble appears after the command **\begin{document}**.

```
231 \gdef\@notprerr{%  
232   \@latex@error{Can be used only in preamble}\@eha}
```

*(End definition for \@notprerr. This function is documented on page ??.)*

**\@inmatherr** Issued by commands that don't work correctly within math (like **\item**). There is no real error recovery happening, e.g., the user might get additional errors afterwards.

```
233 \gdef\@inmatherr#1{%  
234   \relax  
235   \ifmmode  
236     \@latex@error{Command \protect#1 invalid in math mode}\@ehc  
237     \fi}
```

*(End definition for \@inmatherr. This function is documented on page ??.)*

**\@invalidchar** An error for use with invalid characters. This is commented out, since we decided to use catcode 15 instead.

```
238 %\def\@invalidchar{\@latex@error{Invalid character in input}\@ehc}
```

*(End definition for \@invalidchar. This function is documented on page ??.)*

As well as the above error commands some error messages are directly coded to save space. The messages already present in L<sup>A</sup>T<sub>E</sub>X 2.09 include:

**Environment --- undefined**

Issued by **\begin** for undefined environment.

**Tab overflow**

Occurs in **\=** when maximum number of tabs exceeded.

**\< in mid line**

Occurs in **\<** when it appears in middle of line.

**Float(s) lost**

In output routine, caused by a float environment or **\marginpar** occurring in inner vertical mode.

### 1.3 Tracing

The `trace` package implements the commands `\traceon` and `\traceoff` that work similar to `\tracingall` but skip certain code blocks that produce a lot of tracing output being of no interest during debugging (for example loading a font). Code blocks that should be hidden during tracing need to be surrounded by the macros `\conditionally@traceoff` and `\conditionally@traceon`.

For the kernel code the `trace` package then redefines a number of macros to include this tracing support.

However, in order to allow any macro package to react to `\traceon` we also provide dummy definitions for the two commands in the kernel so that they can be used by external packages without the need to distinguish between `trace` being loaded or not.

`\conditionally@traceon` These are only dummy definitions. For details see the `trace` package.  
`\conditionally@traceoff`

```
239 \let\conditionally@traceon\@empty
240 \let\conditionally@traceoff\@empty
```

*(End definition for `\conditionally@traceon` and `\conditionally@traceoff`. These functions are documented on page ??.)*

```
241 </2kernel>
```

## File k

# ltpar.dtx

## 1 Paragraphs

This section of the kernel declares the commands used to set `\par` and `\everypar` whenever their function needs to be changed for a long time.

### 1.1 Implementation

There are two situations in which `\par` may be changed:

- Long-term changes, in which the new value is to remain in effect until the current environment is left. The environments that change `\par` in this way are the following:
  - All list environments (itemize, quote, etc.)
  - Environments that turn `\par` into a noop: tabbing, array and tabular.
- Temporary changes, in which `\par` is restored to its previous value the next time it is executed. The following are all such uses.
  - `\end` when preceded by `\@endparenv`, which is called by `\endtrivlist`
  - The mechanism for avoiding page breaks and getting the spacing right after section heads.

`\@setpar` To permit the proper interaction of these two situations, long-term changes are made by the `\@setpar{<VAL>}` command. Its function is:

To set `\par`. It `\def`'s `\par` and `\@par` to `<VAL>`.

`\@restorepar` Short-term changes are made by the usual `\def\par` commands. The original values are restored after a short-term change by the `\@restorepar` commands.

`\@@par` `\@@par` always is defined to be the original TeX `\par`.

`\everypar` `\everypar` is changed only for the short term. Whenever `\everypar` is set non-null, it should restore itself to null when executed.

The following commands change `\everypar` in this way:

- `\item`
- `\end` when preceded by `\@endparenv`, which is called by `\endtrivlist`
- `\minipage`

When dealing with `\par` and `\everypar` remember the following two warnings:

1. Commands that make short-term changes to `\par` and `\everypar` must take account of the possibility that the new commands and the ones that do the restoration may be executed inside a group. In particular, `\everypar` is executed inside a group whenever a new paragraph begins with a left brace. The `\everypar` command that restores its definition should be local to the current group (in case the command is inside a minipage used inside someplace where `\everypar` has been redefined).

Thus, if `\everypar` is redefined to do an `\everypar{}` it could take several executions of `\everypar` before the restoration “holds”. This usually causes no problem. However, to prevent the extra executions from doing harm, use a global switch to keep anything harmful in the new `\everypar` from being done twice.

2. Commands that change `\everypar` should remember that `\everypar` might be supposed to set the following switches false:

- `@nobreak`
- `@minipage`

they should do the setting if necessary.

```

1 <*2kernel>
2 \message{par,}

```

`\@setpar` Initiate a long-term change to `\par`.

```

\@par 3 \def\@setpar#1{\def\par{#1}\def\@par{#1}}

```

The default definition of `\@par` will ensure that if `\@restorepar` defines `\par` to execute `\@par` it will redefine itself to the primitive `\@@par` after one iteration.

```

4 \def\@par{\let\par\@@par\par}

```

*(End definition for \@setpar and \@par. These functions are documented on page ??.)*

`\@restorepar` Restore from a short-term change to `\par`.

```

5 \def\@restorepar{\def\par{\@par}}
6 </2kernel>

```

*(End definition for \@restorepar. This function is documented on page ??.)*



## File 1

# ltspace.dtx

## 1 Spacing

This section deals with spacing, and line- and page-breaking.

### 1.1 User Commands

`\nopagebreak` [ $\langle i \rangle$ ] :  $\langle i \rangle = 0, \dots, 4$ .  
Default argument = 4. Puts a penalty into the vertical list output as follows:  
0 : penalty = 0  
1 : penalty = `\@lowpenalty`  
2 : penalty = `\@medpenalty`  
3 : penalty = `\@highpenalty`  
4 : penalty = 10000  
`\pagebreak` [ $\langle i \rangle$ ] : same as except negatives of its penalty  
`\linebreak` [ $\langle i \rangle$ ] : analog of the above  
`\nolinebreak` [ $\langle i \rangle$ ] : analog of the above  
`\samepage` : inhibits page breaking most places by setting the following penalties to 10000:  
`\interlinepenalty`  
`\postdisplaypenalty`  
`\interdisplaylinepenalty`  
`\@beginparpenalty`  
`\@endparpenalty`  
`\@itempenalty`  
`\@secpenalty`  
`\interfootnotelinepenalty`  
`\` : initially defined to be `\newline`  
`\` [ $\langle length \rangle$ ] : initially defined to be `\vspace{\langle length \rangle}\newline`  
Note: `\`\* adds a `\vadjust{\penalty 10000}`  
OBSOLETE COMMANDS (which never made it into the manual):  
`\obeycr` : defines `<CR> == \`  
`\restorecr` : restores `<CR>` to its usual meaning.

### 1.2 Chris' comments

There are several aspects of the handling of space in horizontal mode that are inconsistent or do not work well in some cases. These are largely concerned with ignoring the effect of space tokens that would otherwise typeset an inter-word space.

Negating the effect of such space tokens is achieved by two mechanisms:

- `\unskip` is used to remove the glue just added by a space that has already had its effect; it is sometimes invoked after an `\ifdim` test on `\lastskip` (see below);
- `\ignorespaces` is used to ignore space-tokens yet to come.

The test done on `\lastskip` is sometimes for equality with zero and sometimes for being positive. Recall also that the test is only on the natural length of the glue and that no glue cannot be distinguished from glue whose natural length is zero: to summarise, a pretty awful test. It is not clear why these tests are not all the same; I think that they should all be for equality. One place where `\unskip` is often used is just before a `\par` (which itself internally does an `\unskip`) and one bit of code (in `\@item`) even has two `\unskips` before a `\par`. These uses may be fossil code but if they are necessary, maybe `\@killglue` would be even safer.

Such removal of glue by `\unskip` may sometimes have the wrong result, removing not the glue from a space-token but other explicit glue; this is sometimes not what is intended.

A common way to prevent such removal is to add an `\hskip\z@` after the glue that should not be removed. This protects that glue against one `\unskip` with no test but not against more than one. It does work for ‘tested `\unskips`’. This is used by `\hspace*` but not by `\hspace`; this is inconsistent as the star is supposed to prevent removal only at the beginning of a line, not at the end, or in a tabular, etc.

If this reason for removing glue were the only consideration then a tested-`\unskip` and protection by `\hskip\z@` would suffice but would need to be consistently implemented.

However, the class of invisibles, commands and environments tries to be even cleverer: one of these tries to leave only one inter-word space whenever there is one before it and one after it; and it does this quite well.

But problems can arise when there is not a space-token on both sides of it; in particular, when an invisible appears at the beginning or end of a piece of text the method still leaves one space token whereas usually in these cases it should leave none.

Also, the current rules do not work well when more than one such command appears consecutively, separated by space-tokens; it leaves glue between every other invisible.

There is also a question about what these commands should do when they occur next to spaces that do not come from space tokens but, for example, from `\hspace`. Should they still produce ‘just one space’? If so, which one? It is good to note that the manual is sufficiently cautious about invisibles that we are not obliged to make anything work.

Another interesting side-road to explore is whether the space-tokens either side of an `\hspace{...}` should be ignored.

One alternative to the current algorithm that is often suggested is that all glue around the invisible should be consolidated into a space after it (usually without stating how much glue should be put there). The command `\nolinebreak` is implemented this way (and `\linebreak` should also be). This does not work correctly for the following common case:

```
... some text
\index{some-word}
some-word and more text.
```

This is optimal coding since it is normal to index a word that gets split across a page-break on its starting page. This would, on the other hand, fix another common (and documented) failure of the current system: when the invisible is the last thing in a paragraph the space before it is not removed and, worse, it is also hidden from the paragraph-ending mechanism so that an ‘empty’ line can be created at the end of the paragraph.

Another deficiency (I think) of the current system is that the following is treated as having the `\index` command between the paragraphs, which is probably not what the author intended (since there is no empty line after it).

```
\index{beginnings}
Beginnings of paragraphs ...
```

I know of no algorithm that will handle satisfactorily even all the most common cases; note that it could be that the best algorithm may be different for different invisibles since, for example, the common uses and expected behaviour of `\index`, `\marginpar`, `\linebreak`, `\pagebreak` and `\vspace` are somewhat different. [For example, is `\vspace` ever used in the middle of a paragraph?]

One method that can (and is) used to make invisible commands produce no space when used at the beginning of text is to put in some glue that is nearly enough the same as no glue or glue of zero length in all respects except for the precise test for not being exactly equal to zero; examples of such glue are `\hskip 1sp` and, possibly better but more complex, `\hskip -1sp \hskip 1sp`. However, this only works when it is known that user-supplied text is about to start.

Some similar concerns apply to the handling of space and penalties in vertical mode; there is an extra hurdle here as `\unskip` does not work on the main vertical list. The complexity of the tests done by `\addvspace` have never been explained.

The implementation of space hacks etc for vertical mode is another major area that needs further attention; my earlier experiments did not produce much improvement over the current unsatisfactory situation.

One particular problem is what happens when the following very natural coding is used (part of the problem here is that this looks like an hmode problem, but it is not):

```
... end of text.

\begin{enumerate}
  \item \label{item:xxx} Item text.
\end{enumerate}
```

### 1.3 Some immediate actions

- Fix bug in `\linebreak`.
- Fix bug in `\\*`.
- Reimplement `\\`, etc, removing extra `\adjusts` and getting better error trapping (this seems to involve a lot more tokens).
- Investigate whether `\\`, etc need to be errors in vmode; I think that they could be noops (maybe with a warning).
- Make all(?) `\unskips` include test for zero skip (rather than other tests or no test).
- Consider replacing `\hskip 1sp` by something better (here called an ‘infinitesimal’ skip).
- Look at all `\hskip\z@` (or similar) to see if they should be changed to an ‘infinitesimal’ skip.

- Resolve the inconsistency between `\hspace` and `\hspace*`.
- Remove unnecessary `\unskips`.
- Investigate and rationalise the ‘newline’ code.
- Find better algorithms for all sorts of things or, easier(?), fix T<sub>E</sub>X itself.

## 1.4 The code

```

1  <*2ekernel>
2  \message{spacing,}
3  </2ekernel>
4  <*2ekernel | latexrelease>
5  <latexrelease>\IncludeInRelease{2019/10/01}%
6  <latexrelease>                {\pagebreak}{Make commands robust}%

\pagebreak
\nopagebreak
7  \DeclareRobustCommand\pagebreak{\@testopt{\@no@pgbk-}4}
8  \DeclareRobustCommand\nopagebreak{\@testopt{\@no@pgbk4}

(End definition for \pagebreak and \nopagebreak. These functions are documented on page ??.)

\linebreak
\nolinebreak
9  \DeclareRobustCommand\linebreak{\@testopt{\@no@lnbk-}4}
10 \DeclareRobustCommand\nolinebreak{\@testopt{\@no@lnbk4}

(End definition for \linebreak and \nolinebreak. These functions are documented on page ??.)

\samepage
11 \DeclareRobustCommand\samepage{\interlinepenalty\@M
12   \postdisplaypenalty\@M
13   \interdisplaylinepenalty\@M
14   \@beginparpenalty\@M
15   \@endparpenalty\@M
16   \@itempenalty\@M
17   \@secpenalty\@M
18   \interfootnotelinepenalty\@M}

(End definition for \samepage. This function is documented on page ??.)

19 </2ekernel | latexrelease>
20 <latexrelease>\EndIncludeInRelease
21 <latexrelease>\IncludeInRelease{0000/00/00}%
22 <latexrelease>                {\pagebreak}{Make commands robust}%
23 <latexrelease>
24 <latexrelease>\kernel@make@fragile\pagebreak
25 <latexrelease>\kernel@make@fragile\nopagebreak
26 <latexrelease>\kernel@make@fragile\linebreak
27 <latexrelease>\kernel@make@fragile\nolinebreak
28 <latexrelease>\kernel@make@fragile\samepage
29 <latexrelease>
30 <latexrelease>\EndIncludeInRelease
31 <*2ekernel>

```

`\@no@pgbk`

```
32 \def\@no@pgbk #1[#2]{%
33   \ifvmode
34     \penalty #1\@getpen{#2}%
35   \else
36     \@bsphack
37     \vadjust{\penalty #1\@getpen{#2}}%
38     \@esphack
39   \fi}
```

(End definition for \@no@pgbk. This function is documented on page ??.)

`\@no@lnbk`

```
40 \def\@no@lnbk #1[#2]{%
41   \ifvmode
42     \@nolnerr
43   \else
44     \@tempskipa\lastskip
45     \unskip
46     \penalty #1\@getpen{#2}%
47     \ifdim\@tempskipa>\z@
48       \hskip\@tempskipa
49       \ignorespaces
50     \fi
51   \fi}
```

(End definition for \@no@lnbk. This function is documented on page ??.)

`\` The purpose of the new code is to fix a few bugs; however, it also attempts to optimize the following, in order of priority:

1. efficient execution of plain `\`;
2. efficient execution of `\[...]`;
3. memory use;
4. name-space use.

The changes should make no difference to the typeset output. It appears to be safe to use `\reserved@e` and `\reserved@f` here (other reserved macros are somewhat disastrous).

These changes made `\newline` even less robust than it had been, so now it is explicitly robust, like `\`.

The internal definition of the ‘normal’ definition of `\`.

`\@normalcr`

```
52 </2ekernel>
53 <*2ekernel | latexrelease>
54 <latexrelease> \IncludeInRelease{2020/02/02}%
55 <latexrelease>           {\@normalcr}{Make robust}%
56 \protected\def\@normalcr{%
57   \let \reserved@e \relax
58   \let \reserved@f \relax
59   \@ifstar{\let \reserved@e \vadjust \let \reserved@f \nobreak
60             \xnewline}%
61   \xnewline}
```

```

62 \let\\\@normalcr
63 </2ekernel | latexrelease>
64 <latexrelease>\EndIncludeInRelease
65 <latexrelease>\IncludeInRelease{0000/00/00}%
66 <latexrelease>          {\@normalcr}{Make robust}%
67 <latexrelease>
68 <latexrelease>\DeclareRobustCommand\\\{%
69 <latexrelease>  \let \reserved@e \relax
70 <latexrelease>  \let \reserved@f \relax
71 <latexrelease>  \@ifstar{\let \reserved@e \vadjust \let \reserved@f \nobreak
72 <latexrelease>          \xnewline}%
73 <latexrelease>  \xnewline}
74 <latexrelease>\expandafter\let\expandafter\@normalcr
75 <latexrelease>  \csname\expandafter\@gobble\string\\\ \endcsname
76 <latexrelease>
77 <latexrelease>\EndIncludeInRelease
78 <*2ekernel>

```

(End definition for \ and \@normalcr. These functions are documented on page ??.)

**\@vspace@calcify** Helper command to produce a \vskip that is first run through \setlength. This way the calc package can operate on the argument value.

```

79 </2ekernel>
80 <*2ekernel | latexrelease>
81 <latexrelease>\IncludeInRelease{2020/10/01}%
82 <latexrelease>          {\@vspace@calcify}{Add calc support}%
83 \def\@vspace@calcify#1{\begingroup\setlength\skip@{#1}\vskip\skip@\endgroup}
84 </2ekernel | latexrelease>
85 <latexrelease>\EndIncludeInRelease
86 <latexrelease>\IncludeInRelease{0000/00/00}%
87 <latexrelease>          {\@vspace@calcify}{Add calc support}%
88 <latexrelease>
89 <latexrelease>\let\@vspace@calcify\@undefined
90 <latexrelease>\EndIncludeInRelease
91 <*2ekernel>

```

(End definition for \@vspace@calcify. This function is documented on page ??.)

**\newline** A simple form of the ‘normal’ definition of \.

```

92 \DeclareRobustCommand\newline{\@normalcr\relax}

```

(End definition for \newline. This function is documented on page ??.)

**\@xnewline**

```

93 \def\@xnewline{\@ifnextchar[% ] bracket matching
94          \@newline
95          {\@gnewline\relax}}

```

(End definition for \@xnewline. This function is documented on page ??.)

**\@newline**

```

96 </2ekernel>
97 <*2ekernel | latexrelease>
98 <latexrelease>\IncludeInRelease{2020/10/01}%

```

```

99 <latexrelease>                {\@newline}{\newline calc support}%
100 \def\@newline[#1]{\let \reserved@e \vadjust
101                \@gnewline {\@vspace@calcify{#1}}}
102 </2ekernel | latexrelease>
103 <latexrelease>\EndIncludeInRelease

104 <latexrelease>\IncludeInRelease{0000/00/00}%
105 <latexrelease>                {\@newline}{\newline calc support}%
106 <latexrelease>
107 <latexrelease>\def\@newline[#1]{\let \reserved@e \vadjust
108 <latexrelease>                \@gnewline {\vskip #1}}
109 <latexrelease>\EndIncludeInRelease
110 <*2ekernel>

```

(End definition for \@newline. This function is documented on page ??.)

**\@gnewline** The \nobreak added to prevent null lines when \\ ends an overfull line. Change made 24 May 89 as suggested by Frank Mittelbach and Rainer Schöpf

```

111 \def\@gnewline #1{%
112     \ifvmode
113         \@nolnerr
114     \else
115         \unskip \reserved@e {\reserved@f#1}\nobreak \hfil \break
116     \fi}

```

(End definition for \@gnewline. This function is documented on page ??.)

**\@getpen**

```

117 \def\@getpen#1{\ifcase #1 \z@ \or \@lowpenalty\or
118             \@medpenalty \or \@highpenalty
119             \else \@M \fi}

```

(End definition for \@getpen. This function is documented on page ??.)

**\if@nobreak** Switch used to avoid page breaks caused by \label after a section heading, etc. It should be **GLOBALLY** set true after the \nobreak and **globally** set false by the next invocation of \everypar.

Commands that reset \everypar should globally set it false if appropriate.

```

120 \def\@nobreakfalse{\global\let\if@nobreak\iffalse}
121 \def\@nobreaktrue {\global\let\if@nobreak\iftrue}
122 \@nobreakfalse

```

(End definition for \if@nobreak. This function is documented on page ??.)

**\@savsk** Registers used to save the space factor and last skip.

```

\@savsf
123 \newdimen\@savsk
124 \newcount\@savsf

```

(End definition for \@savsk and \@savsf. These functions are documented on page ??.)

`\@bsphack` `\@bsphack` and `\@esphack` used by macros such as `\index` and `\begin{@float} ... \end{@float}` that want to be invisible — i.e., not leave any extra space when used in the middle of text. Such a macro should begin with `\@bsphack` and end with `\@esphack`. The macro in question should not create any text, nor change the mode.

Before giving the current definition we give an extended definition that is currently not used (because it doesn't work as advertised:-)

These are generalised hacks which attempt to do sensible things when 'invisible commands' appear in vmode too.

They need to cope with space in both hmode (plus spacefactor) and vmode, and also cope with breaks etc. In vmode this means ensuring that any following `\advspace`, etc sees the correct glue in `\lastskip`.

In fact, these improved versions should be used for other cases of 'whatsits, thingies etc' which should be invisible. They are only for commands, not environments (see notes on `\@Esphack`).

BTW, anyone know why the standard hacks are surrounded by `\ifmmode\else` rather than simply `\ifhmode`?

And are there any cases where saving the spacefactor is essential? I have some extensions where it is, but it does not appear to be so in the standard uses.

```
def \@bsphack{%
  \relax \ifvmode
    \@savsk \lastskip
    \ifdim \lastskip=\z@
    \else
      \vskip -\lastskip
    \fi
  \else
    \ifhmode
      \@savsk \lastskip
      \@savsf \spacefactor
    \fi
  \fi
}
```

I think that, in vmode, it is the safest to put in a `\nobreak` immediately after such things since writes, inserts etc followed by glue give valid breakpoints and, in general, it is possible to create breaks but impossible to destroy them.

```
def \@esphack{%
  \relax \ifvmode
    \nobreak
    \ifdim \@savsk=\z@
    \else
      \vskip \@savsk
    \fi
  \else
    \ifhmode
      \spacefactor \@savsf
      \ifdim \@savsk>\z@
        \ignorespaces
      \fi
    \fi
  \fi
}
```



```

\fi
\fi

```

For the moment we are going to ignore the vertical versions until they are correct.

```

125 \def\@bsphack{%
126   \relax
127   \ifhmode
128     \@savsk\lastskip
129     \@savsf\spacefactor
130   \fi}

```

(End definition for \@bsphack. This function is documented on page ??.)

**\@esphack** Companion to \@bsphack. If this command is not properly paired with \@bsphack one might end up with a low-level T<sub>E</sub>X error: “BAD spacefactor”. One possible cause is calling \@bsphack in vertical mode, then doing something that gets you (sometimes) into horizontal mode and finally calling \@esphack. Even if no error is generated that is wrong, because \@esphack will then use the saved values for \@savsk and \@savsf from some earlier invocation of \@bsphack which will have nothing to do with the current situation.

```

131 </2kernel>
132 <latexrelease>\IncludeInRelease{2018/10/10}%
133 <latexrelease>          {\@esphack}{hyphenation and nobreak after space hack}%
134 <*2kernel | latexrelease>
135 \def\@esphack{%
136   \relax
137   \ifhmode
138     \spacefactor\@savsf
139     \ifdim\@savsk>\z@
140
141       \ifdim\lastskip=\z@
142         \nobreak \hskip\z@skip
143       \fi
144       \ignorespaces
145     \fi
146
147   \else
148     \ifvmode
149       \if@nobreak\nobreak\else\if@noskipsec\nobreak\fi\fi
150     \fi
151   \fi}%
152 </2kernel | latexrelease>
153 <latexrelease>\EndIncludeInRelease
154 <latexrelease>\IncludeInRelease{2015/10/01}%
155 <latexrelease>          {\@esphack}{hyphenation and nobreak after space hack}%
156 <latexrelease>\def\@esphack{%
157   <latexrelease> \relax
158   <latexrelease> \ifhmode
159     <latexrelease> \spacefactor\@savsf
160     <latexrelease> \ifdim\@savsk>\z@
161     <latexrelease> \ifdim\lastskip=\z@
162       <latexrelease> \nobreak \hskip\z@skip
163     \fi
164   \fi}

```

```

162 <latexrelease> \ignorespaces
163 <latexrelease> \fi
164 <latexrelease> \fi}%
165 <latexrelease>\EndIncludeInRelease
166 <latexrelease>\IncludeInRelease{2015/01/01}%
167 <latexrelease> {\@esphack}{hyphenation and nobreak after space hack}%
168 <latexrelease>\def\@esphack{%
169 <latexrelease> \relax
170 <latexrelease> \ifhmode
171 <latexrelease> \spacefactor\@savsf
172 <latexrelease> \ifdim\@savsk>\z@
173 <latexrelease> \nobreak \hskip\z@skip
174 <latexrelease> \ignorespaces
175 <latexrelease> \fi
176 <latexrelease> \fi}%
177 <latexrelease>\EndIncludeInRelease
178 <latexrelease>\IncludeInRelease{0000/00/00}%
179 <latexrelease> {\@esphack}{hyphenation and nobreak after space hack}%
180 <latexrelease>\def\@esphack{%
181 <latexrelease> \relax
182 <latexrelease> \ifhmode
183 <latexrelease> \spacefactor\@savsf
184 <latexrelease> \ifdim\@savsk>\z@
185 <latexrelease> \ignorespaces
186 <latexrelease> \fi
187 <latexrelease> \fi}%
188 <latexrelease>\EndIncludeInRelease
189 <*2ekernel>

```

(End definition for \@esphack. This function is documented on page ??.)

**\@Esphack** A variant of \@esphack that sets the @ignore switch to true (as \@esphack used to do previously). This is currently used only for floats and similar environments. w

```

190 </2ekernel>
191 <latexrelease>\IncludeInRelease{2015/01/01}%
192 <latexrelease> {\@Esphack}{hyphenation after space hack}%
193 <*2ekernel | latexrelease>
194 \def\@Esphack{%
195 \relax
196 \ifhmode
197 \spacefactor\@savsf
198 \ifdim\@savsk>\z@
199 \nobreak \hskip\z@skip
200 \@ignoretrue
201 \ignorespaces
202 \fi
203 \fi}%
204 </2ekernel | latexrelease>
205 <latexrelease>\EndIncludeInRelease
206 <latexrelease>\IncludeInRelease{0000/00/00}%
207 <latexrelease> {\@Esphack}{hyphenation after space hack}%
208 <latexrelease>\def\@Esphack{%
209 <latexrelease> \relax
210 <latexrelease> \ifhmode

```

```

211 <latexrelease> \spacefactor\@savsf
212 <latexrelease> \ifdim\@savsk>\z@
213 <latexrelease> \ignoretrue
214 <latexrelease> \ignorespaces
215 <latexrelease> \fi
216 <latexrelease> \fi}%
217 <latexrelease>\EndIncludeInRelease
218 <*2kernel>

```

(End definition for \@Esphack. This function is documented on page ??.)

**\@vbsphack** Another variant which is useful for invisible things which should not live in vmode (this is how some people feel about marginals).

If it occurs in vmode then it enters hmode and ensures that \@savsk is nonzero so that the \ignorespaces is put in later. It is not used at present.

```

\def \@vbsphack{ %
  \relax \ifvmode
    \leavevmode
    \@savsk 1sp
    \@savsf \spacefactor
  \else
    \ifhmode
      \@savsk \lastskip
      \@savsf \spacefactor
    \fi
  \fi
}

```

(End definition for \@vbsphack. This function is documented on page ??.)

## 1.5 Vertical spacing

L<sup>A</sup>T<sub>E</sub>X supports the plain T<sub>E</sub>X commands \smallskip, \medskip and \bigskip. However, it redefines them using \vspace instead of \vskip.

Extra vertical space is added by the command \addvspace{<skip>}, which adds a vertical skip of <skip> to the document. The sequence \addvspace{<s1>} \addvspace{<s2>} is equivalent to \addvspace{<maximum of s1, s2>}.

\addvspace should be used only in vertical mode, and gives an error if it's not. The \addvspace command does *not* add vertical space if @minipage is true. The minipage environment uses this to inhibit the addition of extra vertical space at the beginning.

Penalties are put into the vertical list with the \addpenalty{<penalty>} command. It works properly when \addpenalty and \addvspace commands are mixed.

The @nobreak switch is set true used when in vertical mode and no page break should occur. (Right now, it is used only by the section heading commands to inhibit page breaking after a heading.)

```

\addvspace{SKIP} ==
BEGIN
  if vmode
    then if @minipage

```

```

        else if \lastskip =0
        then \vskip SKIP
        else if \lastskip < SKIP
            then \vskip -\lastskip
            \vskip SKIP
            else if SKIP < 0 and \lastskip >= 0
            then \vskip -\lastskip
            \vskip \lastskip + SKIP
        fi      fi      fi      fi
    else useful error message (CAR).
fi
END

```

**\@xaddvskip** Internal macro for \vspace handling the case that space has previously been added.

```

219 \def\@xaddvskip{%
220   \ifdim\lastskip<\@tempskipb
221     \vskip-\lastskip
222     \vskip\@tempskipb
223   \else
224     \ifdim\@tempskipb<\z@
225       \ifdim\lastskip<\z@
226         \else
227           \advance\@tempskipb\lastskip
228           \vskip-\lastskip
229           \vskip \@tempskipb
230         \fi
231       \fi
232     \fi}

```

*(End definition for \@xaddvskip. This function is documented on page ??.)*

**\addvspace** Add vertical space taking into account space already added, as described above.

```

233 </2ekernel>
234 < *2ekernel | latexrelease>
235 < latexrelease> \IncludeInRelease{2020/10/01}%
236 < latexrelease> { \addvspace } { \addvspace calc support }%
237 \def\addvspace#1{%
238   \ifvmode
239     \if@minipage\else
240       \ifdim \lastskip =\z@
241         \@vspace@calcify{#1}%
242       \else
243         \setlength\@tempskipb{#1}%
244         \@xaddvskip
245       \fi
246     \fi
247   \else
248     \@noitemerr
249   \fi}
250 </2ekernel | latexrelease>
251 < latexrelease> \EndIncludeInRelease
252 < latexrelease> \IncludeInRelease{0000/00/00}%
253 < latexrelease> { \addvspace } { \addvspace calc support }%

```

```

254 <latexrelease>
255 <latexrelease>\def\addvspace#1{%
256 <latexrelease> \ifvmode
257 <latexrelease> \if@minipage\else
258 <latexrelease> \ifdim \lastskip =\z@
259 <latexrelease> \vskip #1\relax
260 <latexrelease> \else
261 <latexrelease> \@tempskipb#1\relax
262 <latexrelease> \@xaddvskip
263 <latexrelease> \fi
264 <latexrelease> \fi
265 <latexrelease> \else
266 <latexrelease> \@noitemerr
267 <latexrelease> \fi}
268 <latexrelease>\EndIncludeInRelease
269 <*2ekernel>

```

(End definition for \addvspace. This function is documented on page ??.)

\addpenalty

```

270 </2ekernel>
271 <latexrelease>\IncludeInRelease{2015/01/01}%
272 <latexrelease> \{\addpenalty\}\addpenalty}%
273 <*2ekernel | latexrelease>

```

Fix provided by Donald (though the original fix was not good enough). In 2005 Plamen Tanovski discovered that this fix wasn't good enough either as the \vskip kept getting bigger if several \addpenalty commands followed each other. Donald kindly send a new fix.

```

274 \def\addpenalty#1{%
275 \ifvmode
276 \if@minipage
277 \else
278 \if@nobreak
279 \else
280 \ifdim\lastskip=\z@
281 \penalty#1\relax
282 \else
283 \@tempskipb\lastskip

```

We have to make sure the final \vskip seen by T<sub>E</sub>X is the correct one, namely \@tempskipb. However we may have to adjust for \prevdepth when placing the penalty but that should not affect the skip we pass on to T<sub>E</sub>X.

```

284 \begingroup
285 \@tempskipa\@tempskipb
286 \advance \@tempskipb
287 \ifdim\prevdepth>\maxdepth\maxdepth\else

```

If \prevdepth is -1000pt due to \nointerlineskip we better not add it!

```

288 \ifdim \prevdepth = -\@m\p@ \z@ \else \prevdepth \fi
289 \fi
290 \vskip -\@tempskipb
291 \penalty#1%
292 \ifdim\@tempskipa=\@tempskipb

```

Do nothing if the `\prevdepth` check made no adjustment.

```

293         \else
Combine the prevdepth adjustment into a single skip.
294         \advance\@tempskipb -\@tempskipa
295         \vskip \@tempskipb
296     \fi
The final skip is always the specified length.
297     \vskip \@tempskipa
298 \endgroup
299 \fi
300 \fi
301 \fi
302 \else
303     \@noitemerr
304 \fi}%

305 \</2ekernel | latexrelease>
306 \<latexrelease>\EndIncludeInRelease
307 \<latexrelease>\IncludeInRelease{0000/00/00}%
308 \<latexrelease>        {\addpenalty}{\addpenalty}%
309 \<latexrelease>\def\addpenalty#1{%
310 \<latexrelease> \ifvmode
311 \<latexrelease>     \if@minipage
312 \<latexrelease>     \else
313 \<latexrelease>     \if@nobreak
314 \<latexrelease>     \else
315 \<latexrelease>     \ifdim\lastskip=\z@
316 \<latexrelease>     \penalty#1\relax
317 \<latexrelease>     \else
318 \<latexrelease>     \@tempskipb\lastskip
319 \<latexrelease>     \vskip -\lastskip
320 \<latexrelease>     \penalty#1%
321 \<latexrelease>     \vskip\@tempskipb
322 \<latexrelease>     \fi
323 \<latexrelease>     \fi
324 \<latexrelease>     \fi
325 \<latexrelease> \else
326 \<latexrelease>     \@noitemerr
327 \<latexrelease> \fi}%
328 \<latexrelease>\EndIncludeInRelease
329 \<*2ekernel>

```

*(End definition for `\addpenalty`. This function is documented on page ??.)*

`\vspace`  
`\@vspace`  
`\@vspacer`

The new code for these commands depends on the following facts:

- The value of `prevdepth` is changed only when a box or rule is created and added to a vertical list;
- The value of `prevdepth` is used only when a box is created and added to a vertical list;
- The value of `prevdepth` is always local to the building of one vertical list.

```

330 \DeclareRobustCommand\vspace{\@ifstar\@vspacer\@vspace}

```

```

331 </2ekernel>
332 <*2ekernel | latexrelease>
333 <latexrelease>\IncludeInRelease{2020/10/01}%
334 <latexrelease>          {\@vspace}{Support calc in \vspace}%

```

We support calc syntax in the argument and therefore use \setlength.

```

335 \def\@vspace #1{%
336   \ifvmode
337     \@vspace@calcify{#1}%
338     \vskip\z@skip
339   \else
340     \@bsphack
341     \vadjust{\@restorepar
342               \@vspace@calcify{#1}%
343               \vskip\z@skip
344             }%
345     \@esphack
346   \fi}

347 \def\@vspacer#1{%
348   \ifvmode
349     \dimen@\prevdepth
350     \hrule \@height\z@
351     \nobreak
352     \@vspace@calcify{#1}%
353     \vskip\z@skip
354     \prevdepth\dimen@
355   \else
356     \@bsphack
357     \vadjust{\@restorepar
358               \hrule \@height\z@
359               \nobreak
360               \@vspace@calcify{#1}%
361               \vskip\z@skip}%
362     \@esphack
363   \fi}

364 </2ekernel | latexrelease>
365 <latexrelease>\EndIncludeInRelease
366 <latexrelease>\IncludeInRelease{0000/00/00}%
367 <latexrelease>          {\@vspace}{Support calc in \vspace}%
368 <latexrelease>

369 <latexrelease>\def\@vspace #1{%
370 <latexrelease>  \ifvmode
371 <latexrelease>    \vskip #1
372 <latexrelease>    \vskip\z@skip
373 <latexrelease>  \else
374 <latexrelease>    \@bsphack
375 <latexrelease>    \vadjust{\@restorepar
376 <latexrelease>                  \vskip #1
377 <latexrelease>                  \vskip\z@skip
378 <latexrelease>                }%
379 <latexrelease>    \@esphack
380 <latexrelease>  \fi}
381 <latexrelease>\def\@vspacer#1{%
382 <latexrelease>  \ifvmode

```

```

383 <latexrelease> \dimen@prevdepth
384 <latexrelease> \hrule \@height\z@
385 <latexrelease> \nobreak
386 <latexrelease> \vskip #1
387 <latexrelease> \vskip\z@skip
388 <latexrelease> \prevdepth\dimen@
389 <latexrelease> \else
390 <latexrelease> \@bsphack
391 <latexrelease> \vadjust{\@restorepar
392 <latexrelease> \hrule \@height\z@
393 <latexrelease> \nobreak
394 <latexrelease> \vskip #1
395 <latexrelease> \vskip\z@skip}%
396 <latexrelease> \@esphack
397 <latexrelease> \fi}
398 <latexrelease>\EndIncludeInRelease
399 <*2kernel>

```

(End definition for `\vspace`, `\@vspace`, and `\@vspacer`. These functions are documented on page ??.)

```

\smallskip
\medskip 400 \def\smallskip{\vspace\smallskipamount}
\bigskip 401 \def\medskip{\vspace\medskipamount}
         402 \def\bigskip{\vspace\bigskipamount}

```

(End definition for `\smallskip`, `\medskip`, and `\bigskip`. These functions are documented on page ??.)

```

\smallskipamount
\medskipamount 403 \newskip\smallskipamount \smallskipamount=3pt plus 1pt minus 1pt
\bigskipamount 404 \newskip\medskipamount \medskipamount =6pt plus 2pt minus 2pt
               405 \newskip\bigskipamount \bigskipamount =12pt plus 4pt minus 4pt

```

(End definition for `\smallskipamount`, `\medskipamount`, and `\bigskipamount`. These functions are documented on page ??.)

## 1.6 Horizontal space (and breaks)

`\nobreakdashes` This idea is borrowed from the `amsmath` package but here we define a robust command. This command is a low-level command designed for use only before hyphens or dashes (such as `-`, `--`, or `---`).

It could probably be better implemented: it may need its own private token register and temporary command.

Setting the hyphen in a box and then unboxing it means that the normal penalty will not be added after it—and if the penalty is not there a break will not be taken (unless an explicit penalty or glue follows, thus the final `\nobreak`).

Note that even if it is not followed by a `'-`', it still leaves vmode and sets the spacefactor; so use it carefully!

```

406 \DeclareRobustCommand{\nobreakdashes}{%
407   \leavevmode
408   \toks@{}%
409   \def\reserved@a##1{\toks@\expandafter{\the\toks@-}%
410     \futurelet\@let@token \reserved@b}%
411   \def\reserved@b  {\ifx\@let@token -%

```



```

412             \expandafter\reserved@a
413         \else
414             \setbox\z@ \hbox{\the\toks@\nobreak}%
415             \unhbox\z@
416             \spacefactor\sfcode'\-
417         \fi}%
418 \futurelet\@let@token \reserved@b
419 }

```

(End definition for `\nobreakdashes`. This function is documented on page ??.)

**\nobreakspace** This is a robust command that produces a horizontal space at which, in paragraph-mode, a line-break is not possible. We then define an active `~` to expand to it since this is the documented behaviour of `~`. One reason for introducing this is that some 8-bit input encodings have a slot for such a space and we do not want to use active characters as the L<sup>A</sup>T<sub>E</sub>X internal commands.

The braces in the definition of `~` are needed to ensure that a following space is preserved when reading to/from internal files.

We need to keep `\@xobeysp` as it is widely used; so here it is let to the non-robust command `\nobreakspace`.

```

420 \DeclareRobustCommand{\nobreakspace}{%
421     \leavevmode\nobreak\ }
422 \catcode '\~=13
423 \def~{\nobreakspace}%
424 \expandafter\let\expandafter\@xobeysp\csname nobreakspace \endcsname

```

(End definition for `\nobreakspace` and `\@xobeysp`. These functions are documented on page ??.)

**\@** Placed before a `''`, makes it a sentence-ending period. Does the right thing for other punctuation marks as well. Does this by setting `spacefactor` to 1000.

```

425 </2ekernel>
426 <latexrelease>\IncludeInRelease{2015/01/01}%
427 <latexrelease>           {\@}{Space after \@}%
428 <*2ekernel | latexrelease>

429 \def\@{\spacefactor\@m{}}%
430 </2ekernel | latexrelease>
431 <latexrelease>\EndIncludeInRelease
432 <latexrelease>\IncludeInRelease{0000/00/00}%
433 <latexrelease>           {\@}{Space after \@}%
434 <latexrelease>\def\@{\spacefactor\@m}%
435 <latexrelease>\EndIncludeInRelease
436 <*2ekernel>

```

(End definition for `\@`. This function is documented on page ??.)

**\hspace**

```

437 \DeclareRobustCommand\hspace{\@ifstar\@hspacer\@hspace}

```

(End definition for `\hspace`. This function is documented on page ??.)

`\@hspace`

```
438 </2ekernel>
439 <*2ekernel | latexrelease>
440 <latexrelease>\IncludeInRelease{2020/10/01}%
441 <latexrelease>{\@hspace}{Support calc with \hspace}%
442 \def\@hspace#1{\begingroup\setlength\skip@{#1}\hskip\skip@\endgroup}
443 </2ekernel | latexrelease>
444 <latexrelease>\EndIncludeInRelease
445 <latexrelease>\IncludeInRelease{0000/00/00}%
446 <latexrelease>{\@hspace}{Support calc with \hspace}%
447
448 <latexrelease>
449 <latexrelease>\def\@hspace#1{\hskip #1\relax}
450 <latexrelease>\EndIncludeInRelease
451 <*2ekernel>
```

*(End definition for \@hspace. This function is documented on page ??.)*

`\@hspacer` Extra `\hskip` Opt added 1985/17/12 to guard against a following `\unskip \relax` added 13 Oct 88 for usual T<sub>E</sub>X lossage replaced both changes by `\hskip\z@skip` 27 Nov 91

```
452 \def\@hspacer#1{\vrule \@width\z@\nobreak
453 \hspace{#1}\hskip \z@skip}
```

*(End definition for \@hspacer. This function is documented on page ??.)*

`\fill`

```
454 \newskip\fill
455 \fill = Opt plus 1fill
```

*(End definition for \fill. This function is documented on page ??.)*

`\stretch`

```
456 \def\stretch#1{\z@ \@plus #1fill\relax}
```

*(End definition for \stretch. This function is documented on page ??.)*

```
457 </2ekernel>
458 <*2ekernel | latexrelease>
459 <latexrelease>\IncludeInRelease{2018/12/01}%
460 <latexrelease>{\thinspace}{Start LR-mode}%
```

`\enspace`

```
461 \DeclareRobustCommand\enspace{\leavevmode@ifvmode\kern.5em }
```

*(End definition for \enspace. This function is documented on page ??.)*

`\leavevmode@ifvmode` Leave vmode but only if we are really in vmode, otherwise the expansion is empty (which is not the case with the default definition).

```
462 \protected\def\leavevmode@ifvmode{\ifvmode\expandafter\indent\fi}
```

(End definition for \leavevmode@ifvmode. This function is documented on page ??.)

```

463 </2ekernel | latexrelease>
464 <latexrelease>\EndIncludeInRelease
465 <latexrelease>\IncludeInRelease{0000/00/00}%
466 <latexrelease>{\thinspace}{Start LR-mode}%
467 <latexrelease>\def\thinspace{\kern .16667em }
468 <latexrelease>\def\negthinspace{\kern-.16667em }
469 <latexrelease>\def\enspace{\kern.5em }
470 <latexrelease>\let\leavevmode@ifvmode\@undefined
471 <latexrelease>\EndIncludeInRelease
472 <*2ekernel>

```

\enskip

\quad

\qquad

```

473 \def\enskip{\hskip.5em\relax}
474 \def\quad{\hskip1em\relax}
475 \def\qquad{\hskip2em\relax}

```

(End definition for \enskip, \quad, and \qquad. These functions are documented on page ??.)

For Unicode engines, make the Unicode soft hyphen an active character defined as \-.

```

476 \ifx\Umathcode\@undefined\else
477 \catcode "AD=13
478 \def^^ad{\-}
479 \fi

```

\obeycr

\restorecr

The following definitions will probably get deleted or moved to compatibility mode soon.

```

480 {\catcode'\^M=13 \gdef\obeycr{\catcode'\^M13 \def^^M{\\\relax}%
481 \gobblecr}%
482 {\catcode'\^M=13 \gdef\gobblecr{\@ifnextchar
483 \gobble\ignorespaces}}
484 \gdef\restorecr{\catcode'\^M5 }}

```

(End definition for \obeycr and \restorecr. These functions are documented on page ??.)

```

485 </2ekernel>

```

# File m

## ltlogos.dtx

### 1 Logos

Various logos are defined here.

`\TeX` The  $\mathrm{T}_{\mathrm{E}}\mathrm{X}$  logo, adjusted so that a full stop after the logo counts as ending a sentence.

```
1 <*2ekernel>
2 \DeclareRobustCommand\TeX{T\kern-.1667em\lower.5ex\hbox{E}\kern-.125emX\@}
```

*(End definition for \TeX. This function is documented on page ??.)*

`\LaTeX` The  $\mathrm{L}^{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}$  logo.

```
3 \DeclareRobustCommand{\LaTeX}{L\kern-.36em%
4   {\sbox\z@ T%
5     \vbox to\ht\z@{\hbox{\check@mathfonts
6                           \fontsize\sf@size\z@
7                           \math@fontsfalse\selectfont
8                           A}%
9                           \vss}%
10    }%
11    \kern-.15em%
12    \TeX}
```

*(End definition for \LaTeX. This function is documented on page ??.)*

`\LaTeXe` The  $\mathrm{L}^{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}_{\varepsilon}$  logo as proposed by A-W designers.

```
13 \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
14   \if b\expandafter\@car\f@series\@nil\boldmath\fi
15   \LaTeX\kern.15em2$_{\textstyle\varepsilon}$}}
16 </2ekernel>
```

*(End definition for \LaTeXe. This function is documented on page ??.)*

# File n

## lfiles.dtx

### 1 File Handling

The following user commands are defined in this part:

<code>\document</code>	(ie <code>\begin{document}</code> )
	Reads in the .AUX files and <code>\catcode</code> 's @ to 12.
<code>\nofiles</code>	
	Suppresses all file output by setting <code>\@files</code> false.
<code>\includeonly</code>	<code>{\NAME1, ... ,NAMEn}</code>
	Causes only parts NAME1, ... ,NAMEn to be read by their <code>\include</code> commands. Works by setting <code>partsw</code> true and setting <code>\@partlist</code> to NAME1, ... ,NAMEn.
<code>\include</code>	<code>{\NAME}</code>
	Does an <code>\input NAME</code> unless <code>\@partsw</code> is true and NAME is not in <code>\@partlist</code> . If <code>\@files</code> is true, then it directs .AUX output to NAME.AUX, including a checkpoint at the end.
<code>\input</code>	<code>{\NAME}</code>
	The same as TeX's <code>\input</code> , except it allows optional braces around the file name. In $\text{\LaTeX 2}_{\epsilon}$ , it also avoids the primitive 'missing file' error, if the file can not be found.
<code>\IfFileExists</code>	<code>{\NAME}{\then}{\else}</code>
	If the file exists on the system, execute <i>then</i> otherwise execute <i>else</i> .
<code>\InputIfFileExists</code>	<code>{\NAME}{\then}{\else}</code>
	If the file exists on the system, execute <i>then</i> and input NAME otherwise execute <i>else</i> . <i>Historical <math>\text{\LaTeX 2.09}</math> comments (not necessarily accurate any more):</i>

```

1 \*2kernel)
2 \message{files,}

```

VARIABLES, SWITCHES AND INTERNAL COMMANDS:

```

\@mainaux      : Output file number for main .AUX file.
\@partaux      : Output file number for current part's .AUX file.
\@auxout       : Either \@mainout or \@partout, depending on
                 which .AUX file output goes to.
\@input{foo}   : If file foo exists, then \input's it,
                 otherwise types a warning message.
@filesw        : Switch – set false if no .AUX, .TOC, .IDX etc
                 files are to be written
@partsw        : Set true by a \includeonly command.
\@partlist     : Set to the argument of the \includeonly command.

\cp@F00        : The checkpoint for \include'd file FOO.TEX, written
                 by \writckpt at the end of file FOO.AUX

```

```

\includeonly{FILELIST} ==
BEGIN
  \@partsw := T

```

```

\@partlist := FILELIST
END

\include{FILE} ==
BEGIN
  \clearpage
  if \@filesw = T
    then \immediate\write\@mainaux{\string\@input{FILE.AUX}}
  fi
  if \@partsw = T
    then \@tempswa := F
    \reserved@a := FILE
    for \reserved@a := \@partlist
      do if eval(\reserved@a) = eval(\reserved@b)
        then \@tempswa := T          fi
      od
    fi
  fi

  if \@tempswa = T
    then \@auxout := \@partaux
    if \@filesw = T
      then \immediate\openout\@partaux{FILE.AUX}
      \immediate\write\@partaux{\relax}
    fi
    \input{FILE.TEX}
    \clearpage
    \@writeckpt{FILE}
    if @filesw then \closeout \@partaux fi
    \@auxout := \@mainaux
  else \cp@FILE
  fi
END

\@writeckpt{FILE} ==
BEGIN
  if \@filesw = T
    \immediate\write on file \@partaux:
      \@setckpt{FILE}{
        %% }
    for \reserved@a := \cl@ckpt
      do \immediate\write on file \@partaux:
        \global\string\setcounter
          {eval(\reserved@a)}{eval(\c@eval(\reserved@a))}
      od
      \immediate\write on file \@partaux: }
  fi
END

\@setckpt{FILE}{LIST} ==
BEGIN
  G \cp@FILE := LIST

```

END

INITIALIZATION

\@tempswa := T

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

\@inputcheck Allocate read stream for testing and output stream.

```
\@unused 3 \newread\@inputcheck
          4 \newwrite\@unused
```

*(End definition for \@inputcheck and \@unused. These functions are documented on page ??.)*

\@mainaux

```
\@partaux 5 \newwrite\@mainaux
          6 \newwrite\@partaux
```

*(End definition for \@mainaux and \@partaux. These functions are documented on page ??.)*

\if@filesw

```
\if@partsw 7 \newif\if@filesw \@fileswtrue
          8 \newif\if@partsw \@partswfalse
```

*(End definition for \if@filesw and \if@partsw. These functions are documented on page ??.)*

\@clubpenalty This stores the current normal (non-infinite) value of \@clubpenalty; it should therefore be reset whenever the normal value is changed (as in the bibliography in the standard styles).

```
9 \newcount\@clubpenalty
10 \@clubpenalty \@clubpenalty
```

*(End definition for \@clubpenalty. This function is documented on page ??.)*

\document

```
11 </2ekernel>
12 <latexrelease>\IncludeInRelease{2020/10/01}%
13 <latexrelease> {\document}{Added hook to load l3backend code}%
14 <*2ekernel|latexrelease>
15 \def\document{%
```

We do cancel the grouping as part of the \begin handling (this is now done inside \begin instead) so that the env/<env>/begin hook is not hidden inside \begingroup ... \endgroup.

```
16 % \endgroup
17 \UseOneTimeHook{begindocument/before}%
18 \@kernel@after@begindocument@before
```

Added hook to load l3backend code:

```

19 \expl@sys@load@backend@@
20 \ifx\@unusedoptionlist\@empty\else
21   \@latex@warning@no@line{Unused global option(s):^^J%
22     \spaces[\@unusedoptionlist]}%
23 \fi
24 \@colht\textheight
25 \@colroom\textheight \vsize\textheight
26 \columnwidth\textwidth
27 \@clubpenalty\clubpenalty
28 \if@twocolumn
29   \advance\columnwidth -\columnsep
30   \divide\columnwidth\tw@ \hsize\columnwidth \@firstcolumntrue
31 \fi
32 \hsize\columnwidth \linewidth\hsize
33 \begingroup\@floatplacement\@dblfloatplacement
34   \makeatletter\let\@writefile\@gobbletwo
35   \global \let \@multiplelabels \relax
36   \input{\jobname.aux}%
37 \endgroup
38 \if@filesw
39   \immediate\openout\@mainaux\jobname.aux
40   \immediate\write\@mainaux{\relax}%
41 \fi

```

Dateline 1991/03/26: FMi added `\process@table` to support NFSS; This will also work with old lfonts if no other style defines `\process@table`. The following line forces the initialization of the math fonts.

```

42 \process@table
43 \let\glb@currsiz@empty % Force math initialization.
44 \normalsize
45 \everypar{}%

```

So that punctuation in headings is not disturbed by verbatim or other local changes to the space factor codes, save the document default here. This will be locally reset by the output routine. For special cases a class may want to define `\normalsfcodes` directly, in case that definition will be used. (This is an old bug, problem existed in L<sup>A</sup>T<sub>E</sub>X 2.0x and plain T<sub>E</sub>X.)

```

46 \ifx\normalsfcodes\@empty
47   \ifnum\sfcode'\.=\@m
48     \let\normalsfcodes\frenchspacing
49   \else
50     \let\normalsfcodes\nonfrenchspacing
51   \fi
52 \fi

```

For similar reasons also save the default language, this will be reset locally in the output routine. In particular it allows hyphenation in the page head even if the page break happens in verbatim. If this has already been set by a package, set to the value of `\language` at this point.

```

53 \ifx\document@default@language\m@ne
54   \chardef\document@default@language\language
55 \fi

```



Way back in 1991 (08/26) FMi & RmS set the `\@noskipsec` switch to true in the preamble and to false here. This was done to trap lists and related text in the preamble but it does not catch everything; hence Change 1.1g was introduced.

```
56 \noskipsecfalse

57 \let \@refundefined \relax
```

Just before disabling the preamble commands we execute the begin document hook which contains any code contributed by `\AtBeginDocument`. Also disable the gathering of the file list, if no `\listfiles` has been issued. `\AtBeginDocument` is redefined at this point so that and such commands that get into the hook do not chase their tail...

```
58 \@kernel@before@begindocument
59 \UseOneTimeHook{begindocument}%
60 \@kernel@after@begindocument
```

Most of the following assignments will be done globally in case the user adds something like `\begin{multicols}` to the document hook, i.e. starts are group in `\begin{document}`.

Since a value of exactly 0pt for `\topskip` causes `\twocolumn[]` to misbehave, we add this check, hoping that it will not cause any problems elsewhere.

```
61 \ifdim\topskip<1sp\global\topskip 1sp\relax\fi
62 \global\@maxdepth\maxdepth
63 \global\let\@begindocumenthook\@undefined
64 \ifx\@listfiles\@undefined
65 \global\let\@filelist\relax
66 \global\let\@addtofilelist\@gobble
67 \fi
```

At the very end we disable all preamble commands. This has to happen after the begin document hooks was executed so that this hook can still use such commands.

```
68 \gdef\do##1{\global\let ##1\@notprerr}%
69 \@preamblecmds
```

The next line saves tokens and also allows `\@nodocument` to be used directly to trap preamble errors.

```
70 \global\let \@nodocument \relax
```

The next line is a pure safety measure in case a do list is ever expanded at the wrong place. In addition it will save a few tokens to get rid of the above definition.

```
71 \global\let\do\noexpand
72 \UseOneTimeHook{begindocument/end}%
```

Use of the hook might mean that we are already in horizontal mode, so ignore the space after `\begin{document}`.

```
73 \ignorespaces
```

The `begindocument` hook already existed in the kernel since 1994 under the name `\atbegindocumenthook` the additional ones are originally from the `etoolbox` package under the names `\@endpreamblehook` `\afterpreamble`.

```
74 \NewHook{begindocument}
75 \NewHook{begindocument/before}
76 \NewHook{begindocument/end}
```

```

\@kernel@after@begindocument@before
\@kernel@before@begindocument
\@kernel@after@begindocument

```

Above we used two kernel only hooks to be run after the public `begindocument/before` and after `begindocument` hooks.

In `\@kernel@after@begindocument@before` we already place one action: drop the fast execution code for the `env/document/begin` hook. That hook marks the end of the preamble and should therefore only be run once. In a normal document that is anyway the case (so the code would just sit there taking up space afterwards, which these days is rather harmless), however, in more complicated scenarios where several full documents are combined to a single document it might get applied several times with harmful effects. We therefore explicitly drop it at this point. the coing is somewhat obscure due to the name of the macro which requires constructing.

```

77 \edef \@kernel@after@begindocument@before {%
78   \let\expandafter\noexpand\csname
79     __hook env/document/begin\endcsname
80   \noexpand\@empty}

81 \let \@kernel@before@begindocument \@empty
82 \let \@kernel@after@begindocument \@empty

83 </2kernel | latexrelease>
84 <latexrelease>\EndIncludeInRelease

85 <latexrelease>\IncludeInRelease{2017/04/15}%
86 <latexrelease> {\document}{Save language for hyphenation}%
87 <latexrelease>
88 <latexrelease>\def\document{\endgroup
89 <latexrelease>   \ifx\@unusedoptionlist\@empty\else
90 <latexrelease>     \latex@warning@no@line{Unused global option(s):^^J%
91 <latexrelease>       \spaces[\@unusedoptionlist]}%
92 <latexrelease>   \fi
93 <latexrelease>   \@colht\textheight
94 <latexrelease>   \@colroom\textheight \vsize\textheight
95 <latexrelease>   \columnwidth\textwidth
96 <latexrelease>   \@clubpenalty\clubpenalty
97 <latexrelease>   \if@twocolumn
98 <latexrelease>     \advance\columnwidth -\columnsep
99 <latexrelease>     \divide\columnwidth\tw@ \hsize\columnwidth \@firstcolumntrue
100 <latexrelease>   \fi
101 <latexrelease>   \hsize\columnwidth \linewidth\hsize
102 <latexrelease>   \begingroup\@floatplacement\@dblfloatplacement
103 <latexrelease>     \makeatletter\let\@writefile\@gobbletwo
104 <latexrelease>     \global \let \@multiplelabels \relax
105 <latexrelease>     \input{\jobname.aux}%
106 <latexrelease>   \endgroup
107 <latexrelease>   \if@filesw
108 <latexrelease>     \immediate\openout\@mainaux\jobname.aux
109 <latexrelease>     \immediate\write\@mainaux{\relax}%
110 <latexrelease>   \fi
111 <latexrelease>   \process@table
112 <latexrelease>   \let\glb@currsz\@empty % Force math initialization.
113 <latexrelease>   \normalsize
114 <latexrelease>   \everypar{}%
115 <latexrelease>   \ifx\normalsfcodes\@empty
116 <latexrelease>     \ifnum\sfcode'\.=\@m
117 <latexrelease>       \let\normalsfcodes\frenchspacing

```

```

118 <latexrelease> \else
119 <latexrelease> \let\normalsfcodes\nonfrenchspacing
120 <latexrelease> \fi
121 <latexrelease> \fi
122 <latexrelease> \ifx\document@default@language\m@ne
123 <latexrelease> \chardef\document@default@language\language
124 <latexrelease> \fi
125 <latexrelease> \@noskipsecfalse
126 <latexrelease> \let \@refundefined \relax
127 <latexrelease> \let\AtBeginDocument\@firstofone
128 <latexrelease> \@begindocumenthook
129 <latexrelease> \ifdim\topskip<1sp\global\topskip 1sp\relax\fi
130 <latexrelease> \global\@maxdepth\maxdepth
131 <latexrelease> \global\let\@begindocumenthook\@undefined
132 <latexrelease> \ifx\@listfiles\@undefined
133 <latexrelease> \global\let\@filelist\relax
134 <latexrelease> \global\let\@addtofilelist\@gobble
135 <latexrelease> \fi
136 <latexrelease> \gdef\do##1{\global\let ##1\@notprerr}%
137 <latexrelease> \@preamblecmds
138 <latexrelease> \global\let \@nodocument \relax
139 <latexrelease> \global\let\do\noexpand
140 <latexrelease> \ignorespaces}
141 <latexrelease>\EndIncludeInRelease
142 <latexrelease>
143 <latexrelease>\IncludeInRelease{0000/00/00}%
144 <latexrelease> {\document}{Save language for hyphenation}
145 <latexrelease>\def\document{\endgroup
146 <latexrelease> \ifx\@unusedoptionlist\@empty\else
147 <latexrelease> \@latex@warning@no@line{Unused global option(s):^^J%
148 <latexrelease> \spaces[\@unusedoptionlist]}}%
149 <latexrelease> \fi
150 <latexrelease> \@colht\textheight
151 <latexrelease> \@colroom\textheight \vsize\textheight
152 <latexrelease> \columnwidth\textwidth
153 <latexrelease> \@clubpenalty\clubpenalty
154 <latexrelease> \if@twocolumn
155 <latexrelease> \advance\columnwidth -\columnsep
156 <latexrelease> \divide\columnwidth\tw@ \hsize\columnwidth
157 <latexrelease> \@firstcolumntrue
158 <latexrelease> \fi
159 <latexrelease> \hsize\columnwidth \linewidth\hsize
160 <latexrelease> \begingroup\@floatplacement\@dblfloatplacement
161 <latexrelease> \makeatletter\let\@writefile\@gobbletwo
162 <latexrelease> \global \let \@multiplelabels \relax
163 <latexrelease> \input{\jobname.aux}%
164 <latexrelease> \endgroup
165 <latexrelease> \if@files
166 <latexrelease> \immediate\openout\@mainaux\jobname.aux
167 <latexrelease> \immediate\write\@mainaux{\relax}%
168 <latexrelease> \fi
169 <latexrelease> \process@table
170 <latexrelease> \let\glb@currsize\@empty
171 <latexrelease> \normalsize

```

```

172 <latexrelease> \everypar{}%
173 <latexrelease> \ifx\normalsfcodes\@empty
174 <latexrelease> \ifnum\sfcode'\.=\@m
175 <latexrelease> \let\normalsfcodes\frenchspacing
176 <latexrelease> \else
177 <latexrelease> \let\normalsfcodes\nonfrenchspacing
178 <latexrelease> \fi
179 <latexrelease> \fi
180 <latexrelease> \noskipsecfalse
181 <latexrelease> \let \@refundefined \relax
182 <latexrelease> \let\AtBeginDocument\@firstofone
183 <latexrelease> \@begindocumenthook
184 <latexrelease> \ifdim\topskip<1sp\global\topskip 1sp\relax\fi
185 <latexrelease> \global\@maxdepth\maxdepth
186 <latexrelease> \global\let\@begindocumenthook\@undefined
187 <latexrelease> \ifx\@listfiles\@undefined
188 <latexrelease> \global\let\@filelist\relax
189 <latexrelease> \global\let\@addtofilelist\@gobble
190 <latexrelease> \fi
191 <latexrelease> \gdef\do##1{\global\let ##1\@notprerr}%
192 <latexrelease> \@preamblecmds
193 <latexrelease> \global\let \@nodocument \relax
194 <latexrelease> \global\let\do\noexpand
195 <latexrelease> \ignorespaces}
196 <latexrelease>\EndIncludeInRelease
197 <*2kernel>
198 \@onlypreamble\document

```

(End definition for \document and others. These functions are documented on page ??.)

**\normalsfcodes** The setting of \@empty is just a flag. This command may be defined in a class or package file. If it is still \@empty at \begin{document} it will be defined to be \frenchspacing or \nonfrenchspacing, depending on which of those appears to be in effect at that point.

```
199 \let\normalsfcodes\@empty
```

(End definition for \normalsfcodes. This function is documented on page ??.)

**\nofiles** Set \@fileswfalse which suppresses the places where L<sup>A</sup>T<sub>E</sub>X makes \immediate writes. The \makeindex and \makeglossary are disabled. \protected@write is redefined not to write to the file specified, but rather to write a blank line to the log file. This ensures that a *<whatsit>* node is still created, and so spacing is not affected by the \nofiles command; to ensure this more generally, the \if@nobreak test is needed.

```

200 \def\nofiles{%
201   \@fileswfalse
202   \typeout{No auxiliary output files.^^J}%
203   \long\def\protected@write##1##2##3%
204     {\write\m@ne{}\if@nobreak\ifvmode\nobreak\fi\fi}%
205   \let\makeindex\relax
206   \let\makeglossary\relax}
207 \@onlypreamble\nofiles

```

(End definition for \nofiles. This function is documented on page ??.)

`\protected@write` This takes three arguments: an output stream, some initialization code, and some text to write. It then writes this, with appropriate handling of `\protect` and `\thepage`.

```

208 \long\def \protected@write#1#2#3{%
209     \begingroup
210     \let\thepage\relax
211     #2%
212     \let\protect\@unexpandable@protect
213     \edef\reserved@a{\write#1{#3}}%
214     \reserved@a
215     \endgroup
216     \if@nobreak\ifvmode\nobreak\fi\fi
217 }

```

(End definition for `\protected@write`. This function is documented on page ??.)

```

218 \let\@auxout=\@mainaux

```

`\include` In the definition of `\include`, `\def\reserved@b` changed to `\edef\reserved@b` to be consistent with the `\edef` in `\includeonly`. (Suggested by Rainer Schöpf & Frank Mittelbach. Change made 20 Jul 88.)

Changed definition of `\include` to allow space at end of file name — otherwise, typing `\include{foo }` would cause L<sup>A</sup>T<sub>E</sub>X to overwrite `foo.tex`. Change made 24 May 89, suggested by Rainer Schöpf and Frank Mittelbach

Made `\include` check for being used inside an `\include`'d file, as this will not work and cause surprising results.

```

219 </2ekernel>
220 <*2ekernel | latexrelease>
221 <latexrelease> \IncludeInRelease{2020/10/01}%
222 <latexrelease> { \includeonly } { Spaces in file names } %
223 \def\include#1{\relax
224     \ifnum\@auxout=\@partaux
225         \@latex@error{\string\include\space cannot be nested}\@eha
226     \else

```

Here the normalisation will add `.tex` for all files, (it uses the the same normalisation as the hooks), so we need to remove that manually. `\@strip@tex@ext` does that.

```

227     \set@curr@file{#1}%
228     \edef\@curr@file{\@strip@tex@ext\@curr@file}%

```

For historical reasons `\@include` expects an argument delimited by a space. This is kept (though unnecessary now) to avoid errors in other packages that use `\@include` directly.

```

229     \expandafter\@include\expandafter{\@curr@file} % deliberate space
230     \fi}

```

Here in `\includeonly` we also need to strip `.tex` after normalisation:

```

231 \def\includeonly#1{%
232     \@partswtrue

```

Because the argument to `\includeonly` is a comma-separated list of filenames where there may be comma's preceding some of the filenames or trailing them. Therefore we need to take the list apart, remove the unwanted spaces while leaving the spaces *in* the filenames intact.

```

233     \let\@partlist\@empty
234     \@for\reserved@a:=#1 \do

```

```

235   {%
236     \expandafter\set@curr@file\expandafter{\reserved@a}%
237     \ifx\@partlist\@empty
238       \edef\@partlist{\@strip@tex@ext\@curr@file}%
239     \else
240       \edef\@partlist{\@partlist,\@strip@tex@ext\@curr@file}%
241     \fi
242   }%
243 }
244 \@onlypreamble\includeonly

```

(End definition for \include and \includeonly. These functions are documented on page ??.)

\@strip@tex@ext These macros take a (\detokenized file name and remove any .tex extension). Extra  
\@strip@tex@ext@aux care is taken to not remove the string .tex from the middle of a file name: it is only removed if it's the very last thing in the file name.

```

245 \def\reserved@a#1{%
246 \def\@strip@tex@ext##1{%
247   \expandafter\@strip@tex@ext@aux
248   ##1\@nil\@nil
249   #1\@nil\relax\@nnil}
250 \def\@strip@tex@ext@aux##1#1\@nil##2\@nnil{%
251   \ifx\relax##2\@empty
252     \expandafter\@cdr\expandafter\@empty\@cdr{ }##1%
253   \else##1\fi}}%
254 \expandafter\reserved@a
255 \expandafter{\detokenize{.tex}}
256 </2ekernel | latexrelease>

```

(End definition for \@strip@tex@ext and \@strip@tex@ext@aux. These functions are documented on page ??.)

```

257 <latexrelease>\EndIncludeInRelease
258 <latexrelease>\IncludeInRelease{2019/10/01}%
259 <latexrelease> \includeonly}{Spaces in file names}%
260 <latexrelease>
261 <latexrelease>\def\includeonly#1{%
262 <latexrelease> \@partswtrue
263 <latexrelease> \set@curr@file{\zap@space#1 \@empty}%
264 <latexrelease> \let\@partlist\@curr@file
265 <latexrelease> }
266 <latexrelease>
267 <latexrelease>\def\include#1{\relax
268 <latexrelease> \ifnum\@auxout=\@partaux
269 <latexrelease> \@latex@error{string\include\space cannot be nested}\@eha
270 <latexrelease> \else
271 <latexrelease> \set@curr@file{#1 }%
272 <latexrelease> \expandafter\@include\@curr@file
273 <latexrelease> \fi}
274 <latexrelease>
275 <latexrelease>\let\@strip@tex@ext\@undefined
276 <latexrelease>\let\@strip@tex@ext@aux\@undefined
277 <latexrelease>
278 <latexrelease>\EndIncludeInRelease

```

```

279 <latexrelease>\IncludeInRelease{0000/00/00}%
280 <latexrelease>          {\includeonly}{Spaces in file names}%
281 <latexrelease>\def\includeonly#1{%
282 <latexrelease>  \@partswtrue
283 <latexrelease>  \edef\@partlist{\zap@space#1 \@empty}}
284 <latexrelease>
285 <latexrelease>\def\include#1{\relax
286 <latexrelease>  \ifnum\@auxout=\@partaux
287 <latexrelease>    \@latex@error{\string\include\space cannot be nested}\@eha
288 <latexrelease>  \else \@include#1 \fi}
289 <latexrelease>
290 <latexrelease>\EndIncludeInRelease
291 <*2ekernel>

```

\@include

```

292 </2ekernel>
293 <*2ekernel | latexrelease>
294 <latexrelease>\IncludeInRelease{2020/10/01}%
295 <latexrelease>          {\@include}{Spaces in file names and hooks}%
296 \def\@include#1 {%
297   \clearpage
298   \if@filesw
299     \immediate\write\@mainaux{\string\@input{#1.aux}}%
300   \fi
301   \@tempswtrue
302   \if@partsw
303     \@tempswafalse
304     \edef\reserved@a{#1}%
305     \@for\reserved@a:=\@partlist\do
306       {\ifx\reserved@a\reserved@b\@tempswtrue\fi}%
307   \fi
308   \if@tempswa
309     \let\@auxout\@partaux
310     \if@filesw
311       \immediate\openout\@partaux "#1.aux"
312       \immediate\write\@partaux{\relax}%
313     \fi

```

Now before going to the hooks we need to set \CurrentFile:

```

314 %-----
315   \@filehook@set@CurrentFile

```

Execute the before hooks just after we switched the .aux file ...

```

316   \UseHook{include/before}%
317   \UseHook{include/before/#1}%
318 %-----
319   \@input@{#1.tex}%
320 %-----

```

... then end hooks ...

```

321   \UseHook{include/end/#1}%
322   \UseHook{include/end}%
323 %-----
324   \clearpage
325 %-----

```

... and after the `\clearpage` the after hooks followed by another `\clearpage` just in case new material got added (after all we need to be in well defined state after the `\include`).

```

326     \UseHook{include/after/#1}%
327     \UseHook{include/after}%
328     \clearpage
329 %-----
330     \@writeckpt{#1}%
331     \if@filesw
332         \immediate\closeout\@partaux
333     \fi
334     \else

```

If the file is not included, reset `\deadcycles`, so that a long list of non-included files does not generate an ‘Output loop’ error.

```

335         \deadcycles\z@
336         \nameuse{cp@#1}%
337     \fi
338     \let\@auxout\@mainaux}
339 \<latexrelease>\EndIncludeInRelease
340 \</2ekernel | latexrelease>

341 \<latexrelease>\IncludeInRelease{0000/00/00}%
342 \<latexrelease>                {\@include}{Spaces in file names}%
343 \<latexrelease>\def\@include#1 {%
344 \<latexrelease>  \clearpage
345 \<latexrelease>  \if@filesw
346 \<latexrelease>    \immediate\write\@mainaux{\string\@input{#1.aux}}%
347 \<latexrelease>  \fi
348 \<latexrelease>  \@tempswatrue
349 \<latexrelease>  \if@partsw
350 \<latexrelease>    \@tempswafalse
351 \<latexrelease>    \edef\reserved@b{#1}%
352 \<latexrelease>    \@for\reserved@a:=\@partlist\do
353 \<latexrelease>      {\ifx\reserved@a\reserved@b\@tempswatrue\fi}%
354 \<latexrelease>  \fi
355 \<latexrelease>  \if@tempswa
356 \<latexrelease>    \let\@auxout\@partaux
357 \<latexrelease>    \if@filesw
358 \<latexrelease>      \immediate\openout\@partaux #1.aux
359 \<latexrelease>      \immediate\write\@partaux{\relax}%
360 \<latexrelease>    \fi
361 \<latexrelease>    \@input@{#1.tex}%
362 \<latexrelease>    \clearpage
363 \<latexrelease>    \@writeckpt{#1}%
364 \<latexrelease>    \if@filesw
365 \<latexrelease>      \immediate\closeout\@partaux
366 \<latexrelease>    \fi
367 \<latexrelease>  \else
368 \<latexrelease>    \deadcycles\z@
369 \<latexrelease>    \nameuse{cp@#1}%
370 \<latexrelease>  \fi
371 \<latexrelease>  \let\@auxout\@mainaux}
372 \<latexrelease>
373 \<latexrelease>\EndIncludeInRelease

```



374 `<*2ekernel>`

(End definition for `\@include`. This function is documented on page ??.)

`\@writeckpt`

```
375 \def\@writeckpt#1{%
376   \if@files
377     \immediate\write\@partaux{\string\@setckpt{#1}\@charlb}%
378     {\let\@elt\@wckptelt \cl@ckpt}%
379     \immediate\write\@partaux{\@charrb}%
380   \fi}
```

(End definition for `\@writeckpt`. This function is documented on page ??.)

`\@wckptelt`

```
381 \def\@wckptelt#1{%
382   \immediate\write\@partaux{%
383     \string\setcounter{#1}{\the\@nameuse{c@#1}}}
```

(End definition for `\@wckptelt`. This function is documented on page ??.)

`\@setckpt` RmS 93/08/31: introduced `\@setckpt`

```
384 \def\@setckpt#1{\global\@namedef{cp@#1}}
```

(End definition for `\@setckpt`. This function is documented on page ??.)

`\@charlb` The following defines `\@charlb` and `\@charrb` to be { and }, respectively with `\catcode`  
`\@charrb` 11.

```
385 {\catcode'\@charlb=2
386 \catcode'\@charrb=11
387 \gdef\@charlb[{
388 \gdef\@charrb[]
389 ]% }brace matching
```

(End definition for `\@charlb` and `\@charrb`. These functions are documented on page ??.)

## 1.1 Safe Input Macros

`\@curr@file` File name handling is done by generating a csname from the provided file name (which  
`\set@curr@file` means that UTF-8 octets gets turned into strings as this is what happens if they appear in a csname due to the code in `utf8.def`). By setting `\escapchar` to -1 we ensure that we don't get a backslash in front. As a result we end up with all characters as catcode 12 (plus spaces). We then sometimes add quotes around the construct (removing any existing inner quotes. Sometimes we only remove the quotes if they have been supplied by the user. There is clearly some room for improvement.

A side effect of the new code is that we will see quotes around file name displays where there haven't been any before.

For compatibility with existing code using `{abc}.tex` or `{one.two}.png` an initial brace group is discarded before expansion and `\string` is applied. The content of the brace group is discarded. This means that a leading space will be lost unless protected (by `{ }` or `" "` or `\space`) but filenames with a space are hopefully rare.

The definition below is from 2019 and only used during kernel bootstrapping, later on in `ltfilehook.dtx` it will get overwritten.

```

390 \def\set@curr@file#1{%
391   \begingroup
392   \escapechar\m@ne
393   \xdef\@curr@file{%
394     \expandafter\expandafter\expandafter\unquote@name
395     \expandafter\expandafter\expandafter{%
396       \expandafter\string
397       \csname\@firstofone#1\@empty\endcsname}}%
398   \endgroup
399 }

```

(End definition for \@curr@file and \set@curr@file. These functions are documented on page ??.)

\quote@name Quoting spaces  
\quote@@name  
\unquote@name

```

a b c      -> "a b c"
"a b c"    -> "a b c"
a" "b" "c -> "a b c"
          -> ""

```

```

400 </2ekernel>
401 <*2ekernel | latexrelease>
402 <latexrelease> \IncludeInRelease{2019/10/01}%
403 <latexrelease>           {\quote@name}{Quote file names}%
404 \def\quote@name#1{"\quote@@name#1@gobble"}
405 \def\quote@@name#1"#1\quote@@name}

```

and removing quotes ...

```

406 \def\unquote@name#1{\quote@@name#1@gobble}

```

(End definition for \quote@name, \quote@@name, and \unquote@name. These functions are documented on page ??.)

\IfFileExists

```

407 \DeclareRobustCommand\IfFileExists[1]{%
408   \set@curr@file{#1}%
409   \expandafter\IfFileExists@\expandafter{\@curr@file}}

```

(End definition for \IfFileExists. This function is documented on page ??.)

\IfFileExists@ Argument #1 is \@curr@file so catcode 12 string with no quotes.

```

410 \long\def \IfFileExists@#1#2#3{%
411   \openin\@inputcheck"#1" %
412   \ifeof\@inputcheck
413     \ifx\input@path\@undefined
414       \def\reserved@a{#3}%
415     \else
416       \def\reserved@a{\@iffileonpath{#1}{#2}{#3}}%
417     \fi
418   \else
419     \closein\@inputcheck
420     \edef\@filef@und{"#1" }%
421     \def\reserved@a{#2}%
422   \fi
423   \reserved@a}

```

(End definition for \IfFileExists@. This function is documented on page ??.)

\@iffileonpath If the file is not found by \openin, and \input@path is defined, look in all the directories specified in \input@path.

```

424 \long\def\@iffileonpath#1{%
425   \let\reserved@a\@secondoftwo
426   \expandafter\@tfor\expandafter\reserved@b\expandafter
427     :\expandafter=\input@path\do{%
428     \openin\@inputcheck\expandafter\quote@name\expandafter{\reserved@b#1} %
429     \ifeof\@inputcheck\else
430       \edef\@filef@und{\expandafter\quote@name\expandafter{\reserved@b#1} }%
431       \let\reserved@a\@firstoftwo%
432       \closein\@inputcheck
433       \@break@tfor
434     \fi}%
435   \reserved@a}

```

(End definition for \@iffileonpath. This function is documented on page ??.)

```

436 </2ekernel | latexrelease>
437 <latexrelease>\EndIncludeInRelease
438 <latexrelease>\IncludeInRelease{0000/00/00}%
439 <latexrelease>          {\quote@name}{Quote file names}%
440 <latexrelease>
441 <latexrelease>\let\quote@name\@undefined
442 <latexrelease>\let\quote@@name\@undefined
443 <latexrelease>\let\unquote@name\@undefined
444 <latexrelease>
445 <latexrelease>\let\IfFileExists@\@undefined
446 <latexrelease>
447 <latexrelease>\long\def \IfFileExists#1#2#3{%
448 <latexrelease>  \openin\@inputcheck#1 %
449 <latexrelease>  \ifeof\@inputcheck
450 <latexrelease>    \ifx\input@path\@undefined
451 <latexrelease>      \def\reserved@a{#3}%
452 <latexrelease>    \else
453 <latexrelease>      \def\reserved@a{\@iffileonpath{#1}{#2}{#3}}%
454 <latexrelease>    \fi
455 <latexrelease>  \else
456 <latexrelease>    \closein\@inputcheck
457 <latexrelease>    \edef\@filef@und{#1 }%
458 <latexrelease>    \def\reserved@a{#2}%
459 <latexrelease>  \fi
460 <latexrelease>  \reserved@a}
461 <latexrelease>
462 <latexrelease>\long\def\@iffileonpath#1{%
463 <latexrelease>  \let\reserved@a\@secondoftwo
464 <latexrelease>  \expandafter\@tfor\expandafter\reserved@b\expandafter
465 <latexrelease>    :\expandafter=\input@path\do{%
466 <latexrelease>    \openin\@inputcheck\reserved@b#1 %
467 <latexrelease>    \ifeof\@inputcheck\else
468 <latexrelease>      \edef\@filef@und{\reserved@b#1 }%
469 <latexrelease>      \let\reserved@a\@firstoftwo%
470 <latexrelease>      \closein\@inputcheck
471 <latexrelease>      \@break@tfor

```

```

472 <latexrelease> \fi}%
473 <latexrelease> \reserved@a}
474 <latexrelease>
475 <latexrelease>\EndIncludeInRelease
476 <*2ekernel>

```

**\InputIfFileExists** Now define `\InputIfFileExists` to input #1 if it seems to exist. Immediately prior to the input, #2 is executed. If the file #1 does not exist, execute ‘#3’.

This here is a temporary definition for the kernel. The real one comes somewhat later in the file `lfilehook.dtx`.

```

477 \DeclareRobustCommand \InputIfFileExists[2]{%
478   \IfFileExists{#1}%
479   {%
480     \expandafter\@swaptwoargs\expandafter
481     {\@filef@und}{#2\@addtofilelist{#1}\@@input}}

```

(End definition for `\InputIfFileExists`. This function is documented on page ??.)

**\@swaptwoargs** Swap two arguments and return them unbraced (like `\@firstoftwo` etc).

```

482 </2ekernel>
483 <*2ekernel | latexrelease>
484 <latexrelease>\IncludeInRelease{2019/10/01}%
485 <latexrelease> {\@swaptwoargs}{Don't lose the file name}%
486 \long\def\@swaptwoargs#1#2{#2#1}
487 </2ekernel | latexrelease>
488 <latexrelease>\EndIncludeInRelease
489 <latexrelease>\IncludeInRelease{0000/00/00}%
490 <latexrelease> {\@swaptwoargs}{Don't lose the file name}%
491 <latexrelease>\let\@swaptwoargs\undefined
492 <latexrelease>\EndIncludeInRelease
493 <*2ekernel>

```

(End definition for `\@swaptwoargs`. This function is documented on page ??.)

**\input** Input a file: if the argument is given in braces use safe input macros, otherwise use TeX's primitive `\input` command (which is called `\@@input` in L<sup>A</sup>T<sub>E</sub>X).

```

494 \def\input{\@ifnextchar\bgroup\@iinput\@@input}

```

(End definition for `\input`. This function is documented on page ??.)

**\@iinput** Define `\@iinput` (i.e., `\input`) in terms of `\InputIfFileExists`.

Changes to `\@iinput`: adapt to the changes to `\@missingfileerror`.

```

495 </2ekernel>
496 <*2ekernel | latexrelease>
497 <latexrelease>\IncludeInRelease{2020/10/01}%
498 <latexrelease> {\@iinput}{Change in file error handling}%
499 \def\@iinput#1{%
500   \InputIfFileExists{#1}{}%
501   {\filename@parse\@curr@file
502     \edef\reserved@a{\noexpand\@missingfileerror
503       {\filename@area\filename@base}%
504       {\ifx\filename@ext\relax tex\else\filename@ext\fi}}}%

```

This line now just sets `\@missingfile@{part}`:

```
505 \reserved@a
Now here we have to use it. The file here is guaranteed to exist, because \@missingfileerror
ensures so, but we have to use \InputIfFileExists because it executes the file hooks.
506 \edef\reserved@a{\noexpand\@input{%
507 \@missingfile@area\@missingfile@base.\@missingfile@ext}}%
508 \reserved@a}}
509 </2ekernel | latexrelease>
510 <latexrelease>\EndIncludeInRelease
511 <latexrelease>\IncludeInRelease{2019/10/01}%
512 <latexrelease> \@input}{Quote file names}%
513 <latexrelease>
514 <latexrelease>\def\@input#1{%
515 <latexrelease> \InputIfFileExists{#1}{}%
516 <latexrelease> {\filename@parse\@curr@file
517 <latexrelease> \edef\reserved@a{\noexpand\@missingfileerror
518 <latexrelease> {\filename@area\filename@base}%
519 <latexrelease> {\ifx\filename@ext\relax tex\else\filename@ext\fi}}%
520 <latexrelease> \reserved@a}}
521 <latexrelease>\EndIncludeInRelease
522 <latexrelease>\IncludeInRelease{0000/00/00}%
523 <latexrelease> \@input}{Quote file names}%
524 <latexrelease>\def\@input#1{%
525 <latexrelease> \InputIfFileExists{#1}{}%
526 <latexrelease> {\filename@parse{#1}%
527 <latexrelease> \edef\reserved@a{\noexpand\@missingfileerror
528 <latexrelease> {\filename@area\filename@base}%
529 <latexrelease> {\ifx\filename@ext\relax tex\else\filename@ext\fi}}%
530 <latexrelease> \reserved@a}}
531 <latexrelease>\EndIncludeInRelease
532 <*2ekernel>
```

*(End definition for \@input. This function is documented on page ??.)*

**\@input** Define `\@input` in terms of `\IfFileExists`. So this is a ‘safe input’ command, but the files input are not listed by `\listfiles`.

We don’t want `.aux`, `.toc` files etc be listed by `\listfiles`. However, something like `.bbl` probably should be listed and thus should be implemented not by `\@input`.

```
533 \def\@input#1{%
534 \IfFileExists{#1}{\@input\@filef@und}{\typeout{No file #1.}}}
```

*(End definition for \@input. This function is documented on page ??.)*

**\@input@** Version of `\@input` that does add the file to `\@filelist`.

```
535 \def\@input@#1{\InputIfFileExists{#1}{\typeout{No file #1.}}}
```

*(End definition for \@input@. This function is documented on page ??.)*

**\@missingfileerror** This ‘error’ command avoids T<sub>E</sub>X’s primitive missing file loop.

Missing file error. Prompt for a new filename, offering a default extension.

Changes to `\@missingfileerror`: rather than trying to input the file by force, now `\@missingfileerror` just returns three `\@missingfile@{part}` and the caller macro is responsible for doing the right thing with it.

```

536 </2ekernel>
537 <*2ekernel | latexrelease>
538 <latexrelease>\IncludeInRelease{2020/10/01}%
539 <latexrelease>      {\@missingfileerror}{Do not load missing file immediately}%
540 \gdef\@missingfileerror#1#2{%
541     \typeout{^^J! LaTeX Error: File '#1.#2' not found.^^J^^J%
542     Type X to quit or <RETURN> to proceed,^^J%
543     or enter new name. (Default extension: #2)^^J}%
544     \message{Enter file name: }%
545     {\endlinechar\m@ne
546     \global\read\m@ne to\@gtempa}%
547     \ifx\@gtempa\@empty
If the user answers with <return>, fallback to the .tex file (previously it did nothing).
548     \let\@missingfile@area\@empty
549     \let\@missingfile@base\@empty
550     \def\@missingfile@ext{tex}%
551     \else
Use \batchmode\read-1 to <tl> to end the TEX run, same as expl3 does (it was
\batchmode\@@end before).
552     \def\reserved@b{\batchmode\read-1 to \reserved@a}%
553     \def\reserved@a{x}\ifx\reserved@a\@gtempa\reserved@b\fi
554     \def\reserved@a{X}\ifx\reserved@a\@gtempa\reserved@b\fi
555     \filename@parse\@gtempa
556     \edef\filename@ext{%
557     \ifx\filename@ext\relax#2\else\filename@ext\fi}%
558     \edef\reserved@a{%
Only check \IfFileExists (it was \InputIfFileExists).
559     \noexpand\IfFileExists
560     {\filename@area\filename@base.\filename@ext}%
If the file exists, define \@missingfile@<part>.
561     {\def\noexpand\@missingfile@area{\filename@area}%
562     \def\noexpand\@missingfile@base{\filename@base}%
563     \def\noexpand\@missingfile@ext {\filename@ext}}%
564     {\noexpand\@missingfileerror
565     {\filename@area\filename@base}{\filename@ext}}}%
566     \reserved@a
567     \fi
568 }
569 </2ekernel | latexrelease>
570 <latexrelease>\EndIncludeInRelease
571 <latexrelease>\IncludeInRelease{0000/00/00}%
572 <latexrelease>      {\@missingfileerror}{Do not load missing file immediately}%
573 <latexrelease>
574 <latexrelease>\gdef\@missingfileerror#1#2{%
575 <latexrelease>      \typeout{^^J! LaTeX Error: File '#1.#2' not found.^^J^^J%
576 <latexrelease>      Type X to quit or <RETURN> to proceed,^^J%
577 <latexrelease>      or enter new name. (Default extension: #2)^^J}%
578 <latexrelease>      \message{Enter file name: }%
579 <latexrelease>      {\endlinechar\m@ne
580 <latexrelease>      \global\read\m@ne to\@gtempa}%
581 <latexrelease>      \ifx\@gtempa\@empty

```

```

582 <latexrelease> \else
583 <latexrelease> \def\reserved@a{x}\ifx\reserved@a\@gtempa\batchmode\@end\fi
584 <latexrelease> \def\reserved@a{X}\ifx\reserved@a\@gtempa\batchmode\@end\fi
585 <latexrelease> \filename@parse\@gtempa
586 <latexrelease> \edef\filename@ext{%
587 <latexrelease> \ifx\filename@ext\relax#2\else\filename@ext\fi}%
588 <latexrelease> \edef\reserved@a{%
589 <latexrelease> \noexpand\InputIfFileExists
590 <latexrelease> {\filename@area\filename@base.\filename@ext}%
591 <latexrelease> }%
592 <latexrelease> {\noexpand\@missingfileerror
593 <latexrelease> {\filename@area\filename@base}{\filename@ext}}}%
594 <latexrelease> \reserved@a
595 <latexrelease> \fi}
596 <latexrelease>
597 <latexrelease>\EndIncludeInRelease
598 <*2ekernel>

```

(End definition for \@missingfileerror. This function is documented on page ??.)

**\@obsoletefile** For compatibility with L<sup>A</sup>T<sub>E</sub>X 2.09 document styles, we distribute files called `article.sty`, `book.sty`, `report.sty`, `slides.sty` and `letter.sty`. These use the command `\@obsoletefile`, which produces a warning message.

```

599 \def\@obsoletefile#1#2{%
600 \@latex@warning@no@line{inputting ‘#1’ instead of obsolete ‘#2’}}
601 \@onlypreamble\@obsoletefile

```

## 1.2 Listing files

A list of files input so far. The initial value of `\@gobble` eats the comma before the first file name.

```

602 \let\@filelist\@gobble

```

**\@addtofilelist** Add to the list of files input so far. This ‘real’ definition is only used for ‘cfg’ files during initex. An initial definition of `\@gobble` has already been set.

```

603 %\def\@addtofilelist#1{\xdef\@filelist{\@filelist,#1}}

```

A preamble command to cause `\end{document}` to list files input from the main file.

```

\listfiles
604 \def\listfiles{%
605 \let\listfiles\relax
606 \def\@listfiles##1##2##3##4##5##6##7##8##9\@{%
607 \def\reserved@d{\}%
608 \@tfor\reserved@c:=##1##2##3##4##5##6##7##8\do{%
609 \ifx\reserved@c\reserved@d
610 \edef\filename@area{ \filename@area}%
611 \fi}}%

612 \def\@dofilelist{%
613 \typeout{^^J *File List*}%
614 \@for\@currname:=\@filelist\do{%
615 \filename@parse\@currname
616 \edef\reserved@a{%
617 \filename@base.%

```

```

618         \ifx\filename@ext\relax tex\else\filename@ext\fi}%
619 \expandafter\let\expandafter\reserved@b
620         \csname ver@\reserved@a\endcsname
621 \expandafter\expandafter\expandafter\@listfiles\expandafter
622 \filename@area\filename@base\////////////////////////////////\@
623 \typeout{%
624 \filename@area\reserved@a
625 \ifx\reserved@b\relax\else\@spaces\reserved@b\fi}}%
626 \typeout{ *****~^J}}

```

The \@filelist will be de-activated if \listfiles does not appear in the preamble.  
\begin{document} contains code equivalent to the following:

```

\AtBeginDocument{%
  \ifx\@listfiles\@undefined
    \let\@filelist\relax
    \let\@addtofilelist\@gobble
  \fi}

```

```

627 \@onlypreamble\listfiles

```

```

\@dofilelist 628 \let\@dofilelist\relax
629 </2ekernel>

```

*(End definition for \obsoletefile and others. These functions are documented on page ??.)*



File o

# ltoutenc.dtx

## 1 Font encodings

This section of the kernel contains commands for declaring encoding-specific commands, such as accents. It also contains the code for some of the encoding files, including `omlenc.def`, `omsenc.def`, `t1enc.def` and `ot1enc.def` files, which define the OLM, OMS, T1 and OT1 encodings, and the `fontenc` package for selecting encodings.

The `fontenc` package has options for encodings, of which the last option is the default encoding. For example, to use the OT2, OT3 and T1 encodings, with T1 as the default, you say:

```
\usepackage[OT2,OT3,T1]{fontenc}
```

The standard kernel set-up loads font encoding files and selects an encoding as follows.

```
\input {omlenc.def}
\input {t1enc.def}
\input {ot1enc.def}
\input {omsenc.def}
\fontencoding{OT1}
```

Note that the files in the standard `inputenc` package depend on this behaviour of the kernel.

The syntax for declaring encoding-specific commands is:

```
\DeclareTextCommand{<command>}{<encoding>}
                               [<number>] [<default>]{<commands>}
```

This command is like `\newcommand`, except that it defines a command which is specific to one encoding. The resulting command is always robust, even if its definition is fragile. For example, the definition of `\l` in the OT1 encoding is:

```
\DeclareTextCommand{\l}{OT1}{\@xxxii l}
```

`\DeclareTextCommand` takes the same optional arguments as `\newcommand`.

```
\ProvideTextCommand{<command>}{<encoding>}
                               [<number>] [<default>]{<commands>}
```

This acts like `\DeclareTextCommand`, but does nothing if the command is already defined.

```
\DeclareTextSymbol{<command>}{<encoding>}{<slot>}
```

This command defines a text symbol, with a particular slot in that encoding. The commands:

```
\DeclareTextSymbol{\ss}{OT1}{25}
\DeclareTextCommand{\ss}{OT1}{\char25 }
```

have the same effect, but the `\DeclareTextSymbol` is faster.

```
\DeclareTextAccent{<command>}{<encoding>}{<slot>}
```

This command declares a text accent. The commands:

```
\DeclareTextAccent{"}{OT1}{127}
\DeclareTextCommand{"}{OT1}{\add@accent {127}}
```

have the same effect.

```
\DeclareTextComposite{<command>}
                               {<encoding>}{<argument>}{<slot>}
```

This command declares a composite letter, for example in the T1 encoding `\'a` is slot 225, which is declared by:

```
\DeclareTextComposite{\'}{T1}{a}{225}
```

The *command* will normally have been declared with `\DeclareTextAccent`, or as a one-argument `\DeclareTextCommand`.

`\DeclareTextComposite` is the most common example of using the more general declaration `\DeclareTextCompositeCommand`, which can define a composite to be an arbitrary piece of text.

```
\DeclareTextCompositeCommand{<command>}
                               {<encoding>}{<argument>}{<text>}
```

For example, in the OT1 encoding Å has a hand-crafted definition this is declared as follows

```
\DeclareTextCompositeCommand{\r}{OT1}{A}
{\leavevmode\setbox\z@\hbox{!}\dimen@ht\z@\advance\dimen@-1ex%
 \rlap{\raise.67\dimen@\hbox{\char23}}A}
```

The *command* will normally have been declared with `\DeclareTextAccent`, or as a one-argument `\DeclareTextCommand`.

The commands defined using the above declarations can be used in two ways. Normally they are used by just calling the command in the appropriate encoding, for example `\ss`. However, sometimes you may wish to use a command in an encoding where it is not defined. If the command has no arguments, then you can use it in another encoding by calling `\UseTextSymbol`:

```
\UseTextSymbol{<encoding>}{<command>}
```

For example, `\UseTextSymbol{OT1}{\ss}` has the same effect as:

```
{\fontencoding{OT1}\selectfont\ss}
```

If the command has one argument then you can use it in another encoding by calling `\UseTextAccent`:

```
\UseTextAccent{<encoding>}{<command>}{<text>}
```

For example, if the current encoding is OT2 then `\UseTextAccent{OT1}{\'}{a}` has the same effect as:

```
{\fontencoding{OT1}\selectfont\'{\fontencoding{OT2}\selectfont a}}
```

You can also declare a default definition for a text command, which will be used if the current encoding has no appropriate definition. Such use will also set the definition for this command in the current encoding to equal this default definition; this makes subsequent uses of the command much faster.

```
\DeclareTextCommandDefault{<command>}{<definition>}
```

For example, the default definition of the command `\textonequarter` (which produces the fraction  $\frac{1}{4}$ ) could be built using math mode:

```
\DeclareTextCommandDefault{\textonequarter}{\ensuremath {\frac{1}{4}}}
```

There is a matching `\Provide` command which will not override an existing default definition:

```
\ProvideTextCommandDefault{<command>}{<definition>}
```

The most common use for these commands is to use symbols from other encodings, so there are some optimizations provided:

```
\DeclareTextSymbolDefault{<command>}{<encoding>}
\DeclareTextAccentDefault{<command>}{<encoding>}
```

are short for:

```
\DeclareTextCommandDefault{<command>}
      {\UseTextSymbol{<encoding>}{<command>}}
\DeclareTextCommandDefault[1]{<command>}
      {\UseTextAccent{<encoding>}{<command>}{#1}}
```

For example, to make OT1 the default encoding for `\ss` and `\'` you say:

```
\DeclareTextSymbolDefault{\ss}{OT1}
\DeclareTextAccentDefault{\'}{OT1}
```

Note that you can use these commands on any zero- or one-argument commands declared with `\DeclareText*` or `\ProvideText*`, not just those defined using `\DeclareTextSymbol` or `\DeclareTextAccent`.

## 1.1 Removing encoding-specific commands

In some cases encoding definitions are given to provide some limited support since nothing better is available, for example, the definition for `\textdollar` in OT1 is a hack since \$ and £ actually share the same slot in this encoding. Thus if such a glyph becomes available in a different encoding (e.g., TS1) one would like to get rid of the flacky one and make the default definition point to the new encoding. In such a case defining

```
\DeclareTextSymbol{\textdollar}{TS1}{36}
\DeclareTextSymbolDefault{\textdollar}{TS1}
```

is not enough since if typesetting in OT1 L<sup>A</sup>T<sub>E</sub>X will still find the encoding specific-definition for OT1 and therefore ignore the new default. Therefore to ensure that in this case the TS1 version is used we have to remove the OT1 declaration:

```
\UndeclareTextCommand{\textdollar}{OT1}
```

Since the \$ sign is a proper glyph in the T1 encoding there is no point removing its definition and forcing L<sup>A</sup>T<sub>E</sub>X to pick up the TS1 version if typesetting in this encoding. However, assume you want to use the variant dollar sign, i.e., \$ for your dollars. In that case you have to get rid of the T1 declaration as well, e.g., the following would do that for you:

```
\UndeclareTextCommand{\textdollar}{OT1}
\UndeclareTextCommand{\textdollar}{T1}
\DeclareTextCommandDefault{\textdollar}
{\UseTextSymbol{TS1}\textdollaroldstyle}
```

## 1.2 The order of declarations

If an encoding-specific command is defined for more than one encoding, then it will execute fastest in the encoding in which it was defined last since its top-level definition will be set up to execute in that encoding without any overhead.

For this reason the file `fonttext.ltx` currently first loads the definitions for the T1 encoding and then those for the OT1 encoding so that typesetting in OT1 is optimized since that is (still) the default. However, when T1 is explicitly requested (via `\usepackage[T1]{fontenc}`) the top-level definitions are automatically changed to favour T1 since its declarations are reloaded in the process.

For the same reason default declarations should never come last since they are implemented as a special encoding themselves (with the name ?). Specifying them last would simply mean to make those encoding-specific commands equally inefficient in all encodings. Therefore the `textcomp` package, for example, first sets up all defaults to point to TS1 and then declares the commands in the TS1 encoding.

## 1.3 Docstrip modules

This `.dtx` file is be used to generate several related files containing font encoding definitions. The mutually exclusive docstrip options are listed here.

T1	generates <code>t1enc.def</code> for the Cork encoding.
TS1	generates <code>ts1enc.def</code> for the Text Companion encoding.
TS1sty	generates <code>textcomp.sty</code> , package that sets up use of the Text Companion encoding.
OT1	generates <code>ot1enc.def</code> for Knuth's CM encoding.
OMS	generates <code>omsenc.def</code> for Knuth's math symbol encoding.
OML	generates <code>omlenc.def</code> for Knuth's math letters encoding.
OT4	generates <code>ot4enc.def</code> for the Polish extension to the OT1 encoding, created by B. Jackowski and M. Ryćko for use with the Polish version of Computer Modern and Computer Concrete.
TU	generates <code>tuenc.def</code> for Unicode font encoding.
package	generates <code>fontenc.sty</code> for selecting encodings.
2ekernel	for the kernel commands.

## 1.4 Definitions for the kernel

### 1.4.1 Declaration commands

This section contains definitions for commands such as accents which depend on the current encoding. These commands will usually be kept in `.def` files, for example `ot1enc.def` contains the definitions for the OT1 encoding.

```
1 <*2ekernel>
2 \message{font encodings,}

Far too many macros in one block here!
```

```
\DeclareTextCommand
\ProvideTextCommand
\DeclareTextSymbol
  \@dec@text@cmd
\chardef@text@cmd
  \@changed@cmd
  \@changed@x
\TextSymbolUnavailable
  \@inmathwarn

If you say:
  \DeclareTextCommand{\foo}{T1}...

then \foo is defined to be \T1-cmd \foo \T1\foo, where \T1\foo is one control sequence, not two! We then call \newcommand to define \T1\foo.

3 \def\DeclareTextCommand{%
4   \@dec@text@cmd\newcommand}
5 \def\ProvideTextCommand{%
6   \@dec@text@cmd\providecommand}
7 \def\@dec@text@cmd#1#2#3{%
8   \expandafter\def\expandafter#2%
9     \expandafter{%
10      \csname#3-cmd\expandafter\endcsname
11      \expandafter#2%
12      \csname#3\string#2\endcsname
13    }%
14   \let\@ifdefinable\@rc@ifdefinable
15   \expandafter#1\csname#3\string#2\endcsname}
```

This command was introduced to fix a major bug in `\@dec@text@cmd` without changing that command itself. This was thought to be necessary because it is defined in more than one package. (Perhaps the more serious bug is to put complex low-level commands like this in packages?)

The problem it solves is that whereas both `\newcommand` and `\providecommand` (used just above) both handle the resetting of `\@ifdefinable` (following its disabling in `\@dec@text@cmd`), the primitive `\chardef` neither needs the disabling, nor does the resetting.

```
16 \def\chardef@text@cmd{%
17   \let\@ifdefinable\@@ifdefinable
18   \chardef
19 }
20 \def\DeclareTextSymbol#1#2#3{%
21   \@dec@text@cmd\chardef@text@cmd#1{#2}#3\relax
22 }
```

The declarations are only available before `\begin{document}`.

```
23 \@onlypreamble\DeclareTextCommand
24 \@onlypreamble\DeclareTextSymbol
```

The sneaky bit in all this is what `\T1-cmd \foo \T1\foo` does. There are five possibilities, depending on the current values of `\protect`, `\cf@encoding` and `\ifmmode`:

- If `\protect` is `\@typeset@protect` and `\cf@encoding` is T1, then we execute `\T1\foo`. This should be the normal behaviour, and is optimized for speed.
- If `\protect` is `\@typeset@protect`, `\cf@encoding` is (say) OT1, and `\OT1\foo` is defined, then we execute `\OT1\foo`.
- If `\protect` is `\@typeset@protect`, `\cf@encoding` is (say) OT1, we're in text mode, and `\OT1\foo` is undefined, then we define `\OT1\foo` to be the default value of `\foo`, and execute `\OT1\foo`.
- If `\protect` is `\@typeset@protect`, `\cf@encoding` is (say) OT1, we're in math mode, and `\OT1\foo` is undefined, then we execute the default value of `\foo`. (This is necessary so that things like `$X_\copyright$` work properly.)
- If `\protect` is not `\@typeset@protect` then we execute `\noexpand\foo`. For example, if we are writing to a file, then this results in `\foo` being written. If we are in a `\mark`, then `\foo` will be put in the mark—since `\foo` is robust, it will then survive all the things which may happen to it whilst it's a `\mark`.

So after all that, we will either execute the appropriate definition of `\foo` for the current encoding, or we will execute `\noexpand\foo`.

The default value of `\foo` is `\?\foo` if it is defined, and an error message otherwise.

When the encoding is changed from T1 to OT1, `\T1-cmd` is defined to be `\@changed@cmd` and `\OT1-cmd` is defined to be `\@current@cmd`. This means that the test for what the current encoding is can be performed quickly.

```

25 \def\@current@cmd#1{%
26   \ifx\protect\@typeset@protect
27     \@inmathwarn#1%
28   \else
29     \noexpand#1\expandafter\@gobble
30   \fi}

31 \def\@changed@cmd#1#2{%
32   \ifx\protect\@typeset@protect
33     \@inmathwarn#1%
34     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
35       \expandafter\ifx\csname ?\string#1\endcsname\relax
36         \expandafter\def\csname ?\string#1\endcsname{%
37           \TextSymbolUnavailable#1%
38         }%
39       \fi
40       \global\expandafter\let
41         \csname\cf@encoding\string#1\expandafter\endcsname
42         \csname ?\string#1\endcsname
43     \fi
44     \csname\cf@encoding\string#1%
45       \expandafter\endcsname
46   \else
47     \noexpand#1%
48   \fi}

49 \gdef\TextSymbolUnavailable#1{%
50   \@latex@error{%
51     Command \protect#1 unavailable in encoding \cf@encoding%
52   }\@eha}

```

The command `\@inmathwarn` produces a warning message if we are currently in math mode. Note that since this command is used inside text commands, it can't call `\relax` before the `\ifmmode`. This means that it is possible for the warning to fail to be issued at the beginning of a row of an `halign` whose template enters math mode. This is probably a bad feature, but there's not much that can be done about it, since adding a `\relax` would break ligatures and kerning between text symbols.

A more efficient solution would be to make `\@inmathwarn` and `\@inmatherr` equal to `\@empty` and `\relax` by default, and to have `\everymath` reset them to their usual definitions. This is left for future investigation (for example it may break some third party code).

```
53 \def\@inmathwarn#1{%
54   \ifmmode
55     \latex@warning{Command \protect#1 invalid in math mode}%
56   \fi}
```

*(End definition for \DeclareTextCommand and others. These functions are documented on page ??.)*

`\DeclareTextCommandDefault`  
`\ProvideTextCommandDefault`

These define commands with encoding ?.

Note that `\DeclareTextCommandDefault` can only be used in the preamble, but that the `\Provide` version is allowed in inputenc .def files, so is allowed anywhere.

```
57 \def\DeclareTextCommandDefault#1{%
58   \DeclareTextCommand#1?}

59 \def\ProvideTextCommandDefault#1{%
60   \ProvideTextCommand#1?}

61 \@onlypreamble\DeclareTextCommandDefault
62 %\@onlypreamble\ProvideTextCommandDefault
```

They require `\? -cmd` to be initialized as `\@changed@cmd`.

```
63 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
```

*(End definition for \DeclareTextCommandDefault and \ProvideTextCommandDefault. These functions are documented on page ??.)*

`\DeclareTextAccent`

This is just a disguise for defining a T<sub>E</sub>X `\accent` command.

```
64 \def\DeclareTextAccent#1#2#3{%
65   \DeclareTextCommand#1{#2}{\add@accent{#3}}}}

66 \@onlypreamble\DeclareTextAccent
```

*(End definition for \DeclareTextAccent. This function is documented on page ??.)*

`\add@accent`

To save space this code is shared between all text accents that are set using the `\accent` primitive. The argument is pre-set in a box so that any font loading that is needed is already done within the box. This is needed because font-loading involves grouping and that would prevent the accent mechanism from working so that the accent would not be positioned over the argument. Declarations that change the font should be allowed (only low-level ones are at present) inside the argument of an accent command, but not size changes, as they involve `\setbox` operations which also inhibit the mechanism of the `\accent` primitive.

Note that the whole process is within a group. For a detailed discussion of this reimplementaion and its deficiencies, see pr/3160.

```
67 \def\add@accent#1#2{\hmode\bgroup
```

Turn off the group in `\UseTextSymbol` in case this is used inside the argument of `\add@accent`.

```
68 \let\hmode@start@before@group\@firstofone
69 \setbox\@tempboxa\hbox{#2}
```

When presetting the argument in a box we record its `\spacefactor` for later use after the accent got typeset. This way something like `\‘A` gets the spacefactor of `A` (i.e., 999) rather than the default value of 1000.

```
70 \global\mathchardef\accent@spacefactor\spacefactor}%
```

The accent primitive doesn't allow things `\begingroup` to interfere between accent and base character. Therefore we need to avoid that (they are some hidden inside `\maybe@load@fontshape`). As we don't have to load the fontshape in this case (as that happened in the box above if necessary, we simply disable that part of the code temporarily. We also ignore `\ignorespaces` which has the same issue and may show up as part of `\normalfont` if that is used.

```
71 \let\maybe@load@fontshape\relax
72 \let\ignorespaces\relax
73 \accent#1 #2\egroup\spacefactor\accent@spacefactor}
```

Default definition for `\accent@spacefactor` prevents a horrible death of the above macro inside an unprotected `\edef`.

```
74 \let\accent@spacefactor\relax
```

(End definition for `\add@accent`. This function is documented on page ??.)

`\hmode@bgroup`

```
75 \def\hmode@bgroup{\leavevmode\bgroup}
```

(End definition for `\hmode@bgroup`. This function is documented on page ??.)

`\DeclareTextCompositeCommand` Another amusing game to play with `\expandafter`, `\csname`, and `\string`. When you say `\DeclareTextCompositeCommand{\foo}{T1}{a}{bar}`, we look to see if the expansion of `\T1\foo` begins with `\@text@composite`, and if it doesn't, we redefine `\T1\foo` to be:

```
\@text@composite@x
\@strip@args
#1 -> \@text@composite \T1\foo #1\@empty \@text@composite {...}
```

where `...` is the previous definition of `\T1\foo`. Finally, we define `\T1\foo-a` to expand to `bar`.

```
76 </2kernel>
77 <latexrelease>\IncludeInRelease{2017/04/15}{\DeclareTextCompositeCommand}
78 <latexrelease> {test for undeclared accent}%
79 <*2kernel | latexrelease>
80 \def\DeclareTextCompositeCommand#1#2#3#4{%
81 \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
82 \ifx\reserved@a\relax
83 \DeclareTextCommand#1{#2}{%
84 \@latex@error{\string#1 undeclared in encoding #2}\@eha}%
85 \@latex@info{Composite with undeclared \string#1 in encoding #2}%
86 \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
87 \fi
88 \expandafter\expandafter\expandafter\ifx
89 \expandafter\@car\reserved@a\relax\relax\@nil \@text@composite \else
90 \edef\reserved@b##1{%
```



```

91         \def\expandafter\noexpand
92         \csname#2\string#1\endcsname###1{%
93         \noexpand\@text@composite
94         \expandafter\noexpand\csname#2\string#1\endcsname
95         ###1\noexpand\@empty\noexpand\@text@composite
96         {##1}}}%
97     \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
98 \fi
99 \expandafter\def\csname\expandafter\string\csname
100     #2\endcsname\string#1-\string#3\@empty\endcsname{##1}%
101 }
102 </2ekernel | latexrelease>
103 <latexrelease>\EndIncludeInRelease
104 <latexrelease>\IncludeInRelease{0000/00/00}{\DeclareTextCompositeCommand}
105 <latexrelease>                                     {test for undeclared accent}%
106 <latexrelease>\def\DeclareTextCompositeCommand#1#2#3#4{%
107 <latexrelease> \expandafter\let\expandafter\reserved@a
108 <latexrelease>                                     \csname#2\string#1\endcsname
109 <latexrelease> \expandafter\expandafter\expandafter\ifx
110 <latexrelease> \expandafter\@car\reserved@a\relax\relax\@nil
111 <latexrelease>                                     \@text@composite \else
112 <latexrelease> \edef\reserved@b##1{%
113 <latexrelease> \def\expandafter\noexpand
114 <latexrelease> \csname#2\string#1\endcsname###1{%
115 <latexrelease> \noexpand\@text@composite
116 <latexrelease> \expandafter\noexpand\csname#2\string#1\endcsname
117 <latexrelease> ###1\noexpand\@empty\noexpand\@text@composite
118 <latexrelease> {##1}}}%
119 <latexrelease> \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
120 <latexrelease> \fi
121 <latexrelease> \expandafter\def\csname\expandafter\string\csname
122 <latexrelease>     #2\endcsname\string#1-\string#3\@empty\endcsname{##1}}
123 <latexrelease>\EndIncludeInRelease
124 <*2ekernel>
125 \@onlypreamble\DeclareTextCompositeCommand

```

This all works because:

```
\@text@composite \T1\foo A\@empty \@text@composite {...}
```

expands to `\T1\foo-A` if `\T1\foo-A` has been defined, and `{...}` otherwise.

Note that `\@text@composite` grabs the first token of the argument and puts just that in the csname. This is so that `\'\{ \textit{e} \}` will work—it checks whether `\T1\'-\textit{e}` is defined (which presumably it isn't) and so expands to `\{ \accent 1 \textit{e} \}`.

This trick won't always work, for example `\'\{ \itshape e \}` will expand to (with spaces added for clarity):

```
\csname \string \T1\' - \string { \itshape e } \@empty \endcsname
```

which will die pretty horribly. Unfortunately there's not much can be done about this if we're going to use `\csname` lookups as a fast way of accessing composites.

This has an unfortunate 'misfeature' though, which is that in the T1 encoding, `\'\{aa\}` produces á. This is not the expected behaviour, and should perhaps be fixed if the fix doesn't affect performance too badly.

Finally, it's worth noting that the `\@empty` is used in `\@text@composite` so that accents will work even when the argument is empty. If you say `\'{}`  then this looks up `\\T1\'-\@empty`, which ought to be `\relax`, and so all is well. If we didn't include the `\@empty`, then `\'{}`  would expand to:

```
\csname \string \T1\' - \string \endcsname
```

so the `\endcsname` would be `\string'ed` and the whole of the rest of the document would be put inside the `\csname`. This would not be good.

```
126 \def\@text@composite#1#2#3\@text@composite{%
127   \expandafter\@text@composite@x
128     \csname\string#1-\string#2\endcsname}
```

Originally the `\@text@composite@x` macro had two arguments and if `#1` was not `\relax` it was executed, otherwise `#2` was executed. All this happened within the `\ifx` code so that neither `#1` nor `#2` could have picked up any additional arguments from the input stream. This has now been changed using the typical `\@firstoftwo / \@secondoftwo` coding. This way the final expansion will happen without any `\else` or `\fi` intervening in the case that we need to get a further token from the input stream.

```
129 \def\@text@composite@x#1{%
130   \ifx#1\relax
131     \expandafter\@secondoftwo
132   \else
133     \expandafter\@firstoftwo
134   \fi
135   #1}
```

The command `\DeclareTextComposite` uses `\DeclareTextCompositeCommand` to declare a command which expands out to a single glyph.

```
136 \catcode\z@=11\relax
137 \def\DeclareTextComposite#1#2#3#4{%
138   \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
139   \bgroup
140     \lccode\z@#4%
141     \lowercase{%
142   \egroup
143     \reserved@a ^^@}}
144 \catcode\z@=15\relax
145 \@onlypreamble\DeclareTextComposite
```

*(End definition for \DeclareTextCompositeCommand and others. These functions are documented on page ??.)*

```
146 </2ekernel>
147 <*2ekernel | latexrelease>
148 <latexrelease>\IncludeInRelease{2019/10/01}%
149 <latexrelease>          {\UseTextAccent}{Make commands robust}%
```

<code>\UseTextAccent</code> <code>\UseTextSymbol</code> <code>\@use@text@encoding</code>	<p>These fragile commands access glyphs from different encodings. They use grotty low-level calls to the font selection scheme for speed, and in order to make sure that <code>\UseTextSymbol</code> doesn't do anything which you're not allowed to do between an <code>\accent</code> and its glyph.</p> <p>For a detailed discussion of this reimplementaion and its deficiencies, see pr/3160.</p>
------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

```

150 \DeclareRobustCommand*\UseTextAccent[3]{%
151   \hmode@start@before@group
152   {%
Turn off the group in \UseTextSymbol in case this is used inside the arguments of
\UseTextAccent.
153   \let\hmode@start@before@group\@firstofone
154   \let\@curr@enc\cf@encoding
155   \@use@text@encoding{#1}%
156   #2{\@use@text@encoding\@curr@enc#3}%
157   }}

158 \DeclareRobustCommand*\UseTextSymbol[2]{%
159   \hmode@start@before@group
160   {%
161     \def\@wrong@font@char{\MessageBreak
162       for \noexpand\symbol{'\string#2'}}%
163     \@use@text@encoding{#1}%
164     #2%
165   }%
166   }

167 </2ekernel | latexrelease>
168 <latexrelease>\EndIncludeInRelease
169 <latexrelease>\IncludeInRelease{0000/00/00}%
170 <latexrelease>          {\UseTextAccent}{Make commands robust}%
171 <latexrelease>
172 <latexrelease>\kernel@make@fragile\UseTextAccent
173 <latexrelease>\kernel@make@fragile\UseTextSymbol
174 <latexrelease>
175 <latexrelease>\EndIncludeInRelease
176 <*2ekernel>

```

Switch to a different text encoding without any grouping for use in `\UseTextAccent` or `\UseTextSymbol` (and for `\oldstylenums`).

```

177 \def\@use@text@encoding#1{%
178   \edef\f@encoding{#1}%
179   \xdef\font@name{%
180     \csname\curr@fontshape/\f@size\endcsname}%
181   \pickup@font
182   \font@name
183   \@@enc@update}

```

*(End definition for \UseTextAccent, \UseTextSymbol, and \@use@text@encoding. These functions are documented on page ??.)*

`\hmode@start@before@group` The `\hmode@start@before@group` starts hmode and should be immediately followed by an explicit `{...}`. Its purpose is to ensure that hmode is started before this group is opened. Inside `\add@accent` and `\UseTextAccent` it is redefined to remove this group so that it doesn't conflict with the `\accent` primitive.

For a detailed discussion see pr/3160.

```

184 \let\hmode@start@before@group\leavevmode

```

*(End definition for \hmode@start@before@group. This function is documented on page ??.)*

`\DeclareTextSymbolDefault` Some syntactic sugar. Again, these should probably be optimized for speed.

`\DeclareTextAccentDefault`

```

185 \def\DeclareTextSymbolDefault#1#2{%
186   \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}}
187 \def\DeclareTextAccentDefault#1#2{%
188   \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}}
189 \@onlypreamble\DeclareTextSymbolDefault
190 \@onlypreamble\DeclareTextAccentDefault

```

*(End definition for \DeclareTextSymbolDefault and \DeclareTextAccentDefault. These functions are documented on page ??.)*

`\UndeclareTextCommand` This command safely removes an encoding specific declaration for a given encoding. It is helpful if one intends to use the default definition always and therefore wants to get rid of a declaration for some specific encoding.

```

191 \def\UndeclareTextCommand#1#2{%

```

If there is no declaration for the current encoding do nothing. (This makes a hash table entry but without eTeX we can't do anything about that).

```

192   \expandafter\ifx\csname#2\string#1\endcsname\relax
193   \else

```

Else: throw away that declaration.

```

194     \global\expandafter\let\csname#2\string#1\endcsname
195     \@undefined

```

But this is unfortunately not enough, we have to take a look at the top-level definition of the encoding specific command which for a command `\foo` would look similar to `\T1-cmd \foo \T1\foo` (three tokens).

Of course, instead of `T1` one could see a different encoding name; which one depends the encoding for which `\foo` was declared last.

Now assume we have just removed the declaration for `\foo` in `T1` and the top-level of `\foo` expands to the above. Then we better change that pretty fast otherwise we do get an “undefined csname error” when we try to typeset `\foo` within `T1` instead of getting the default definition for `\foo`. And what is the best way to change that top-level definition? Well, the only “encoding” we know for sure will still be around is the default encoding denoted by `?`.

Thus in case the last token of the top-level expansion is now undefined we change the declaration to look like `\?-cmd \foo \?\foo` which is done by the following (readable?) code:

```

196   \expandafter\expandafter\expandafter
197   \ifx\expandafter\@thirdofthree#1\@undefined
198     \expandafter\gdef\expandafter#1\expandafter
199     {\csname ?-cmd\expandafter\endcsname\expandafter
200      #1\csname?\string#1\endcsname}%
201   \fi
202 \fi
203 }

```

```

204 \@onlypreamble\UndeclareTextCommand

```

*(End definition for \UndeclareTextCommand. This function is documented on page ??.)*

### 1.4.2 Hyphenation

`\patterns` We redefine `\patterns` and `\hyphenation` to allow the use of commands declared with  
`\@@patterns` `\DeclareText*` to be used inside them.  
`\hyphenation`  
`\@@hyphenation`

```
205 %\let\@@patterns\patterns
206 %\let\@@hyphenation\hyphenation
207 %\def\patterns{%
208 %   \bgroup
209 %     \let\protect\@empty
210 %     \let\@typeset@protect\@empty
211 %     \let\@changed@x\@changed@x@mouth
212 %   \afterassignment\egroup
213 %   \@@patterns
214 %}
215 %\def\hyphenation{%
216 %   \bgroup
217 %     \let\protect\@empty
218 %     \let\@typeset@protect\@empty
219 %     \let\@changed@x\@changed@x@mouth
220 %   \afterassignment\egroup
221 %   \@@hyphenation
222 %}
```

*(End definition for `\patterns` and others. These functions are documented on page ??.)*

### 1.4.3 Miscellania

`\a` The `\a` command is used to access the accent commands even when they have been redefined (for example by the `\tabbing` environment). Its internal name is `\@tabacckludge`.  
The `\string` within the `\csname` guards against something like `'` being active at the point of use.

```
223 \def\@tabacckludge#1{\expandafter\@changed@cmd
224                                     \csname\string#1\endcsname\relax}
225 \let\a=\@tabacckludge
```

*(End definition for `\a`. This function is documented on page ??.)*

### 1.4.4 Default encodings

We define the default encodings for most commands to be either OT1, OML or OMS. These defaults are in the kernel and therefore fonts with these encodings must be available unless these defaults are redefined elsewhere. Recall that the standard kernel loads the encoding files for these encodings, and also that for the T1 encoding.

The naming conventions in the kernel are not what we would use if we were starting from scratch... Those defined by DEK (like `\ae` and `\ss`) or by the T<sub>E</sub>X Users Group Technical Working Group on multi-lingual typesetting (like `\th` and `\ng`) have short names. Those which were added to the kernel in 1993 and early 1994 are named after their Adobe glyph names (like `\guillemotleft` and `\quotedblbase`). Unfortunately, this naming scheme won't work for all glyphs, since some names (like `\space`) are already used, and some (like `\endash`) are very likely to be defined by users. So we're now using the naming scheme of `\text` followed by the Adobe name, (like `\textendash` and `\textsterling`). Except that some glyphs don't have Adobe names, so we're using the names used by fontinst for those (like `\textcompwordmark`). Sigh.

Some accents from OT1:

```
226 \DeclareTextAccentDefault{"}{OT1}
227 \DeclareTextAccentDefault{'}{OT1}
228 \DeclareTextAccentDefault{.}{OT1}
229 \DeclareTextAccentDefault{=}{OT1}
230 \DeclareTextAccentDefault{H}{OT1}
231 \DeclareTextAccentDefault{^}{OT1}
232 \DeclareTextAccentDefault{'}{OT1}
233 \DeclareTextAccentDefault{b}{OT1}
234 \DeclareTextAccentDefault{c}{OT1}
235 \DeclareTextAccentDefault{d}{OT1}
236 \DeclareTextAccentDefault{r}{OT1}
237 \DeclareTextAccentDefault{u}{OT1}
238 \DeclareTextAccentDefault{v}{OT1}
239 \DeclareTextAccentDefault{~}{OT1}
```

Some symbols from OT1:

```
240 %\DeclareTextSymbolDefault{AA}{OT1}
241 \DeclareTextSymbolDefault{AE}{OT1}
242 \DeclareTextSymbolDefault{L}{OT1}
243 \DeclareTextSymbolDefault{OE}{OT1}
244 \DeclareTextSymbolDefault{O}{OT1}
245 %\DeclareTextSymbolDefault{aa}{OT1}
246 \DeclareTextSymbolDefault{ae}{OT1}
247 \DeclareTextSymbolDefault{i}{OT1}
248 \DeclareTextSymbolDefault{j}{OT1}

249 \DeclareTextSymbolDefault{ij}{OT1}
250 \DeclareTextSymbolDefault{IJ}{OT1}

251 \DeclareTextSymbolDefault{l}{OT1}
252 \DeclareTextSymbolDefault{oe}{OT1}
253 \DeclareTextSymbolDefault{o}{OT1}
254 \DeclareTextSymbolDefault{ss}{OT1}
255 \DeclareTextSymbolDefault{textdollar}{OT1}
256 \DeclareTextSymbolDefault{textemdash}{OT1}
257 \DeclareTextSymbolDefault{textendash}{OT1}
258 \DeclareTextSymbolDefault{textexclamdown}{OT1}
259 %\DeclareTextSymbolDefault{texthyphenchar}{OT1}
260 %\DeclareTextSymbolDefault{texthyphen}{OT1}
261 \DeclareTextSymbolDefault{textquestiondown}{OT1}
262 \DeclareTextSymbolDefault{textquotedblleft}{OT1}
263 \DeclareTextSymbolDefault{textquotedblright}{OT1}
264 \DeclareTextSymbolDefault{textquoteleft}{OT1}
265 \DeclareTextSymbolDefault{textquoteright}{OT1}
266 \DeclareTextSymbolDefault{textsterling}{OT1}
```

Some symbols from OMS:

```
267 \DeclareTextSymbolDefault{textasteriskcentered}{OMS}
268 \DeclareTextSymbolDefault{textbackslash}{OMS}
269 \DeclareTextSymbolDefault{textbar}{OMS}
270 \DeclareTextSymbolDefault{textbardbl}{OMS}
271 \DeclareTextSymbolDefault{textbraceleft}{OMS}
272 \DeclareTextSymbolDefault{textbraceright}{OMS}
273 \DeclareTextSymbolDefault{textbullet}{OMS}
```

```

274 \DeclareTextSymbolDefault{\textdaggerdbl}{OMS}
275 \DeclareTextSymbolDefault{\textdagger}{OMS}
276 \DeclareTextSymbolDefault{\textparagraph}{OMS}
277 \DeclareTextSymbolDefault{\textperiodcentered}{OMS}
278 \DeclareTextSymbolDefault{\textsection}{OMS}
279 \DeclareTextAccentDefault{\textcircled}{OMS}

```

Some symbols from OML:

```

280 \DeclareTextSymbolDefault{\textless}{OML}
281 \DeclareTextSymbolDefault{\textgreater}{OML}
282 \DeclareTextAccentDefault{\t}{OML}

```

Some defaults we can fake.

The interface for defining `\copyright` changed, it used to use `\expandafter` to add braces at the appropriate points.

```

283 \DeclareTextCommandDefault{\textcopyright}{\textcircled{c}}
284 % \expandafter\def\expandafter
285 % \copyright\expandafter{\expandafter{\copyright}}

286 \DeclareTextCommandDefault{\textasciicircum}{\^{}{}}
287 \DeclareTextCommandDefault{\textasciitilde}{\~{}{}}
288 \DeclareTextCommandDefault{\textunderscore}{%
289 \leavevmode \kern.06em\vbox{\hrule\@width.3em}}

```

There is no good reason anymore to fake `\textcompwordmark`.

```

290 %\DeclareTextCommandDefault{\textcompwordmark}{\leavevmode\kern\z@}
291 \DeclareTextSymbolDefault{\textcompwordmark}{T1}

292 \DeclareTextCommandDefault{\textvisiblespace}{%
293 \mbox{\kern.06em\vrule \@height.3ex}%
294 \vbox{\hrule \@width.3em}%
295 \hbox{\vrule \@height.3ex}}

```

Using `\fontdimen3` in the next definition is some sort of a kludge (since it is the interword stretch) but it makes the ellipsis come out right in mono-spaced fonts too (since there it is zero).

```

296 \DeclareTextCommandDefault{\textellipsis}{%
297 .\kern\fontdimen3\font
298 .\kern\fontdimen3\font
299 .\kern\fontdimen3\font}

300 %\DeclareTextCommandDefault{\textregistered}{\textcircled{\scshape r}}
301 \DeclareTextCommandDefault{\textregistered}{\textcircled{%
302 \check@mathfonts\fontsize\sf@size\z@\math@fontsfalse\selectfont R}}
303 \DeclareTextCommandDefault{\texttrademark}{\textsuperscript{TM}}
304 \DeclareTextCommandDefault{\SS}{SS}

305 \DeclareTextCommandDefault{\textordfeminine}{\textsuperscript{a}}
306 \DeclareTextCommandDefault{\textordmasculine}{\textsuperscript{o}}

```

### 1.4.5 Math material

Some commands can be used in both text and math mode:

```
307 \DeclareRobustCommand{\$}{\ifmmode\mathdollar\else\textdollar\fi}
```

We use `\protected` not `\DeclareRobustCommand` so that `\bigl\{` etc. works inside `\protected@edef`.

```
308 \protected\def{{\ifmmode\lbrace\else\textbraceleft\fi}
```

```
309 \protected\def\}{\ifmmode\rbrace\else\textbraceright\fi}
```

```
310 \DeclareRobustCommand{\P}{\ifmmode\mathparagraph\else\textparagraph\fi}
```

```
311 \DeclareRobustCommand{\S}{\ifmmode\mathsection\else\textsection\fi}
```

```
312 \DeclareRobustCommand{\dag}{\ifmmode{\dagger}\else\textdagger\fi}
```

```
313 \DeclareRobustCommand{\ddag}{\ifmmode{\ddagger}\else\textdaggerdbl\fi}
```

For historical reasons `\copyright` needs `{}` around the definition in maths.

```
314 \DeclareRobustCommand{\_}{%
```

```
315   \ifmmode\nfss@text{\textunderscore}\else\textunderscore\fi}
```

```
316 \DeclareRobustCommand{\copyright}{%
```

```
317   \ifmmode{\nfss@text{\textcopyright}}\else\textcopyright\fi}
```

```
318 \DeclareRobustCommand{\pounds}{%
```

```
319   \ifmmode\mathsterling\else\textsterling\fi}
```

```
320 \DeclareRobustCommand{\dots}{%
```

```
321   \ifmmode\mathellipsis\else\textellipsis\fi}
```

```
322 \let\ldots\dots
```

Default definition of the `commabelow` accent.

```
323 </2ekernel>
```

```
324 <latexrelease>\IncludeInRelease{2015/10/01}{\textcommabelow}{comma accent}%
```

```
325 <*2ekernel | latexrelease>
```

```
326 \DeclareTextCommandDefault\textcommabelow[1]
```

```
327   {\hmode\bgroup\oalign{\null#1\crr\hidewidth\raise-.31ex
```

```
328     \hbox{\check@mathfonts\fontsize\ssf@size\z@
```

```
329     \math@fontsfalse\selectfont,}\hidewidth}\egroup}
```

```
330 <latexrelease>\EndIncludeInRelease
```

```
331 </2ekernel | latexrelease>
```

```
332 <latexrelease>\IncludeInRelease{0000/00/00}{\textcommabelow}{comma accent}%
```

```
333 <latexrelease>\let\textcommabelow@undefined
```

```
334 <latexrelease>\expandafter
```

```
335 <latexrelease> \let\csname\string\T1\string\c-G\endcsname@undefined
```

```
336 <latexrelease>\expandafter
```

```
337 <latexrelease> \let\csname\string\T1\string\c-K\endcsname@undefined
```

```
338 <latexrelease>\expandafter
```

```
339 <latexrelease> \let\csname\string\T1\string\c-k\endcsname@undefined
```

```
340 <latexrelease>\expandafter
```

```
341 <latexrelease> \let\csname\string\T1\string\c-L\endcsname@undefined
```

```
342 <latexrelease>\expandafter
```

```
343 <latexrelease> \let\csname\string\T1\string\c-l\endcsname@undefined
```

```
344 <latexrelease>\expandafter
```

```
345 <latexrelease> \let\csname\string\T1\string\c-N\endcsname@undefined
```

```
346 <latexrelease>\expandafter
```

```
347 <latexrelease> \let\csname\string\T1\string\c-n\endcsname@undefined
```

```
348 <latexrelease>\expandafter
```

```
349 <latexrelease> \let\csname\string\T1\string\c-R\endcsname@undefined
```



```

350 <latexrelease>\expandafter
351 <latexrelease> \let\cename\string\T1\string\c-r\endcsname\@undefined
352 <latexrelease>\EndIncludeInRelease

    Default definition of the commaabove accent(E.G.).

353 <latexrelease>\IncludeInRelease{2016/02/01}{\textcommaabove}{comma above}%
354 <*2ekernel | latexrelease>
355 \DeclareTextCommandDefault\textcommaabove[1]{%
356   \hmode\bgroup
357   \ooalign{%
358     \hidewidth
359     \raise.7ex\hbox{%
360       \check@mathfonts\fontsize\ssf@size\z@\math@fontsfalse\selectfont‘%
361     }%
362     \hidewidth\crrcr
363     \null#1\crrcr
364   }%
365   \egroup
366 }
367 <latexrelease>\EndIncludeInRelease
368 </2ekernel | latexrelease>
369 <latexrelease>\IncludeInRelease{0000/00/00}{\textcommaabove}{comma above}%
370 <latexrelease>\let\textcommaabove\@undefined
371 <latexrelease>\expandafter
372 <latexrelease> \let\cename\string\OT1\string\c-g\endcsname\@undefined
373 <latexrelease>\expandafter
374 <latexrelease> \let\cename\string\T1\string\c-g\endcsname\@undefined
375 <latexrelease>\EndIncludeInRelease

```

## 1.5 Definitions for the OT1 encoding

The definitions for the ‘T<sub>E</sub>X text’ (OT1) encoding.

Declare the encoding.

```

376 <*OT1>
377 \DeclareFontEncoding{OT1}{-}{-}

```

Declare the accents.

```

378 \DeclareTextAccent{"}{OT1}{127}
379 \DeclareTextAccent{'}{OT1}{19}
380 \DeclareTextAccent{.}{OT1}{95}
381 \DeclareTextAccent{=}{OT1}{22}
382 \DeclareTextAccent{^}{OT1}{94}
383 \DeclareTextAccent{'}{OT1}{18}
384 \DeclareTextAccent{\~}{OT1}{126}
385 \DeclareTextAccent{\H}{OT1}{125}
386 \DeclareTextAccent{\u}{OT1}{21}
387 \DeclareTextAccent{\v}{OT1}{20}
388 \DeclareTextAccent{\r}{OT1}{23}

```

Some accents have to be built by hand: Note that `\ooalign` and `\o@lign` must be inside a group. In these definitions we no longer use the helper function `\sh@ft` from `plain.tex` since that now has two incompatible definitions.

```

389 \DeclareTextCommand{\b}{OT1}[1]
390   {\hmode\bgroup\o@lign{\relax#1\crrcr\hidewidth\ltx@sh@ft{-3ex}}%

```

```

391 \vbox to.2ex{\hbox{\char22}\vss}\hidewidth}\egroup}
392 \DeclareTextCommand{\c}{OT1}[1]
393 {\leavevmode\setbox\z@\hbox{#1}\ifdim\ht\z@=1ex\accent24 #1%
394 \else\oalign{\unhbox\z@\cr\hidewidth\char24\hidewidth}}\fi}
395 \DeclareTextCommand{\d}{OT1}[1]
396 {\hmode\bgroup
397 \o@lign{\relax#1\cr\hidewidth\ltx@sh@ft{-1ex}.\hidewidth}\egroup}

```

Declare the text symbols.

```

398 \DeclareTextSymbol{\AE}{OT1}{29}
399 \DeclareTextSymbol{\OE}{OT1}{30}
400 \DeclareTextSymbol{\O}{OT1}{31}
401 \DeclareTextSymbol{\ae}{OT1}{26}
402 \DeclareTextSymbol{\i}{OT1}{16}
403 \DeclareTextSymbol{\j}{OT1}{17}
404 \DeclareTextSymbol{\oe}{OT1}{27}
405 \DeclareTextSymbol{\o}{OT1}{28}
406 \DeclareTextSymbol{\ss}{OT1}{25}
407 \DeclareTextSymbol{\textemdash}{OT1}{124}
408 \DeclareTextSymbol{\textendash}{OT1}{123}

```

Using the ligatures helps with OT1 fonts that have `\textexclamdown` and `\textquestiondown` in unusual positions.

```

409 %\DeclareTextSymbol{\textexclamdown}{OT1}{60}
410 %\DeclareTextSymbol{\textquestiondown}{OT1}{62}
411 \DeclareTextCommand{\textexclamdown}{OT1}{!'}
412 \DeclareTextCommand{\textquestiondown}{OT1}{?' }
413 %\DeclareTextSymbol{\textthyphenchar}{OT1}{'-}
414 %\DeclareTextSymbol{\textthyphen}{OT1}{'-}
415 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
416 \DeclareTextSymbol{\textquotedblright}{OT1}{'\'}
417 \DeclareTextSymbol{\textquoteleft}{OT1}{'\'}
418 \DeclareTextSymbol{\textquoteright}{OT1}{'\'}

```

Some symbols which are faked from others:

```

419 % \DeclareTextCommand{\aa}{OT1}
420 % {{\accent23a}}
421 \DeclareTextCommand{\L}{OT1}
422 {\leavevmode\setbox\z@\hbox{L}\hb@xt@\wd\z@{\hss\@xxxii L}}
423 \DeclareTextCommand{\l}{OT1}
424 {\hmode\bgroup\@xxxii l\egroup}
425 % \DeclareTextCommand{\AA}{OT1}
426 % {\leavevmode\setbox\z@\hbox{h}\dimen@ht\z@\advance\dimen@-1ex%
427 % \rlap{\raise.67\dimen@\hbox{\char23}}A}

```

In the OT1 encoding Å has a hand-crafted definition, so we have here the first recorded explicit use of `\DeclareTextCompositeCommand`.

```

428 \DeclareTextCompositeCommand{\r}{OT1}{A}
429 {\leavevmode\setbox\z@\hbox{!}\dimen@ht\z@\advance\dimen@-1ex%
430 \rlap{\raise.67\dimen@\hbox{\char23}}A}

```

The dutch language uses the letter ‘ij’. It is available in T1 encoded fonts, but not in the OT1 encoded fonts. Therefore we fake it for the OT1 encoding.

```

431 \DeclareTextCommand{\ij}{OT1}{%
432 \nobreak\hskip\z@skip i\kern-0.02em j\nobreak\hskip\z@skip}
433 \DeclareTextCommand{\IJ}{OT1}{%

```

```

434 \nobreak\hskip\z@skip I\kern-0.02em J\nobreak\hskip\z@skip}

```

In the OT1 encoding, £ and \$ share a slot.

```

435 \DeclareTextCommand{\textdollar}{OT1}{\hmode@bgroup
436   \ifdim \fontdimen\@ne\font >\z@
437     \slshape
438   \else
439     \upshape
440   \fi
441   \char'\$ \egroup}
442 \DeclareTextCommand{\textsterling}{OT1}{\hmode@bgroup
443   \ifdim \fontdimen\@ne\font >\z@
444     \itshape
445   \else
446     \fontshape{ui}\selectfont
447   \fi
448   \char'\$ \egroup}

```

Here we are adding some more composite commands to the OT1 encoding. This makes the use of certain accents with i compatible with their use with the T1 encoding; this enables them to become true L<sup>A</sup>T<sub>E</sub>X internal representations. However, it will make these accents work a little less fast since a check will always be made for the existence of a composite.

```

449 \DeclareTextComposite{\.}{OT1}{i}{\i}
450 \DeclareTextComposite{\.}{OT1}{i}{\i}
451 \DeclareTextCompositeCommand{\'}{OT1}{i}{\@tabacckludge'\i}
452 \DeclareTextCompositeCommand{\'}{OT1}{i}{\@tabacckludge'\i}
453 \DeclareTextCompositeCommand{\^}{OT1}{i}{\^i}
454 \DeclareTextCompositeCommand{\^}{OT1}{i}{\^i}

```

T1 encoding is given more extensive set of overloads for \c But here we just adjust \c{g}.

```

455 \ifx\textcommaabove\undefined\else
456 \DeclareTextCompositeCommand{\c}{OT1}{g}{\textcommaabove{g}}
457 \fi
458 </OT1>

```

## 1.6 Definitions for the T1 encoding

The definitions for the ‘Extended T<sub>E</sub>X text’ (T1) encoding.

Declare the encoding.

```

459 <*T1>
460 \DeclareFontEncoding{T1}{\}{}

```

Declare the accents.

```

461 \DeclareTextAccent{\'}{T1}{0}
462 \DeclareTextAccent{\'}{T1}{1}
463 \DeclareTextAccent{\^}{T1}{2}
464 \DeclareTextAccent{\^}{T1}{3}
465 \DeclareTextAccent{\^}{T1}{4}
466 \DeclareTextAccent{\^}{T1}{5}
467 \DeclareTextAccent{\r}{T1}{6}
468 \DeclareTextAccent{\v}{T1}{7}

```

```

469 \DeclareTextAccent{\u}{T1}{8}
470 \DeclareTextAccent{\=}{T1}{9}
471 \DeclareTextAccent{\.}{T1}{10}

```

Some accents have to be built by hand. Note that `\ooalign` and `\oalign` must be inside a group. In these definitions we no longer use the helper function `\sh@ft` from `plain.tex` since that now has two incompatible definitions.

```

472 \DeclareTextCommand{\b}{T1}[1]
473   {\hmode\bgroup\oalign{\relax#1\crcr\hidewidth\ltx@sh@ft{-3ex}%
474     \vbox to.2ex{\hbox{\char9}\vss}\hidewidth}\egroup}
475 \DeclareTextCommand{\c}{T1}[1]
476   {\leavevmode\setbox\z@\hbox{#1}\ifdim\ht\z@=1ex\accent11 #1%
477     \else{\ooalign{\unhbox\z@\crcr
478       \hidewidth\char11\hidewidth}}\fi}
479 \DeclareTextCommand{\d}{T1}[1]
480   {\hmode\bgroup
481     \oalign{\relax#1\crcr\hidewidth\ltx@sh@ft{-1ex}.\hidewidth}\egroup}
482 \DeclareTextCommand{\k}{T1}[1]
483   {\hmode\bgroup\ooalign{\null#1\crcr\hidewidth\char12}\egroup}
484 \DeclareTextCommand{\textogonekcentered}{T1}[1]
485   {\hmode\bgroup\ooalign{%
486     \null#1\crcr\hidewidth\char12\hidewidth}\egroup}

```

Some symbols are constructed.

Slot 24 contains a small circle intended for construction of these two glyphs.

```

487 \DeclareTextCommand{\textperthousand}{T1}
488   {\%\char 24 } % space or 'relax as delimiter?
489 \DeclareTextCommand{\textpertenthousand}{T1}
490   {\%\char 24\char 24 } % space or 'relax as delimiter?

```

For Maltese, `\Hwithstroke` and `\hwithstroke` are needed.

```

491 \DeclareTextCommand{\Hwithstroke}{T1}
492   {%
493     \hmode\bgroup
494     \vphantom{H}%
495     \sbox\z@{H}%
496     \ooalign{%
497       H\cr
498       \hidewidth
499       \vrule
500       height \dimexpr 0.7\ht\z@+0.1ex\relax
501       depth -0.7\ht\z@
502       width 0.8\wd\z@
503       \hidewidth\cr
504     }%
505     \egroup
506   }
507 \DeclareTextCommand{\hwithstroke}{T1}
508   {%
509     \hmode\bgroup
510     \vphantom{h}%
511     \sbox\z@{h}%
512     \ooalign{%
513       h\cr

```

```

514     \kern0.075\wd\z@
515     \vrule
516         height \dimexpr 0.7\ht\z@+0.1ex\relax
517         depth  -0.7\ht\z@
518         width   0.4\wd\z@
519     \hidewidth\cr
520 }%
521 \egroup
522 }

```

Declare the text symbols.

```

523 %\DeclareTextSymbol{\AA}{T1}{197}
524 \DeclareTextSymbol{\AE}{T1}{198}
525 \DeclareTextSymbol{\DH}{T1}{208}
526 \DeclareTextSymbol{\DJ}{T1}{208}
527 \DeclareTextSymbol{\L}{T1}{138}
528 \DeclareTextSymbol{\NG}{T1}{141}
529 \DeclareTextSymbol{\OE}{T1}{215}
530 \DeclareTextSymbol{\O}{T1}{216}
531 \DeclareTextSymbol{\SS}{T1}{223}
532 \DeclareTextSymbol{\TH}{T1}{222}
533 %\DeclareTextSymbol{\aa}{T1}{229}
534 \DeclareTextSymbol{\ae}{T1}{230}
535 \DeclareTextSymbol{\dh}{T1}{240}
536 \DeclareTextSymbol{\dj}{T1}{158}

537 \DeclareTextSymbol{\guillemetleft}{T1}{19}
538 \DeclareTextSymbol{\guillemetright}{T1}{20}
539 % old Adobe names
540 \DeclareTextSymbol{\guillemotleft}{T1}{19}
541 \DeclareTextSymbol{\guillemotright}{T1}{20}

542 \DeclareTextSymbol{\guilsinglleft}{T1}{14}
543 \DeclareTextSymbol{\guilsinglright}{T1}{15}
544 \DeclareTextSymbol{\i}{T1}{25}
545 \DeclareTextSymbol{\j}{T1}{26}
546 \DeclareTextSymbol{\ij}{T1}{188}
547 \DeclareTextSymbol{\IJ}{T1}{156}
548 \DeclareTextSymbol{\l}{T1}{170}
549 \DeclareTextSymbol{\ng}{T1}{173}
550 \DeclareTextSymbol{\oe}{T1}{247}
551 \DeclareTextSymbol{\o}{T1}{248}
552 \DeclareTextSymbol{\quotedblbase}{T1}{18}
553 \DeclareTextSymbol{\quotesinglbase}{T1}{13}
554 \DeclareTextSymbol{\ss}{T1}{255}
555 \DeclareTextSymbol{\textasciicircum}{T1}{'\^}
556 \DeclareTextSymbol{\textasciitilde}{T1}{'\~}
557 \DeclareTextSymbol{\textbackslash}{T1}{'\}
558 \DeclareTextSymbol{\textbar}{T1}{'|}
559 \DeclareTextSymbol{\textbraceleft}{T1}{'\{ }
560 \DeclareTextSymbol{\textbraceright}{T1}{'\} }
561 \DeclareTextSymbol{\textcompwordmark}{T1}{23}
562 \DeclareTextSymbol{\textdollar}{T1}{'\$}
563 \DeclareTextSymbol{\textendash}{T1}{22}
564 \DeclareTextSymbol{\textendash}{T1}{21}

```

```

565 \DeclareTextSymbol{\textexclamdown}{T1}{189}
566 \DeclareTextSymbol{\textgreater}{T1}{'\>}
567 %\DeclareTextSymbol{\textthyphenchar}{T1}{127}
568 %\DeclareTextSymbol{\textthyphen}{T1}{'\-}
569 \DeclareTextSymbol{\textless}{T1}{'\<}
570 \DeclareTextSymbol{\textquestiondown}{T1}{190}
571 \DeclareTextSymbol{\textquotedblleft}{T1}{16}
572 \DeclareTextSymbol{\textquotedblright}{T1}{17}
573 \DeclareTextSymbol{\textquotedbl}{T1}{'" }
574 \DeclareTextSymbol{\textquoteleft}{T1}{'\'}
575 \DeclareTextSymbol{\textquoteright}{T1}{'\'}
576 \DeclareTextSymbol{\textsection}{T1}{159}
577 \DeclareTextSymbol{\textsterling}{T1}{191}
578 \DeclareTextSymbol{\textunderscore}{T1}{95}
579 \DeclareTextSymbol{\textvisiblespace}{T1}{32}
580 \DeclareTextSymbol{\th}{T1}{254}

```

Declare the composites.

```

581 \DeclareTextComposite{\.}{T1}{i}{'\i}
582 \DeclareTextComposite{\.}{T1}{i}{'\i}
"80 = 128
583 \DeclareTextComposite{\u}{T1}{A}{128}
584 \DeclareTextComposite{\k}{T1}{A}{129}
585 \DeclareTextComposite{\'}{T1}{C}{130}
586 \DeclareTextComposite{\v}{T1}{C}{131}
587 \DeclareTextComposite{\v}{T1}{D}{132}
588 \DeclareTextComposite{\v}{T1}{E}{133}
589 \DeclareTextComposite{\k}{T1}{E}{134}
590 \DeclareTextComposite{\u}{T1}{G}{135}
"88 = 136
591 \DeclareTextComposite{\'}{T1}{L}{136}
592 \DeclareTextComposite{\v}{T1}{L}{137}
593 \DeclareTextComposite{\'}{T1}{N}{139}
594 \DeclareTextComposite{\v}{T1}{N}{140}
595 \DeclareTextComposite{\H}{T1}{O}{142}
596 \DeclareTextComposite{\'}{T1}{R}{143}
"90 = 144
597 \DeclareTextComposite{\v}{T1}{R}{144}
598 \DeclareTextComposite{\'}{T1}{S}{145}
599 \DeclareTextComposite{\v}{T1}{S}{146}
600 \DeclareTextComposite{\c}{T1}{S}{147}
601 \DeclareTextComposite{\v}{T1}{T}{148}
602 \DeclareTextComposite{\c}{T1}{T}{149}
603 \DeclareTextComposite{\H}{T1}{U}{150}
604 \DeclareTextComposite{\r}{T1}{U}{151}
"98 = 152
605 \DeclareTextComposite{\"}{T1}{Y}{152}
606 \DeclareTextComposite{\'}{T1}{Z}{153}
607 \DeclareTextComposite{\v}{T1}{Z}{154}
608 \DeclareTextComposite{\.}{T1}{Z}{155}
609 \DeclareTextComposite{\.}{T1}{I}{157}

```

```

"A0 = 160
610 \DeclareTextComposite{\u}{T1}{a}{160}
611 \DeclareTextComposite{\k}{T1}{a}{161}
612 \DeclareTextComposite{\'}{T1}{c}{162}
613 \DeclareTextComposite{\v}{T1}{c}{163}
614 \DeclareTextComposite{\v}{T1}{d}{164}
615 \DeclareTextComposite{\v}{T1}{e}{165}
616 \DeclareTextComposite{\k}{T1}{e}{166}
617 \DeclareTextComposite{\u}{T1}{g}{167}
"A8 = 168
618 \DeclareTextComposite{\'}{T1}{l}{168}
619 \DeclareTextComposite{\v}{T1}{l}{169}
620 \DeclareTextComposite{\'}{T1}{n}{171}
621 \DeclareTextComposite{\v}{T1}{n}{172}
622 \DeclareTextComposite{\H}{T1}{o}{174}
623 \DeclareTextComposite{\'}{T1}{r}{175}
"B0 = 176
624 \DeclareTextComposite{\v}{T1}{r}{176}
625 \DeclareTextComposite{\'}{T1}{s}{177}
626 \DeclareTextComposite{\v}{T1}{s}{178}
627 \DeclareTextComposite{\c}{T1}{s}{179}
628 \DeclareTextComposite{\v}{T1}{t}{180}
629 \DeclareTextComposite{\c}{T1}{t}{181}
630 \DeclareTextComposite{\H}{T1}{u}{182}
631 \DeclareTextComposite{\r}{T1}{u}{183}
"B8 = 184
632 \DeclareTextComposite{\"}{T1}{y}{184}
633 \DeclareTextComposite{\'}{T1}{z}{185}
634 \DeclareTextComposite{\v}{T1}{z}{186}
635 \DeclareTextComposite{\.}{T1}{z}{187}
"C0 = 192
636 \DeclareTextComposite{\'}{T1}{A}{192}
637 \DeclareTextComposite{\'}{T1}{A}{193}
638 \DeclareTextComposite{\^}{T1}{A}{194}
639 \DeclareTextComposite{\~}{T1}{A}{195}
640 \DeclareTextComposite{\"}{T1}{A}{196}
641 \DeclareTextComposite{\r}{T1}{A}{197}
642 \DeclareTextComposite{\c}{T1}{C}{199}
"C8 = 200
643 \DeclareTextComposite{\'}{T1}{E}{200}
644 \DeclareTextComposite{\'}{T1}{E}{201}
645 \DeclareTextComposite{\^}{T1}{E}{202}
646 \DeclareTextComposite{\"}{T1}{E}{203}
647 \DeclareTextComposite{\'}{T1}{I}{204}
648 \DeclareTextComposite{\'}{T1}{I}{205}
649 \DeclareTextComposite{\^}{T1}{I}{206}
650 \DeclareTextComposite{\"}{T1}{I}{207}
"D0 = 208
651 \DeclareTextComposite{\~}{T1}{N}{209}
652 \DeclareTextComposite{\'}{T1}{O}{210}

```

```

653 \DeclareTextComposite{\'}{T1}{0}{211}
654 \DeclareTextComposite{\^}{T1}{0}{212}
655 \DeclareTextComposite{\~}{T1}{0}{213}
656 \DeclareTextComposite{\"}{T1}{0}{214}
"D8 = 216
657 \DeclareTextComposite{\'}{T1}{U}{217}
658 \DeclareTextComposite{\^}{T1}{U}{218}
659 \DeclareTextComposite{\~}{T1}{U}{219}
660 \DeclareTextComposite{\"}{T1}{U}{220}
661 \DeclareTextComposite{\'}{T1}{Y}{221}
"E0 = 224
662 \DeclareTextComposite{\'}{T1}{a}{224}
663 \DeclareTextComposite{\^}{T1}{a}{225}
664 \DeclareTextComposite{\~}{T1}{a}{226}
665 \DeclareTextComposite{\~}{T1}{a}{227}
666 \DeclareTextComposite{\"}{T1}{a}{228}
667 \DeclareTextComposite{\r}{T1}{a}{229}
668 \DeclareTextComposite{\c}{T1}{c}{231}
"E8 = 232
669 \DeclareTextComposite{\'}{T1}{e}{232}
670 \DeclareTextComposite{\^}{T1}{e}{233}
671 \DeclareTextComposite{\~}{T1}{e}{234}
672 \DeclareTextComposite{\"}{T1}{e}{235}
673 \DeclareTextComposite{\'}{T1}{i}{236}
674 \DeclareTextComposite{\'}{T1}{\i}{236}
675 \DeclareTextComposite{\^}{T1}{i}{237}
676 \DeclareTextComposite{\^}{T1}{\i}{237}
677 \DeclareTextComposite{\~}{T1}{i}{238}
678 \DeclareTextComposite{\~}{T1}{\i}{238}
679 \DeclareTextComposite{\"}{T1}{i}{239}
680 \DeclareTextComposite{\"}{T1}{\i}{239}
"F0 = 240
681 \DeclareTextComposite{\~}{T1}{n}{241}
682 \DeclareTextComposite{\'}{T1}{o}{242}
683 \DeclareTextComposite{\^}{T1}{o}{243}
684 \DeclareTextComposite{\~}{T1}{o}{244}
685 \DeclareTextComposite{\~}{T1}{o}{245}
686 \DeclareTextComposite{\"}{T1}{o}{246}
"F8 = 248
687 \DeclareTextComposite{\'}{T1}{u}{249}
688 \DeclareTextComposite{\^}{T1}{u}{250}
689 \DeclareTextComposite{\~}{T1}{u}{251}
690 \DeclareTextComposite{\"}{T1}{u}{252}
691 \DeclareTextComposite{\^}{T1}{y}{253}

692 \DeclareTextCompositeCommand{\k}{T1}{o}{\textogonekcentered{o}}
693 \DeclareTextCompositeCommand{\k}{T1}{0}{\textogonekcentered{0}}

694 \ifx\textcommaabove\undefined\else
695 \DeclareTextCompositeCommand{\c}{T1}{g}{\textcommaabove{g}}
696 \fi

```



```

697 \ifx\textcommabelow\undefined\else
698 \DeclareTextCompositeCommand{\c}{T1}{G}{\textcommabelow{G}}
699 \DeclareTextCompositeCommand{\c}{T1}{K}{\textcommabelow{K}}
700 \DeclareTextCompositeCommand{\c}{T1}{k}{\textcommabelow{k}}
701 \DeclareTextCompositeCommand{\c}{T1}{L}{\textcommabelow{L}}
702 \DeclareTextCompositeCommand{\c}{T1}{l}{\textcommabelow{l}}
703 \DeclareTextCompositeCommand{\c}{T1}{N}{\textcommabelow{N}}
704 \DeclareTextCompositeCommand{\c}{T1}{n}{\textcommabelow{n}}
705 \DeclareTextCompositeCommand{\c}{T1}{R}{\textcommabelow{R}}
706 \DeclareTextCompositeCommand{\c}{T1}{r}{\textcommabelow{r}}
707 \fi
708 </T1>

```

## 1.7 Definitions for the OMS encoding

The definitions for the ‘ $\TeX$  math symbol’ (OMS) encoding. Even though this is meant to be a math font, it includes some of the standard  $\LaTeX$  text symbols.

Declare the encoding.

```

709 <*OMS>
710 \DeclareFontEncoding{OMS}{-}{-}

```

Declare the symbols. Note that slot 13 has in places been named `\Orb`: please root out and destroy this impolity wherever you find it!

```

711 \DeclareTextSymbol{\textasteriskcentered}{OMS}{3} % "03
712 \DeclareTextSymbol{\textbackslash}{OMS}{110} % "6E
713 \DeclareTextSymbol{\textbar}{OMS}{106} % "6A
714 \DeclareTextSymbol{\textbardbl}{OMS}{107} % "6B
715 \DeclareTextSymbol{\textbraceleft}{OMS}{102} % "66
716 \DeclareTextSymbol{\textbraceright}{OMS}{103} % "67
717 \DeclareTextSymbol{\textbullet}{OMS}{15} % "0F
718 \DeclareTextSymbol{\textdaggerdbl}{OMS}{122} % "7A
719 \DeclareTextSymbol{\textdagger}{OMS}{121} % "79
720 \DeclareTextSymbol{\textparagraph}{OMS}{123} % "7B
721 \DeclareTextSymbol{\textperiodcentered}{OMS}{1} % "01
722 \DeclareTextSymbol{\textsection}{OMS}{120} % "78
723 \DeclareTextSymbol{\textbigcircle}{OMS}{13} % "0D
724 \DeclareTextCommand{\textcircled}{OMS}[1]{\hmode@bgroup
725   \ooalign{%
726     \hfil \raise .07ex\hbox {\upshape#1}\hfil \crcr
727     \char 13 % "0D
728   }%
729   \egroup}
730 </OMS>

```

## 1.8 Definitions for the OML encoding

The definitions for the ‘ $\TeX$  math italic’ (OML) encoding. Even though this is meant to be a math font, it includes some of the standard  $\LaTeX$  text symbols.

Declare the encoding.

```

731 <*OML>
732 \DeclareFontEncoding{OML}{-}{-}

```

Declare the symbols.

```

733 \DeclareTextSymbol{\textless}{OML}{'\<}
734 \DeclareTextSymbol{\textgreater}{OML}{'\>}
735 \DeclareTextAccent{\t}{OML}{127} % "7F
736 \end{OML}

```

## 1.9 Definitions for the OT4 encoding

These definitions are for the Polish extension to the ‘TeX text’ (OT1) encoding. This encoding was created by B. Jackowski and M. Ryćko for use with the Polish version of Computer Modern and Computer Concrete. In positions 0–127 it is identical to OT1 but it contains some additional characters in the upper half. The L<sup>A</sup>T<sub>E</sub>X support was developed by Mariusz Olko.

The PL fonts that use it are available as follows:

Metafont sources <ftp://ftp.gust.org.pl/TeX/language/polish/pl-mf.zip>;

Font files <ftp://ftp.gust.org.pl/TeX/language/polish/pl-tfm.zip>.

Declare the encoding.

```

737 \*OT4
738 \DeclareFontEncoding{OT4}{}{}
739 \DeclareFontSubstitution{OT4}{cmr}{m}{n}

```

Declare the accents.

```

740 \DeclareTextAccent{"}{OT4}{127}
741 \DeclareTextAccent{'}{OT4}{19}
742 \DeclareTextAccent{.}{OT4}{95}
743 \DeclareTextAccent{=}{OT4}{22}
744 \DeclareTextAccent{~}{OT4}{94}
745 \DeclareTextAccent{\'}{OT4}{18}
746 \DeclareTextAccent{\~}{OT4}{126}
747 \DeclareTextAccent{\H}{OT4}{125}
748 \DeclareTextAccent{\u}{OT4}{21}
749 \DeclareTextAccent{\v}{OT4}{20}
750 \DeclareTextAccent{\r}{OT4}{23}

```

The ogonek accent is available only under a e A & E. But we have to provide some definition for \k. Some other accents have to be built by hand as in OT1:

```

751 \DeclareTextCommand{\k}{OT4}[1]{%
752   \TextSymbolUnavailable{\k{#1}}#1}

```

In these definitions we no longer use the helper function \sh@ft from plain.tex since that now has two incompatible definitions.

```

753 \DeclareTextCommand{\b}{OT4}[1]
754   {\hmode\bgroup\o@lign{\relax#1\crr\hidewidth\ltx@sh@ft{-3ex}%
755     \vbox to.2ex{\hbox{\char22}\vss}\hidewidth}\egroup}
756 \DeclareTextCommand{\c}{OT4}[1]
757   {\leavevmode\setbox\z@\hbox{#1}\ifdim\ht\z@=1ex\accent24 #1%
758     \else\o@lign{\unhbox\z@\crr\hidewidth\char24\hidewidth}\fi}
759 \DeclareTextCommand{\d}{OT4}[1]
760   {\hmode\bgroup
761     \o@lign{\relax#1\crr\hidewidth\ltx@sh@ft{-1ex}.\hidewidth}\egroup}

```

Declare the text symbols.

```

762 \DeclareTextSymbol{\AE}{OT4}{29}
763 \DeclareTextSymbol{\OE}{OT4}{30}
764 \DeclareTextSymbol{\O}{OT4}{31}
765 \DeclareTextSymbol{\L}{OT4}{138}
766 \DeclareTextSymbol{\ae}{OT4}{26}

767 \DeclareTextSymbol{\guillemetleft}{OT4}{174}
768 \DeclareTextSymbol{\guillemetright}{OT4}{175}
769 % old Adobe names
770 \DeclareTextSymbol{\guillemotleft}{OT4}{174}
771 \DeclareTextSymbol{\guillemotright}{OT4}{175}

772 \DeclareTextSymbol{\i}{OT4}{16}
773 \DeclareTextSymbol{\j}{OT4}{17}
774 \DeclareTextSymbol{\l}{OT4}{170}
775 \DeclareTextSymbol{\o}{OT4}{28}
776 \DeclareTextSymbol{\oe}{OT4}{27}
777 \DeclareTextSymbol{\quotedblbase}{OT4}{255}
778 \DeclareTextSymbol{\ss}{OT4}{25}
779 \DeclareTextSymbol{\textendash}{OT4}{124}
780 \DeclareTextSymbol{\textendash}{OT4}{123}
781 \DeclareTextSymbol{\textexclamdown}{OT4}{60}
782 %\DeclareTextSymbol{\textthyphenchar}{OT4}{'\-}
783 %\DeclareTextSymbol{\textthyphen}{OT4}{'\-}
784 \DeclareTextSymbol{\textquestiondown}{OT4}{62}
785 \DeclareTextSymbol{\textquotedblleft}{OT4}{92}
786 \DeclareTextSymbol{\textquotedblright}{OT4}{'\"}
787 \DeclareTextSymbol{\textquoteleft}{OT4}{'\'}
788 \DeclareTextSymbol{\textquoteright}{OT4}{'\'}

```

Definition for Å as in OT1:

```

789 \DeclareTextCompositeCommand{\r}{OT4}{A}
790   {\leavevmode\setbox\z@\hbox{!}\dimen@ht\z@\advance\dimen@-1ex%
791    \rlap{\raise.67\dimen@\hbox{\char23}}A}

```

In the OT4 encoding, £ and \$ share a slot.

```

792 \DeclareTextCommand{\textdollar}{OT4}{\hmode@bgroup
793   \ifdim \fontdimen\@ne\font >\z@
794     \slshape
795   \else
796     \upshape
797   \fi
798   \char'\$\egroup}
799 \DeclareTextCommand{\textsterling}{OT4}{\hmode@bgroup
800   \ifdim \fontdimen\@ne\font >\z@
801     \itshape
802   \else
803     \fontshape{ui}\selectfont
804   \fi
805   \char'\$\egroup}

```

Declare the composites.

```

806 \DeclareTextComposite{\k}{OT4}{A}{129}
807 \DeclareTextComposite{\'}{OT4}{C}{130}
808 \DeclareTextComposite{\k}{OT4}{E}{134}

```

```

809 \DeclareTextComposite{\'}{OT4}{N}{139}
810 \DeclareTextComposite{\'}{OT4}{S}{145}
811 \DeclareTextComposite{\'}{OT4}{Z}{153}
812 \DeclareTextComposite{\.}{OT4}{Z}{155}
813 \DeclareTextComposite{\k}{OT4}{a}{161}
814 \DeclareTextComposite{\'}{OT4}{c}{162}
815 \DeclareTextComposite{\k}{OT4}{e}{166}
816 \DeclareTextComposite{\'}{OT4}{n}{171}
817 \DeclareTextComposite{\'}{OT4}{s}{177}
818 \DeclareTextComposite{\'}{OT4}{z}{185}
819 \DeclareTextComposite{\.}{OT4}{z}{187}
820 \DeclareTextComposite{\'}{OT4}{0}{211}
821 \DeclareTextComposite{\'}{OT4}{o}{243}
822 </OT4>

```

## 1.10 Definitions for the TS1 encoding

```

823 <*TS1>
824 \DeclareFontEncoding{TS1}{}{}
825 \DeclareFontSubstitution{TS1}{cmr}{m}{n}

```

Some accents have to be built by hand. Note that `\ooalign` and `\o@lign` must be inside a group.

```

826 \DeclareTextCommand{\capitalcedilla}{TS1}[1]
827   {\hmode\bgroup
828     \ooalign{\null#1\cr\hidewidth\char11\hidewidth}\egroup}
829 \DeclareTextCommand{\capitalogonek}{TS1}[1]
830   {\hmode\bgroup
831     \ooalign{\null#1\cr\hidewidth\char12\hidewidth}\egroup}

```

Accents for capital letters.

These commands can be used by the end user either directly or through definitions of the type

```
\DeclareTextCompositeCommand{\'}{T1}{X}{\capitalacute X}
```

None of the latter definitions are provided by default, since they are probably rarely used.

"00 = 0

```

832 \DeclareTextAccent{\capitalgrave}{TS1}{0}
833 \DeclareTextAccent{\capitalacute}{TS1}{1}
834 \DeclareTextAccent{\capitalcircumflex}{TS1}{2}
835 \DeclareTextAccent{\capitaltilde}{TS1}{3}
836 \DeclareTextAccent{\capitaldieresis}{TS1}{4}
837 \DeclareTextAccent{\capitalhungarumlaut}{TS1}{5}
838 \DeclareTextAccent{\capitalring}{TS1}{6}
839 \DeclareTextAccent{\capitalcaron}{TS1}{7}

```

"08 = 8

```

840 \DeclareTextAccent{\capitalbreve}{TS1}{8}
841 \DeclareTextAccent{\capitalmacron}{TS1}{9}
842 \DeclareTextAccent{\capitaldotaccent}{TS1}{10}

```

Tie accents.

The tie accent was borrowed from the `cmmi` font. The `tc` fonts now provide four tie accents, the first two are done in the classical way with assymetric glyphs hanging out of

their boxes; the new ties are centered in their boxes like all other accents. They need a name: please tell us if you know what to call them.

" =

```
843 \DeclareTextAccent{\t}{TS1}{26}
844 \DeclareTextAccent{\capitaltie}{TS1}{27}
845 \DeclareTextAccent{\newtie}{TS1}{28}
846 \DeclareTextAccent{\capitalnewtie}{TS1}{29}
```

Compound word marks.

The text companion fonts contain two compound word marks of different heights, one has `cap_height`, the other `asc_height`.

```
847 \DeclareTextSymbol{\textcapitalcompwordmark}{TS1}{23}
848 \DeclareTextSymbol{\textascendercompwordmark}{TS1}{31}
```

The text companion symbols.

```
849 \DeclareTextSymbol{\textquotestraightbase}{TS1}{13}
```

"10 = 16

```
850 \DeclareTextSymbol{\textquotestraightdblbase}{TS1}{18}
851 \DeclareTextSymbol{\texttwelveudash}{TS1}{21}
852 \DeclareTextSymbol{\textthreequartersemdash}{TS1}{22}
```

"18 = 24

```
853 \DeclareTextSymbol{\textleftarrow}{TS1}{24}
854 \DeclareTextSymbol{\textrightarrow}{TS1}{25}
```

"20 = 32

```
855 \DeclareTextSymbol{\textblank}{TS1}{32}
856 \DeclareTextSymbol{\textdollar}{TS1}{36}
857 \DeclareTextSymbol{\textquotesingle}{TS1}{39}
```

"28 = 40

```
858 \DeclareTextSymbol{\textasteriskcentered}{TS1}{42}
```

Note that '054 is a comma and '056 is a full stop: these make numbers using oldstyle digits easier to input.

```
859 \DeclareTextSymbol{\textdblhyphen}{TS1}{45}
860 \DeclareTextSymbol{\textfractionsolidus}{TS1}{47}
```

Oldstyle digits.

"30 = 48

```
861 \DeclareTextSymbol{\textzerooldstyle}{TS1}{48}
862 \DeclareTextSymbol{\textoneoldstyle}{TS1}{49}
863 \DeclareTextSymbol{\texttwooldstyle}{TS1}{50}
864 \DeclareTextSymbol{\textthreeoldstyle}{TS1}{51}
865 \DeclareTextSymbol{\textfouroldstyle}{TS1}{52}
866 \DeclareTextSymbol{\textfiveoldstyle}{TS1}{53}
867 \DeclareTextSymbol{\textsixoldstyle}{TS1}{54}
868 \DeclareTextSymbol{\textsevenoldstyle}{TS1}{55}
```

"38 = 56

```
869 \DeclareTextSymbol{\texteightoldstyle}{TS1}{56}
870 \DeclareTextSymbol{\textnineoldstyle}{TS1}{57}
```

More text companion symbols.

```
871 \DeclareTextSymbol{\textlangle}{TS1}{60}
872 \DeclareTextSymbol{\textminus}{TS1}{61}
873 \DeclareTextSymbol{\textrangle}{TS1}{62}
```

"48 = 72

```
874 \DeclareTextSymbol{\textmho}{TS1}{77}
```

The big circle is here to define the command `\textcircled`. Formerly it was taken from the `cmsy` font.

```
875 \DeclareTextSymbol{\textbigcircle}{TS1}{79}
876 \DeclareTextCommand{\textcircled}{TS1}[1]{\hmode\bgroup
877   \oalign{%
878     \hfil \raise .07ex\hbox {\upshape#1}\hfil \crcr
879     \char 79   % '117 = "4F
880   }%
881 \egroup}
```

More text companion symbols.

"50 = 80

```
882 \DeclareTextSymbol{\textohm}{TS1}{87}
```

"58 = 88

```
883 \DeclareTextSymbol{\textlbrackdbl}{TS1}{91}
884 \DeclareTextSymbol{\textrbrackdbl}{TS1}{93}
885 \DeclareTextSymbol{\textuparrow}{TS1}{94}
886 \DeclareTextSymbol{\textdownarrow}{TS1}{95}
```

"60 = 96

```
887 \DeclareTextSymbol{\textasciigrave}{TS1}{96}
888 \DeclareTextSymbol{\textborn}{TS1}{98}
889 \DeclareTextSymbol{\textdivorced}{TS1}{99}
890 \DeclareTextSymbol{\textdied}{TS1}{100}
```

"68 = 104

```
891 \DeclareTextSymbol{\textleaf}{TS1}{108}
892 \DeclareTextSymbol{\textmarried}{TS1}{109}
893 \DeclareTextSymbol{\textmusicalnote}{TS1}{110}
```

"78 = 120

```
894 \DeclareTextSymbol{\texttildebelow}{TS1}{126}
```

This glyph, `\textdblhyphenchar` is hanging, like the `hyphenchar` of the `ec` fonts.

```
895 \DeclareTextSymbol{\textdblhyphenchar}{TS1}{127}
```

"80 = 128

```
896 \DeclareTextSymbol{\textasciibreve}{TS1}{128}
897 \DeclareTextSymbol{\textasciicaron}{TS1}{129}
```

This next glyph is *not* the same as `\textquotedbl`.

```
898 \DeclareTextSymbol{\textacutedbl}{TS1}{130}
899 \DeclareTextSymbol{\textgravedbl}{TS1}{131}
900 \DeclareTextSymbol{\textdagger}{TS1}{132}
901 \DeclareTextSymbol{\textdaggerdbl}{TS1}{133}
902 \DeclareTextSymbol{\textbardbl}{TS1}{134}
903 \DeclareTextSymbol{\textperthousand}{TS1}{135}
```

"88 = 136

```
904 \DeclareTextSymbol{\textbullet}{TS1}{136}
905 \DeclareTextSymbol{\textcelsius}{TS1}{137}
906 \DeclareTextSymbol{\textdollaroldstyle}{TS1}{138}
907 \DeclareTextSymbol{\textcentoldstyle}{TS1}{139}
908 \DeclareTextSymbol{\textflorin}{TS1}{140}
909 \DeclareTextSymbol{\textcolonmonetary}{TS1}{141}
910 \DeclareTextSymbol{\textwon}{TS1}{142}
911 \DeclareTextSymbol{\textnaira}{TS1}{143}
```

"90 = 144

```
912 \DeclareTextSymbol{\textguarani}{TS1}{144}
913 \DeclareTextSymbol{\textpeso}{TS1}{145}
914 \DeclareTextSymbol{\textlira}{TS1}{146}
915 \DeclareTextSymbol{\textrecipe}{TS1}{147}
916 \DeclareTextSymbol{\textinterrobang}{TS1}{148}
917 \DeclareTextSymbol{\textinterrobangdown}{TS1}{149}
918 \DeclareTextSymbol{\textdong}{TS1}{150}
919 \DeclareTextSymbol{\texttrademark}{TS1}{151}
```

"98 = 152

```
920 \DeclareTextSymbol{\textpertenthousand}{TS1}{152}
921 \DeclareTextSymbol{\textpilcrow}{TS1}{153}
922 \DeclareTextSymbol{\textbaht}{TS1}{154}
923 \DeclareTextSymbol{\textnumero}{TS1}{155}
```

This next name may change. For the following sign we know only a german name, which is abzüglich. The meaning is something like “commercial minus”. An ASCII ersatz is ./ (dot slash dot). The temporary English name is \textdiscount.

```
924 \DeclareTextSymbol{\textdiscount}{TS1}{156}
925 \DeclareTextSymbol{\textestimated}{TS1}{157}
926 \DeclareTextSymbol{\textopenbullet}{TS1}{158}
927 \DeclareTextSymbol{\textservicemark}{TS1}{159}
```

"A0 = 160

```
928 \DeclareTextSymbol{\textlquill}{TS1}{160}
929 \DeclareTextSymbol{\textrquill}{TS1}{161}
930 \DeclareTextSymbol{\textcent}{TS1}{162}
931 \DeclareTextSymbol{\textsterling}{TS1}{163}
932 \DeclareTextSymbol{\textcurrency}{TS1}{164}
933 \DeclareTextSymbol{\textyen}{TS1}{165}
934 \DeclareTextSymbol{\textbrokenbar}{TS1}{166}
935 \DeclareTextSymbol{\textsection}{TS1}{167}
```

"A8 = 168

```
936 \DeclareTextSymbol{\textasciidieresis}{TS1}{168}
937 \DeclareTextSymbol{\textcopyright}{TS1}{169}
938 \DeclareTextSymbol{\textordfeminine}{TS1}{170}
939 \DeclareTextSymbol{\textcopyleft}{TS1}{171}
940 \DeclareTextSymbol{\textlnot}{TS1}{172}
```

The meaning of the circled-P is “sound recording copyright”.

```
941 \DeclareTextSymbol{\textcircledP}{TS1}{173}
942 \DeclareTextSymbol{\textregistered}{TS1}{174}
943 \DeclareTextSymbol{\textasciimacron}{TS1}{175}
```

```

"B0 = 176
944 \DeclareTextSymbol{\textdegree}{TS1}{176}
945 \DeclareTextSymbol{\textpm}{TS1}{177}
946 \DeclareTextSymbol{\texttwosuperior}{TS1}{178}
947 \DeclareTextSymbol{\textthreesuperior}{TS1}{179}
948 \DeclareTextSymbol{\textasciicute}{TS1}{180}
949 \DeclareTextSymbol{\textmu}{TS1}{181} % micro sign
950 \DeclareTextSymbol{\textparagraph}{TS1}{182}
951 \DeclareTextSymbol{\textperiodcentered}{TS1}{183}
"B8 = 184
952 \DeclareTextSymbol{\textreferencemark}{TS1}{184}
953 \DeclareTextSymbol{\textonesuperior}{TS1}{185}
954 \DeclareTextSymbol{\textordmasculine}{TS1}{186}
955 \DeclareTextSymbol{\textsurd}{TS1}{187}
956 \DeclareTextSymbol{\textonequarter}{TS1}{188}
957 \DeclareTextSymbol{\textonehalf}{TS1}{189}
958 \DeclareTextSymbol{\textthreequarters}{TS1}{190}
959 \DeclareTextSymbol{\texteuro}{TS1}{191}
"E0 = 208
960 \DeclareTextSymbol{\texttimes}{TS1}{214}
"F0 = 240
961 \DeclareTextSymbol{\textdiv}{TS1}{246}
962 </TS1>

```

## 1.11 Definitions for the TU encoding

The TU encoding was originally introduced in the contributed package **fontspec** as a Unicode encoding for XeTeX and LuaTeX.

Normally for these engines, the input consists of Unicode characters encoded in UTF-8. There is therefore little need to use the traditional (ASCII) encoding-specific commands

However, sometimes (e.g. for backwards compatibility) it can be useful to access these Unicode characters via such ASCII-based markup. The commands provided here Cover the characters in the T1 and TS1 encodings, but specified in Unicode position. Almost all the command names have been mechanically extracted from the **inputenc** UTF-8 support, which is essentially doing a reverse mapping from UTF-8 data to L<sup>A</sup>T<sub>E</sub>X LICR commands.

A few additional names for character which were supported in the original **fontspec** version of this file have also been added, even though they are not currently in the default **inputenc** UTF-8 declarations.

```

963 < *TU>

```

In the base interface the Unicode encoding is always known as TU But we parameterise the encoding name to allow for modelling differences in Unicode support by different fonts.

```

964 \providecommand\UnicodeEncodingName{TU}

```



As the Unicode encoding, TU, is only currently available with XeTeX or LuaTeX, we detect these engines first, and make adjustments for the differing font loading syntax. For other engines, we issue a warning then abort this file, switching back to T1 encoding.

```

965 \begingroup\expandafter\expandafter\expandafter\endgroup
966 \expandafter\ifx\csname XeTeXrevision\endcsname\relax

967 \begingroup\expandafter\expandafter\expandafter\endgroup
968 \expandafter\ifx\csname directlua\endcsname\relax

    Not LuaTeX or XeTeX, abort with a warning.

969 \PackageWarningNoLine{fontenc}
970   {\UnicodeEncodingName\space
971    encoding is only available with XeTeX and LuaTeX.\MessageBreak
972    Defaulting to T1 encoding}
973 \def\encodingdefault{T1}
974 \expandafter\expandafter\expandafter\endinput

975 \else

```

LuaTeX. For LuaTeX 1.10+, define a Lua function to disable any handling by the font code. Otherwise we reload the font without TeX ligatures.

```

976 \def\UnicodeFontTeXLigatures{+tlig;}
977 \ifnum\luatexversion<110

978 \def\reserved@a#1{%
979   \def\@remove@tlig##1{\@remove@tlig@##1\@nil#1\@nil\relax}
980   \def\@remove@tlig@##1#1{\@remove@tlig@##1}}
981 \edef\reserved@b{\detokenize{+tlig;}}
982 \expandafter\reserved@a\expandafter{\reserved@b}
983 \def\@remove@tlig@##1\@nil#2\relax{#1}

984 \def\remove@tlig#1{%
985   \begingroup
986   \font\remove@tlig
987   \expandafter\@remove@tlig\expandafter{\fontname\font}%
988   \remove@tlig
989   \char#1\relax
990   \endgroup
991 }
992 \else
993 \newluafunction\@remove@tlig@@@

```

Now we can define the function. Mostly we just have to insert a protected glyph node, which is a glyph node with subtype 256. But we have to keep track of the current mode to avoid inserting the glyph into a vlist.

```

994 \now@and@everyjob{\directlua{
995   local rawchar_func = token.create'\@remove@tlig@@@'.index
996   local forcehmode = tex.forcehmode
997   local put_next = token.put_next
998   local glyph_id = node.id'glyph'
999   local rawchar_token = token.new(rawchar_func, token.command_id'lua_call')
1000   lua.get_functions_table()[rawchar_func] = function()
1001     local mode = tex.nest.top.mode
1002     if mode == 1 or mode == -1 then
1003       put_next(rawchar_token)
1004       return forcehmode(true)

```

```

1005         end
1006         local n = node.new(glyph_id, 256)
1007         n.font = font.current()
1008         n.char = token.scan_int()
1009         return node.write(n)
1010     end
1011     token.set_lua('@remove@tlig@@@', rawchar_func, 'global', 'protected')
1012 }

```

Now `\remove@tlig` can be implemented almost as in XeTeX.

```

1013     \def\remove@tlig#1{\@remove@tlig@@@#1\relax}
1014     \fi
1015     \fi
1016 \else
1017     XeTeX
1018     \def\UnicodeFontTeXLigatures{mapping=tex-text;}
1019     \def\remove@tlig#1{\XeTeXglyph\numexpr\XeTeXcharglyph#1\relax}
1020     \fi
1021 \def\UnicodeFontFile#1#2{"[#1]:#2"}
1022 \def\UnicodeFontName#1#2{"#1:#2"}
1023
1024     Declare the encoding
1025 \DeclareFontEncoding\UnicodeEncodingName{}{}
1026
1027     Declare accent command to use a postpended combining character rather than the
1028     TeX \accent primitive
1029 \def\add@unicode@accent#1#2{%
1030     \if\relax\detokenize{#2}\relax~^a0\else#2\fi
1031     \char#1\relax}
1032
1033 \def\DeclareUnicodeAccent#1#2#3{%
1034     \DeclareTextCommand{#1}{#2}{\add@unicode@accent{#3}}%
1035 }

```

Wrapper around `\DeclareTextCompositeCommand` that uses the declared composite if it exists in the current font or falls back to the default definition for the TU accent if not.

```

1029 {
1030     \catcode\z@=11\relax
1031     \gdef\DeclareUnicodeComposite#1#2#3{%
1032         \def\reserved@a##1##2{%
1033             \DeclareTextCompositeCommand#1\UnicodeEncodingName{#2}{%
1034                 \iffontchar\font#3 ##2%
1035                 \else ##1\fi}}%
1036         \expandafter\expandafter\expandafter\extract@default@composite
1037         \csname\UnicodeEncodingName\string#1\endcsname{#2}\@nil
1038         \bgroup
1039         \lccode\z@#3 %
1040         \lowercase{\egroup
1041             \expandafter\reserved@a\expandafter{\reserved@b}{~^@}}}%
1042     }

```

```

1043 \def\extract@default@composite#1{%
1044 \ifx\@text@composite#1%
1045 \expandafter\extract@default@composite@a
1046 \else
1047 \expandafter\extract@default@composite@b\expandafter#1%
1048 \fi}

1049 \def\extract@default@composite@a#1\@text@composite#2\@nil{%
1050 \def\reserved@b{#2}}
1051 \def\extract@default@composite@b#1#2\@nil{%
1052 \def\reserved@b{#1#2}}

1053 \DeclareTextCommand\textquotesingle \UnicodeEncodingName{%
1054 \remove@tlig{"0027}}
1055 \DeclareTextCommand\textasciigrave \UnicodeEncodingName{%
1056 \remove@tlig{"0060}}
1057 \DeclareTextCommand\textquotedbl \UnicodeEncodingName{%
1058 \remove@tlig{"0022}}

1059 \DeclareTextSymbol{\textdollar} \UnicodeEncodingName{"0024}
1060 \DeclareTextSymbol{\textless} \UnicodeEncodingName{"003C}
1061 \DeclareTextSymbol{\textgreater} \UnicodeEncodingName{"003E}
1062 \DeclareTextSymbol{\textbackslash} \UnicodeEncodingName{"005C}
1063 \DeclareTextSymbol{\textasciicircum} \UnicodeEncodingName{"005E}
1064 \DeclareTextSymbol{\textunderscore} \UnicodeEncodingName{"005F}
1065 \DeclareTextSymbol{\textbraceleft} \UnicodeEncodingName{"007B}
1066 \DeclareTextSymbol{\textbar} \UnicodeEncodingName{"007C}
1067 \DeclareTextSymbol{\textbraceright} \UnicodeEncodingName{"007D}
1068 \DeclareTextSymbol{\textasciitilde} \UnicodeEncodingName{"007E}
1069 \DeclareTextSymbol{\texttexclamdown} \UnicodeEncodingName{"00A1}
1070 \DeclareTextSymbol{\textcent} \UnicodeEncodingName{"00A2}
1071 \DeclareTextSymbol{\textsterling} \UnicodeEncodingName{"00A3}
1072 \DeclareTextSymbol{\textcurrency} \UnicodeEncodingName{"00A4}
1073 \DeclareTextSymbol{\textyen} \UnicodeEncodingName{"00A5}
1074 \DeclareTextSymbol{\textbrokenbar} \UnicodeEncodingName{"00A6}
1075 \DeclareTextSymbol{\textsection} \UnicodeEncodingName{"00A7}
1076 \DeclareTextSymbol{\textasciidieresis} \UnicodeEncodingName{"00A8}
1077 \DeclareTextSymbol{\textcopyright} \UnicodeEncodingName{"00A9}
1078 \DeclareTextSymbol{\textordfeminine} \UnicodeEncodingName{"00AA}

1079 \DeclareTextSymbol{\guillemetleft} \UnicodeEncodingName{"00AB}
1080 % old Adobe name
1081 \DeclareTextSymbol{\guillemotleft} \UnicodeEncodingName{"00AB}

1082 \DeclareTextSymbol{\textlnot} \UnicodeEncodingName{"00AC}
1083 \DeclareTextSymbol{\textregistered} \UnicodeEncodingName{"00AE}
1084 \DeclareTextSymbol{\textasciimacron} \UnicodeEncodingName{"00AF}
1085 \DeclareTextSymbol{\textdegree} \UnicodeEncodingName{"00B0}
1086 \DeclareTextSymbol{\textpm} \UnicodeEncodingName{"00B1}
1087 \DeclareTextSymbol{\texttwosuperior} \UnicodeEncodingName{"00B2}
1088 \DeclareTextSymbol{\textthreesuperior} \UnicodeEncodingName{"00B3}
1089 \DeclareTextSymbol{\textasciiacute} \UnicodeEncodingName{"00B4}
1090 \DeclareTextSymbol{\textmu} \UnicodeEncodingName{"00B5}
1091 \DeclareTextSymbol{\textparagraph} \UnicodeEncodingName{"00B6}
1092 \DeclareTextSymbol{\textperiodcentered} \UnicodeEncodingName{"00B7}
1093 \DeclareTextSymbol{\textonesuperior} \UnicodeEncodingName{"00B9}
1094 \DeclareTextSymbol{\textordmasculine} \UnicodeEncodingName{"00BA}

```

1095	\DeclareTextSymbol{\guillemetright}	\UnicodeEncodingName{"00BB}
1096	% old Adobe name	
1097	\DeclareTextSymbol{\guillemotright}	\UnicodeEncodingName{"00BB}
1098	\DeclareTextSymbol{\textonequarter}	\UnicodeEncodingName{"00BC}
1099	\DeclareTextSymbol{\textonehalf}	\UnicodeEncodingName{"00BD}
1100	\DeclareTextSymbol{\textthreequarters}	\UnicodeEncodingName{"00BE}
1101	\DeclareTextSymbol{\textquestiondown}	\UnicodeEncodingName{"00BF}
1102	\DeclareTextSymbol{\AE}	\UnicodeEncodingName{"00C6}
1103	\DeclareTextSymbol{\DH}	\UnicodeEncodingName{"00D0}
1104	\DeclareTextSymbol{\texttimes}	\UnicodeEncodingName{"00D7}
1105	\DeclareTextSymbol{\O}	\UnicodeEncodingName{"00D8}
1106	\DeclareTextSymbol{\TH}	\UnicodeEncodingName{"00DE}
1107	\DeclareTextSymbol{\ss}	\UnicodeEncodingName{"00DF}
1108	\DeclareTextSymbol{\ae}	\UnicodeEncodingName{"00E6}
1109	\DeclareTextSymbol{\dh}	\UnicodeEncodingName{"00F0}
1110	\DeclareTextSymbol{\textdiv}	\UnicodeEncodingName{"00F7}
1111	\DeclareTextSymbol{\o}	\UnicodeEncodingName{"00F8}
1112	\DeclareTextSymbol{\th}	\UnicodeEncodingName{"00FE}
1113	\DeclareTextSymbol{\DJ}	\UnicodeEncodingName{"0110}
1114	\DeclareTextSymbol{\dj}	\UnicodeEncodingName{"0111}
1115	\DeclareTextSymbol{\i}	\UnicodeEncodingName{"0131}
1116	\DeclareTextSymbol{\IJ}	\UnicodeEncodingName{"0132}
1117	\DeclareTextSymbol{\ij}	\UnicodeEncodingName{"0133}
1118	\DeclareTextSymbol{\L}	\UnicodeEncodingName{"0141}
1119	\DeclareTextSymbol{\l}	\UnicodeEncodingName{"0142}
1120	\DeclareTextSymbol{\NG}	\UnicodeEncodingName{"014A}
1121	\DeclareTextSymbol{\ng}	\UnicodeEncodingName{"014B}
1122	\DeclareTextSymbol{\OE}	\UnicodeEncodingName{"0152}
1123	\DeclareTextSymbol{\oe}	\UnicodeEncodingName{"0153}
1124	\DeclareTextSymbol{\textflorin}	\UnicodeEncodingName{"0192}
1125	\DeclareTextSymbol{\j}	\UnicodeEncodingName{"0237}
1126	\DeclareTextSymbol{\textasciicaron}	\UnicodeEncodingName{"02C7}
1127	\DeclareTextSymbol{\textasciibreve}	\UnicodeEncodingName{"02D8}
1128	\DeclareTextSymbol{\textacutedbl}	\UnicodeEncodingName{"02DD}
1129	\DeclareTextSymbol{\textgravedbl}	\UnicodeEncodingName{"02F5}
1130	\DeclareTextSymbol{\texttildebelow}	\UnicodeEncodingName{"02F7}
1131	\DeclareTextSymbol{\textbaht}	\UnicodeEncodingName{"0E3F}
1132	\DeclareTextSymbol{\SS}	\UnicodeEncodingName{"1E9E}
1133	\DeclareTextSymbol{\textcompwordmark}	\UnicodeEncodingName{"200C}
1134	\DeclareTextSymbol{\textendash}	\UnicodeEncodingName{"2013}
1135	\DeclareTextSymbol{\textemdash}	\UnicodeEncodingName{"2014}
1136	\DeclareTextSymbol{\textbardbl}	\UnicodeEncodingName{"2016}
1137	\DeclareTextSymbol{\textquotelleft}	\UnicodeEncodingName{"2018}
1138	\DeclareTextSymbol{\textquoteright}	\UnicodeEncodingName{"2019}
1139	\DeclareTextSymbol{\quotesinglbase}	\UnicodeEncodingName{"201A}
1140	\DeclareTextSymbol{\textquotedblleft}	\UnicodeEncodingName{"201C}
1141	\DeclareTextSymbol{\textquotedblright}	\UnicodeEncodingName{"201D}
1142	\DeclareTextSymbol{\quotedblbase}	\UnicodeEncodingName{"201E}
1143	\DeclareTextSymbol{\textdagger}	\UnicodeEncodingName{"2020}
1144	\DeclareTextSymbol{\textdaggerdbl}	\UnicodeEncodingName{"2021}
1145	\DeclareTextSymbol{\textbullet}	\UnicodeEncodingName{"2022}
1146	\DeclareTextSymbol{\textellipsis}	\UnicodeEncodingName{"2026}
1147	\DeclareTextSymbol{\textperthousand}	\UnicodeEncodingName{"2030}
1148	\DeclareTextSymbol{\textpertenthousand}	\UnicodeEncodingName{"2031}

```

1149 \DeclareTextSymbol{\guilsinglleft} \UnicodeEncodingName{"2039}
1150 \DeclareTextSymbol{\guilsinglright} \UnicodeEncodingName{"203A}
1151 \DeclareTextSymbol{\textreferencemark} \UnicodeEncodingName{"203B}
1152 \DeclareTextSymbol{\textinterrobang} \UnicodeEncodingName{"203D}
1153 \DeclareTextSymbol{\textfractionsolidus} \UnicodeEncodingName{"2044}
1154 \DeclareTextSymbol{\textlquill} \UnicodeEncodingName{"2045}
1155 \DeclareTextSymbol{\textrquill} \UnicodeEncodingName{"2046}
1156 \DeclareTextSymbol{\textdiscount} \UnicodeEncodingName{"2052}
1157 \DeclareTextSymbol{\textcolonmonetary} \UnicodeEncodingName{"20A1}
1158 \DeclareTextSymbol{\textlira} \UnicodeEncodingName{"20A4}
1159 \DeclareTextSymbol{\textnaira} \UnicodeEncodingName{"20A6}
1160 \DeclareTextSymbol{\textwon} \UnicodeEncodingName{"20A9}
1161 \DeclareTextSymbol{\textdong} \UnicodeEncodingName{"20AB}
1162 \DeclareTextSymbol{\texteuro} \UnicodeEncodingName{"20AC}
1163 \DeclareTextSymbol{\textpeso} \UnicodeEncodingName{"20B1}
1164 \DeclareTextSymbol{\textcelsius} \UnicodeEncodingName{"2103}
1165 \DeclareTextSymbol{\textnumero} \UnicodeEncodingName{"2116}
1166 \DeclareTextSymbol{\textcircledP} \UnicodeEncodingName{"2117}
1167 \DeclareTextSymbol{\textrecipe} \UnicodeEncodingName{"211E}
1168 \DeclareTextSymbol{\textservicemark} \UnicodeEncodingName{"2120}
1169 \DeclareTextSymbol{\texttrademark} \UnicodeEncodingName{"2122}
1170 \DeclareTextSymbol{\textohm} \UnicodeEncodingName{"2126}
1171 \DeclareTextSymbol{\textmho} \UnicodeEncodingName{"2127}
1172 \DeclareTextSymbol{\textestimated} \UnicodeEncodingName{"212E}
1173 \DeclareTextSymbol{\textleftarrow} \UnicodeEncodingName{"2190}
1174 \DeclareTextSymbol{\textuparrow} \UnicodeEncodingName{"2191}
1175 \DeclareTextSymbol{\textrightarrow} \UnicodeEncodingName{"2192}
1176 \DeclareTextSymbol{\textdownarrow} \UnicodeEncodingName{"2193}
1177 \DeclareTextSymbol{\textminus} \UnicodeEncodingName{"2212}
1178
1179 \DeclareTextSymbol{\Hwithstroke} \UnicodeEncodingName{"0126}
1180 \DeclareTextSymbol{\hwithstroke} \UnicodeEncodingName{"0127}
1181
1182 \Not all fonts have U+2217 but using U+002A requires some adjustment.
1183 \DeclareTextCommand{\textasteriskcentered}\UnicodeEncodingName{%
1184 \iffontchar\font"2217 \char"2217 \else
1185 \begingroup
1186 \fontsize
1187 {\the\dimexpr1.2\dimexpr\fontsize pt\relax}%
1188 {\f@baselineskip}%
1189 \selectfont
1190 \raisebox{-0.6ex}{\dimexpr\height-0.6ex}[0pt]{*}%
1191 \endgroup
1192 \fi
1193 }
1194
1195 \DeclareTextSymbol{\textsurd} \UnicodeEncodingName{"221A}
1196 \DeclareTextSymbol{\textlangle} \UnicodeEncodingName{"2329}
1197 \DeclareTextSymbol{\textrangle} \UnicodeEncodingName{"232A}
1198 \DeclareTextSymbol{\textblank} \UnicodeEncodingName{"2422}
1199 \DeclareTextSymbol{\textvisiblespace} \UnicodeEncodingName{"2423}
1200 \DeclareTextSymbol{\textopenbullet} \UnicodeEncodingName{"25E6}
1201 \DeclareTextSymbol{\textbigcircle} \UnicodeEncodingName{"25EF}
1202 \DeclareTextSymbol{\textmusicalnote} \UnicodeEncodingName{"266A}

```

```

1200 \DeclareTextSymbol{\textmarried}      \UnicodeEncodingName{"26AD}
1201 \DeclareTextSymbol{\textdivorced}    \UnicodeEncodingName{"26AE}
1202 \DeclareTextSymbol{\textinterrobangdown} \UnicodeEncodingName{"2E18}

Accents must be declared before the composites that use them.

1203 \DeclareUnicodeAccent{\` }           \UnicodeEncodingName{"0300}
1204 \DeclareUnicodeAccent{\' }           \UnicodeEncodingName{"0301}
1205 \DeclareUnicodeAccent{\^ }           \UnicodeEncodingName{"0302}
1206 \DeclareUnicodeAccent{\~ }           \UnicodeEncodingName{"0303}
1207 \DeclareUnicodeAccent{\=}            \UnicodeEncodingName{"0304}
1208 \DeclareUnicodeAccent{\u }           \UnicodeEncodingName{"0306}
1209 \DeclareUnicodeAccent{\. }           \UnicodeEncodingName{"0307}
1210 \DeclareUnicodeAccent{\ " }           \UnicodeEncodingName{"0308}
1211 \DeclareUnicodeAccent{\r }           \UnicodeEncodingName{"030A}
1212 \DeclareUnicodeAccent{\H }           \UnicodeEncodingName{"030B}
1213 \DeclareUnicodeAccent{\v }           \UnicodeEncodingName{"030C}
1214 \DeclareUnicodeAccent{\b }           \UnicodeEncodingName{"0332}
1215 \DeclareUnicodeAccent{\d }           \UnicodeEncodingName{"0323}
1216 \DeclareUnicodeAccent{\c }           \UnicodeEncodingName{"0327}
1217 \DeclareUnicodeAccent{\k }           \UnicodeEncodingName{"0328}
1218 \DeclareTextCommand\textcommabelow    \UnicodeEncodingName[1]
1219   {\hmode\bgroup\oalign{\null#1\crrc\hidewidth\raise-.31ex
1220     \hbox{\check@mathfonts\fontsize\ssf@size\z@
1221       \math@fontsfalse\selectfont,}\hidewidth}\egroup}

1222 \DeclareUnicodeComposite{\` }          {}{"005E}
1223 \DeclareUnicodeComposite{\~ }          {}{"007E}

1224 \DeclareUnicodeComposite{\` }          {A}{"00C0}
1225 \DeclareUnicodeComposite{\' }          {A}{"00C1}
1226 \DeclareUnicodeComposite{\^ }          {A}{"00C2}
1227 \DeclareUnicodeComposite{\~ }          {A}{"00C3}
1228 \DeclareUnicodeComposite{\ " }          {A}{"00C4}
1229 \DeclareUnicodeComposite{\r }          {A}{"00C5}
1230 \DeclareUnicodeComposite{\c }          {C}{"00C7}
1231 \DeclareUnicodeComposite{\` }          {E}{"00C8}
1232 \DeclareUnicodeComposite{\' }          {E}{"00C9}
1233 \DeclareUnicodeComposite{\^ }          {E}{"00CA}
1234 \DeclareUnicodeComposite{\ " }          {E}{"00CB}
1235 \DeclareUnicodeComposite{\` }          {I}{"00CC}
1236 \DeclareUnicodeComposite{\' }          {I}{"00CD}
1237 \DeclareUnicodeComposite{\^ }          {I}{"00CE}
1238 \DeclareUnicodeComposite{\ " }          {I}{"00CF}
1239 \DeclareUnicodeComposite{\~ }          {N}{"00D1}
1240 \DeclareUnicodeComposite{\` }          {O}{"00D2}
1241 \DeclareUnicodeComposite{\' }          {O}{"00D3}
1242 \DeclareUnicodeComposite{\^ }          {O}{"00D4}
1243 \DeclareUnicodeComposite{\~ }          {O}{"00D5}
1244 \DeclareUnicodeComposite{\ " }          {O}{"00D6}
1245 \DeclareUnicodeComposite{\` }          {U}{"00D9}
1246 \DeclareUnicodeComposite{\' }          {U}{"00DA}
1247 \DeclareUnicodeComposite{\^ }          {U}{"00DB}
1248 \DeclareUnicodeComposite{\ " }          {U}{"00DC}
1249 \DeclareUnicodeComposite{\' }          {Y}{"00DD}
1250 \DeclareUnicodeComposite{\` }          {a}{"00E0}
1251 \DeclareUnicodeComposite{\' }          {a}{"00E1}

```

1252	\DeclareUnicodeComposite{\^}	{a}{"00E2}
1253	\DeclareUnicodeComposite{\~}	{a}{"00E3}
1254	\DeclareUnicodeComposite{"}	{a}{"00E4}
1255	\DeclareUnicodeComposite{\r}	{a}{"00E5}
1256	\DeclareUnicodeComposite{\c}	{c}{"00E7}
1257	\DeclareUnicodeComposite{\'}	{e}{"00E8}
1258	\DeclareUnicodeComposite{\'}	{e}{"00E9}
1259	\DeclareUnicodeComposite{\^}	{e}{"00EA}
1260	\DeclareUnicodeComposite{"}	{e}{"00EB}
1261	\DeclareUnicodeComposite{\'}	\i {"00EC}
1262	\DeclareUnicodeComposite{\'}	{i}{"00EC}
1263	\DeclareUnicodeComposite{\'}	\i {"00ED}
1264	\DeclareUnicodeComposite{\'}	{i}{"00ED}
1265	\DeclareUnicodeComposite{\^}	\i {"00EE}
1266	\DeclareUnicodeComposite{\^}	{i}{"00EE}
1267	\DeclareUnicodeComposite{"}	\i {"00EF}
1268	\DeclareUnicodeComposite{"}	{i}{"00EF}
1269	\DeclareUnicodeComposite{\~}	{n}{"00F1}
1270	\DeclareUnicodeComposite{\'}	{o}{"00F2}
1271	\DeclareUnicodeComposite{\'}	{o}{"00F3}
1272	\DeclareUnicodeComposite{\^}	{o}{"00F4}
1273	\DeclareUnicodeComposite{\~}	{o}{"00F5}
1274	\DeclareUnicodeComposite{"}	{o}{"00F6}
1275	\DeclareUnicodeComposite{\'}	{u}{"00F9}
1276	\DeclareUnicodeComposite{\'}	{u}{"00FA}
1277	\DeclareUnicodeComposite{\^}	{u}{"00FB}
1278	\DeclareUnicodeComposite{"}	{u}{"00FC}
1279	\DeclareUnicodeComposite{\'}	{y}{"00FD}
1280	\DeclareUnicodeComposite{"}	{y}{"00FF}
1281	\DeclareUnicodeComposite{\=}	{A}{"0100}
1282	\DeclareUnicodeComposite{\=}	{a}{"0101}
1283	\DeclareUnicodeComposite{\u}	{A}{"0102}
1284	\DeclareUnicodeComposite{\u}	{a}{"0103}
1285	\DeclareUnicodeComposite{\k}	{A}{"0104}
1286	\DeclareUnicodeComposite{\k}	{a}{"0105}
1287	\DeclareUnicodeComposite{\'}	{C}{"0106}
1288	\DeclareUnicodeComposite{\'}	{c}{"0107}
1289	\DeclareUnicodeComposite{\^}	{C}{"0108}
1290	\DeclareUnicodeComposite{\^}	{c}{"0109}
1291	\DeclareUnicodeComposite{\.}	{C}{"010A}
1292	\DeclareUnicodeComposite{\.}	{c}{"010B}
1293	\DeclareUnicodeComposite{\v}	{C}{"010C}
1294	\DeclareUnicodeComposite{\v}	{c}{"010D}
1295	\DeclareUnicodeComposite{\v}	{D}{"010E}
1296	\DeclareUnicodeComposite{\v}	{d}{"010F}
1297	\DeclareUnicodeComposite{\=}	{E}{"0112}
1298	\DeclareUnicodeComposite{\=}	{e}{"0113}
1299	\DeclareUnicodeComposite{\u}	{E}{"0114}
1300	\DeclareUnicodeComposite{\u}	{e}{"0115}
1301	\DeclareUnicodeComposite{\.}	{E}{"0116}
1302	\DeclareUnicodeComposite{\.}	{e}{"0117}
1303	\DeclareUnicodeComposite{\k}	{E}{"0118}
1304	\DeclareUnicodeComposite{\k}	{e}{"0119}
1305	\DeclareUnicodeComposite{\v}	{E}{"011A}

1306	\DeclareUnicodeComposite{\v}	{e}{"011B}
1307	\DeclareUnicodeComposite{\^}	{G}{"011C}
1308	\DeclareUnicodeComposite{\^}	{g}{"011D}
1309	\DeclareUnicodeComposite{\u}	{G}{"011E}
1310	\DeclareUnicodeComposite{\u}	{g}{"011F}
1311	\DeclareUnicodeComposite{\.}	{G}{"0120}
1312	\DeclareUnicodeComposite{\.}	{g}{"0121}
1313	\DeclareUnicodeComposite{\c}	{G}{"0122}
1314	\DeclareUnicodeComposite{\c}	{g}{"0123}
1315	\DeclareUnicodeComposite{\^}	{H}{"0124}
1316	\DeclareUnicodeComposite{\^}	{h}{"0125}
1317	\DeclareUnicodeComposite{\~}	{I}{"0128}
1318	\DeclareUnicodeComposite{\~}	\i {"0129}
1319	\DeclareUnicodeComposite{\~}	{i}{"0129}
1320	\DeclareUnicodeComposite{\=}	{I}{"012A}
1321	\DeclareUnicodeComposite{\=}	\i {"012B}
1322	\DeclareUnicodeComposite{\=}	{i}{"012B}
1323	\DeclareUnicodeComposite{\u}	{I}{"012C}
1324	\DeclareUnicodeComposite{\u}	\i {"012D}
1325	\DeclareUnicodeComposite{\u}	{i}{"012D}
1326	\DeclareUnicodeComposite{\k}	{I}{"012E}
1327	\DeclareUnicodeComposite{\k}	\i {"012F}
1328	\DeclareUnicodeComposite{\k}	{i}{"012F}
1329	\DeclareUnicodeComposite{\.}	{I}{"0130}
1330	\DeclareUnicodeComposite{\^}	{J}{"0134}
1331	\DeclareUnicodeComposite{\^}	\j {"0135}
1332	\DeclareUnicodeComposite{\^}	{j}{"0135}
1333	\DeclareUnicodeComposite{\c}	{K}{"0136}
1334	\DeclareUnicodeComposite{\c}	{k}{"0137}
1335	\DeclareUnicodeComposite{\'}	{L}{"0139}
1336	\DeclareUnicodeComposite{\'}	{l}{"013A}
1337	\DeclareUnicodeComposite{\c}	{L}{"013B}
1338	\DeclareUnicodeComposite{\c}	{l}{"013C}
1339	\DeclareUnicodeComposite{\v}	{L}{"013D}
1340	\DeclareUnicodeComposite{\v}	{l}{"013E}
1341	\DeclareUnicodeComposite{\'}	{N}{"0143}
1342	\DeclareUnicodeComposite{\'}	{n}{"0144}
1343	\DeclareUnicodeComposite{\c}	{N}{"0145}
1344	\DeclareUnicodeComposite{\c}	{n}{"0146}
1345	\DeclareUnicodeComposite{\v}	{N}{"0147}
1346	\DeclareUnicodeComposite{\v}	{n}{"0148}
1347	\DeclareUnicodeComposite{\=}	{O}{"014C}
1348	\DeclareUnicodeComposite{\=}	{o}{"014D}
1349	\DeclareUnicodeComposite{\u}	{O}{"014E}
1350	\DeclareUnicodeComposite{\u}	{o}{"014F}
1351	\DeclareUnicodeComposite{\H}	{O}{"0150}
1352	\DeclareUnicodeComposite{\H}	{o}{"0151}
1353	\DeclareUnicodeComposite{\'}	{R}{"0154}
1354	\DeclareUnicodeComposite{\'}	{r}{"0155}
1355	\DeclareUnicodeComposite{\c}	{R}{"0156}
1356	\DeclareUnicodeComposite{\c}	{r}{"0157}
1357	\DeclareUnicodeComposite{\v}	{R}{"0158}
1358	\DeclareUnicodeComposite{\v}	{r}{"0159}
1359	\DeclareUnicodeComposite{\'}	{S}{"015A}



1360	\DeclareUnicodeComposite{\'}	{s}{"015B}
1361	\DeclareUnicodeComposite{\^}	{S}{"015C}
1362	\DeclareUnicodeComposite{\^}	{s}{"015D}
1363	\DeclareUnicodeComposite{\c}	{S}{"015E}
1364	\DeclareUnicodeComposite{\c}	{s}{"015F}
1365	\DeclareUnicodeComposite{\v}	{S}{"0160}
1366	\DeclareUnicodeComposite{\v}	{s}{"0161}
1367	\DeclareUnicodeComposite{\c}	{T}{"0162}
1368	\DeclareUnicodeComposite{\c}	{t}{"0163}
1369	\DeclareUnicodeComposite{\v}	{T}{"0164}
1370	\DeclareUnicodeComposite{\v}	{t}{"0165}
1371	\DeclareUnicodeComposite{\~}	{U}{"0168}
1372	\DeclareUnicodeComposite{\~}	{u}{"0169}
1373	\DeclareUnicodeComposite{=}	{U}{"016A}
1374	\DeclareUnicodeComposite{=}	{u}{"016B}
1375	\DeclareUnicodeComposite{\u}	{U}{"016C}
1376	\DeclareUnicodeComposite{\u}	{u}{"016D}
1377	\DeclareUnicodeComposite{\r}	{U}{"016E}
1378	\DeclareUnicodeComposite{\r}	{u}{"016F}
1379	\DeclareUnicodeComposite{\H}	{U}{"0170}
1380	\DeclareUnicodeComposite{\H}	{u}{"0171}
1381	\DeclareUnicodeComposite{\k}	{U}{"0172}
1382	\DeclareUnicodeComposite{\k}	{u}{"0173}
1383	\DeclareUnicodeComposite{\^}	{W}{"0174}
1384	\DeclareUnicodeComposite{\^}	{w}{"0175}
1385	\DeclareUnicodeComposite{\^}	{Y}{"0176}
1386	\DeclareUnicodeComposite{\^}	{y}{"0177}
1387	\DeclareUnicodeComposite{\"}}	{Y}{"0178}
1388	\DeclareUnicodeComposite{\'}	{Z}{"0179}
1389	\DeclareUnicodeComposite{\'}	{z}{"017A}
1390	\DeclareUnicodeComposite{\.}	{Z}{"017B}
1391	\DeclareUnicodeComposite{\.}	{z}{"017C}
1392	\DeclareUnicodeComposite{\v}	{Z}{"017D}
1393	\DeclareUnicodeComposite{\v}	{z}{"017E}
1394	\DeclareUnicodeComposite{\v}	{A}{"01CD}
1395	\DeclareUnicodeComposite{\v}	{a}{"01CE}
1396	\DeclareUnicodeComposite{\v}	{I}{"01CF}
1397	\DeclareUnicodeComposite{\v}	\i {"01D0}
1398	\DeclareUnicodeComposite{\v}	{i}{"01D0}
1399	\DeclareUnicodeComposite{\v}	{O}{"01D1}
1400	\DeclareUnicodeComposite{\v}	{o}{"01D2}
1401	\DeclareUnicodeComposite{\v}	{U}{"01D3}
1402	\DeclareUnicodeComposite{\v}	{u}{"01D4}
1403	\DeclareUnicodeComposite{\=}	\AE{"01E2}
1404	\DeclareUnicodeComposite{\=}	\ae{"01E3}
1405	\DeclareUnicodeComposite{\v}	{G}{"01E6}
1406	\DeclareUnicodeComposite{\v}	{g}{"01E7}
1407	\DeclareUnicodeComposite{\v}	{K}{"01E8}
1408	\DeclareUnicodeComposite{\v}	{k}{"01E9}
1409	\DeclareUnicodeComposite{\k}	{O}{"01EA}
1410	\DeclareUnicodeComposite{\k}	{o}{"01EB}
1411	\DeclareUnicodeComposite{\v}	\j {"01F0}
1412	\DeclareUnicodeComposite{\v}	{j}{"01F0}
1413	\DeclareUnicodeComposite{\'}	{G}{"01F4}

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1414 \DeclareUnicodeComposite{\'} {g}{"01F5}
1415 \DeclareUnicodeComposite{\textcommabelow}{S}{"0218}
1416 \DeclareUnicodeComposite{\textcommabelow}{s}{"0219}
1417 \DeclareUnicodeComposite{\textcommabelow}{T}{"021A}
1418 \DeclareUnicodeComposite{\textcommabelow}{t}{"021B}
1419 \DeclareUnicodeComposite{\=} {Y}{"0232}
1420 \DeclareUnicodeComposite{\=} {y}{"0233}
1421 \DeclareUnicodeComposite{\.} {B}{"1E02}
1422 \DeclareUnicodeComposite{\.} {b}{"1E03}
1423 \DeclareUnicodeComposite{\d} {B}{"1E04}
1424 \DeclareUnicodeComposite{\d} {b}{"1E05}
1425 \DeclareUnicodeComposite{\d} {D}{"1E0C}
1426 \DeclareUnicodeComposite{\d} {d}{"1E0D}
1427 \DeclareUnicodeComposite{\=} {G}{"1E20}
1428 \DeclareUnicodeComposite{\=} {g}{"1E21}
1429 \DeclareUnicodeComposite{\d} {H}{"1E24}
1430 \DeclareUnicodeComposite{\d} {h}{"1E25}
1431 \DeclareUnicodeComposite{\d} {K}{"1E32}
1432 \DeclareUnicodeComposite{\d} {k}{"1E33}
1433 \DeclareUnicodeComposite{\d} {L}{"1E36}
1434 \DeclareUnicodeComposite{\d} {l}{"1E37}
1435 \DeclareUnicodeComposite{\d} {M}{"1E42}
1436 \DeclareUnicodeComposite{\d} {m}{"1E43}
1437 \DeclareUnicodeComposite{\d} {N}{"1E46}
1438 \DeclareUnicodeComposite{\d} {n}{"1E47}
1439 \DeclareUnicodeComposite{\d} {R}{"1E5A}
1440 \DeclareUnicodeComposite{\d} {r}{"1E5B}
1441 \DeclareUnicodeComposite{\d} {S}{"1E62}
1442 \DeclareUnicodeComposite{\d} {s}{"1E63}
1443 \DeclareUnicodeComposite{\d} {T}{"1E6C}
1444 \DeclareUnicodeComposite{\d} {t}{"1E6D}
1445 \DeclareUnicodeComposite{\d} {V}{"1E7E}
1446 \DeclareUnicodeComposite{\d} {v}{"1E7F}
1447 \DeclareUnicodeComposite{\d} {W}{"1E88}
1448 \DeclareUnicodeComposite{\d} {w}{"1E89}
1449 \DeclareUnicodeComposite{\d} {Z}{"1E92}
1450 \DeclareUnicodeComposite{\d} {z}{"1E93}
1451 \DeclareUnicodeComposite{\d} {A}{"1EA0}
1452 \DeclareUnicodeComposite{\d} {a}{"1EA1}
1453 \DeclareUnicodeComposite{\d} {E}{"1EB8}
1454 \DeclareUnicodeComposite{\d} {e}{"1EB9}
1455 \DeclareUnicodeComposite{\d} {I}{"1ECA}
1456 \DeclareUnicodeComposite{\d} {i}{"1ECB}
1457 \DeclareUnicodeComposite{\d} {O}{"1ECC}
1458 \DeclareUnicodeComposite{\d} {o}{"1ECD}
1459 \DeclareUnicodeComposite{\d} {U}{"1EE4}
1460 \DeclareUnicodeComposite{\d} {u}{"1EE5}
1461 \DeclareUnicodeComposite{\d} {Y}{"1EF4}
1462 \DeclareUnicodeComposite{\d} {y}{"1EF5}
1463 </TU>

```

## 2 Package files

This file now also contains some packages that provide access to the more specialised encodings.

### 2.1 The fontenc package

This package allows authors to specify which encodings they will use. For each encoding F00, the package looks to see if the encoding F00 has already been declared. If it has not, the file `fooenc.def` is loaded. The default encoding is set to be F00.

In addition the package at the moment contains extra code to extend the `\@uclclist` (list of upper/lower case pairs) for encodings that involve cyrillic characters. THIS IS A TEMPORARY SOLUTION and will not stay this way forever (or so we hope) but right now we are missing a proper interface for this and didn't wanted to rush it.

1464 `{*package)`

Here we define a macro that extends the `\@uclclist` if needed and afterwards turns itself in a noop.

```
1465 \def\update@uclc@with@cyrillic{%
1466 \expandafter\def\expandafter\@uclclist\expandafter
1467 {\@uclclist
1468 \cyr\CYRA\cyrahch\CYRABHCH\cyrahchdsc\CYRABHCHDSC\cyrahhdze
1469 \CYRABHDZE\cyrahha\CYRABHHA\cyrac\CYRAE\cyrb\CYRB\cyrbys
1470 \CYREBYUS\cyrc\CYRC\cyrch\CYRCH\cyrchldsc\CYRCHLDSC\cyrchrdsc
1471 \CYRCHRDSC\cyrchvcrs\CYRCHVCRS\cyrd\CYRD\cyrdelta\CYRDELTA
1472 \cyrdje\CYRDEJE\cyrdze\CYRDZE\cyrdzhe\CYRDZHE\cyre\CYRE\cyreps
1473 \CYREPS\cyrerev\CYREREV\cyrery\CYRERY\cyrf\CYRF\cyrfita
1474 \CYRFITA\cyrg\CYRG\cyrgdsc\CYRGDSC\cyrgdschcrs\CYRGDSCHCRS
1475 \cyrgchcrs\CYRGHCRS\cyrgkh\CYRGHK\cyrgup\CYRGUP\cyrh\CYRH
1476 \cyrhdsdsc\CYRHDS\cyrhchcrs\CYRHCHCRS\cyrhkh\CYRHHK\cyrhdsn
1477 \CYRHRDSN\cyri\CYRI\cyrie\CYRIE\cyrii\CYRII\cyrishrt\CYRISHRT
1478 \cyrishrtdsc\CYRISHRTDSC\cyrizh\CYRIZH\cyrje\CYRJE\cyrk\CYRK
1479 \cyrkbeak\CYRKBEAK\cyrkdsdsc\CYRKDSC\cyrkchcrs\CYRKCHCRS\cyrkhh
1480 \CYRKHK\cyrkvcrs\CYRKVCRS\cyr\CYRL\cyrldsc\CYRLDSC\cyrllhk
1481 \CYRLHK\cyrllje\CYRLJE\cyr\CYRM\cyrmdsc\CYRMDSC\cyrmhk\CYRMHK
1482 \cyrn\CYRN\cyrndsc\CYRNDSC\cyrng\CYRNG\cyrnhk\CYRNHK\cyrnje
1483 \CYRNJE\cyrnlhk\CYRNLHK\cyro\CYRO\cyrotld\CYROTLD\cyrp\CYRP
1484 \cyrphk\CYRPHK\cyrq\CYRQ\cyrr\CYRR\cyrrdsdsc\CYRRDSC\cyrrhk
1485 \CYRRHK\cyrrtick\CYRRTICK\cyrs\CYRS\cyrsacrs\CYRSACRS
1486 \cyrschwa\CYRSCHWA\cyrsdsc\CYRSDSC\cyrsemisftsn\CYRSEMISFTSN
1487 \cyrsftsn\CYRSFTSN\cyrsh\CYRSH\cyrshch\CYRSHCH\cyrshha\CYRSHHA
1488 \cyrt\CYRT\cyrtedsc\CYRTDSC\cyrtetse\CYRTETSE\cyrtshe\CYRTSHE
1489 \cyru\CYRU\cyrushrt\CYRUSHRT\cyrv\CYRV\cyrw\CYRW\cyr\CYRY
1490 \CYRYA\CYRYA\cyrat\CYRYAT\cyrhcrs\CYRYHCRS\cyr\CYRYI\CYRYI\cyr
1491 \CYRYO\CYRYO\CYRYU\cyrz\CYRZ\cyzdsdsc\CYRZDSC\cyrz\CYRZH
1492 \cyzhdsc\CYRZHDSC}%
1493 \let\update@uclc@with@cyrillic\relax
1494 }
```

Here we process each option:

```
1495 \DeclareOption*{%
1496 \let\encodingdefault\CurrentOption
```

From 2020/02/02 release onward we only load the encoding files if they haven't be loaded already. To check this we look if `\T@encoding` is already defined. If not we load (indicated by setting the switch `@tempswa` to true and we always load if we run in an older format (or rather in a rollback situation).

```

1497 \@tempswafalse
1498 \@ifl@t@r\fmtversion{2020/02/02}%
1499     {\expandafter\ifx\csname T@\CurrentOption\endcsname\relax
1500      \@tempswatrue\fi}%
1501     {\@tempswatrue}%

```

Load if necessary:

```

1502 \if@tempswa
1503     \edef\reserved@f{%
1504         \lowercase{\def\noexpand\reserved@f{\CurrentOption enc.def}}}%
1505     \reserved@f
1506     \InputIfFileExists\reserved@f
1507     {\PackageError{fontenc}%
1508      {Encoding file ‘\reserved@f’ not found.%
1509       \MessageBreak
1510       You might have misspelt the name of the encoding}%
1511      {Necessary code for this encoding was not
1512       loaded.\MessageBreak
1513       Thus calling the encoding later on will
1514       produce further error messages.}}%
1515     \let\reserved@f\relax

```

In case the current encoding is one of a list of known cyrillic ones we extend the `\@uclclist`:

```

1516 \expandafter\in@\expandafter{\CurrentOption}%
1517                               {T2A,T2B,T2C,X2,LCY,OT2}%
1518 \ifin@

```

But only if it hasn't already been extended. This might happen if there are several calls to fontenc loading one of the above encodings. If we don't do this check the `\@uclclist` gets unnecessarily big, slowing down the processing at runtime.

```

1519 \expandafter\in@\expandafter\cyrillic\expandafter
1520                               {\@uclclist}%
1521 \ifin@
1522 \else
1523     \update@uclc@with@cyrillic
1524 \fi
1525 \fi
1526 \fi
1527 }

```

```

1528 \ProcessOptions*

```

We select the new font encoding default (i.e., the last encoding specified in the option list. But this encoding may not work with the current `\f@shape`, e.g., `LY1` is not defined for `cmr` and therefore packages switching to `LY1` usually also change `\rmdefault`. But that only applies at `\begin{document}` so we get a spurious warning if we use what L<sup>A</sup>T<sub>E</sub>X previously used:

```

1529 %\fontencoding\encodingdefault\selectfont

```

So instead we do this here:

```
1530 \usefont\encodingdefault\familydefault\seriesdefault\shapedefault
```

To save some space we get rid of the macro extending the `\@uclclist` (might have happened already).

```
1531 \let\update@uclc@with@cyrillic\relax
```

Finally we pretend that the fontenc package wasn't read in. This allows for using it several times, e.g., in a class file and in the preamble (at the cost of not getting any version info). That kind of hackery shows that using a general purpose package just for loading an encoding is not the right kind of interface for setting up encodings — it will get replaced at some point in the future.

```
1532 \let\@elt\relax
```

```
1533 \xdef\@fontenc@load@list{\@fontenc@load@list
```

```
1534   \@elt{\csname opt@fontenc.sty\endcsname}}
```

```
1535 \global\expandafter\let\csname ver@fontenc.sty\endcsname\relax
```

```
1536 \global\expandafter\let\csname opt@fontenc.sty\endcsname\relax
```

```
1537 \global\let\@ifl@ter@@\@ifl@ter
```

```
1538 \def\@ifl@ter#1#2#3#4#5{\global\let\@ifl@ter\@ifl@ter@@}
```

```
1539 \endpackage
```

# File p ltcounts.dtx

## 1 Counters and Lengths

Commands for defining and using counters. This file defines:

<code>\newcounter</code>	To define a new counter.
<code>\setcounter</code>	To set the value of counters.
<code>\addtocounter</code>	Increase the counter <b>#1</b> by the number <b>#2</b> .
<code>\stepcounter</code>	Increase a counter by one.
<code>\refstepcounter</code>	Increase a counter by one, also setting the value used by <code>\label</code> .
<code>\value</code>	For accessing the value of the counter as a TeX number (as opposed to <code>\the&lt;counter&gt;</code> which expands to the <i>printed</i> representation of <code>&lt;counter&gt;</code> )
<code>\arabic</code>	<code>\arabic{&lt;counter&gt;}</code> : 1, 2, 3, ...
<code>\roman</code>	<code>\roman{&lt;counter&gt;}</code> : i, ii, iii, ...
<code>\Roman</code>	<code>\Roman{&lt;counter&gt;}</code> : I, II, III, ...
<code>\alph</code>	<code>\alph{&lt;counter&gt;}</code> : a, b, c, ...
<code>\Alph</code>	<code>\Alph{&lt;counter&gt;}</code> : A, B, C, ...
<code>\fnsymbol</code>	<code>\fnsymbol{&lt;counter&gt;}</code> : *, †, ‡, ...
<code>\counterwithin</code>	<code>\counterwithin{&lt;counter&gt;}{&lt;within-counter&gt;}</code> : Resets <code>&lt;counter&gt;</code> whenever <code>&lt;within-counter&gt;</code> is stepped. Also redefines <code>\the&lt;counter&gt;</code> command to produce <code>\the&lt;within-counter&gt;.\arabic{&lt;counter&gt;}</code> . Star form omits redefining the print representation.
<code>\counterwithout</code>	<code>\counterwithout{&lt;counter&gt;}{&lt;within-counter&gt;}</code> : Removes <code>&lt;counter&gt;</code> from the reset list of <code>&lt;within-counter&gt;</code> . Also redefines <code>\the&lt;counter&gt;</code> command to produce <code>\arabic{&lt;counter&gt;}</code> . Star form omits redefining the print representation.

1 (\*2ekernel)

### 1.1 Environment Counter Macros

An environment foo has an associated counter defined by the following control sequences:

<code>\c@foo</code>	Contains the counter's numerical value. It is defined by <code>\newcount\foocounter</code> .
<code>\thefoo</code>	Macro that expands to the printed value of <code>\foocounter</code> . For example, if sections are numbered within chapters, and section headings look like Section II-3. The Nature of Counters then <code>\thesection</code> might be defined by: <code>\def\thesection</code> <code>{\@Roman{\c@chapter}-\@arabic{\c@section}}</code>
<code>\p@foo</code>	Macro that expands to a printed 'reference prefix' of counter foo. Any <code>\ref</code> to a value created by counter foo will produce the expansion of <code>\p@foo\thefoo</code> when the <code>\label</code> command is executed. See file <code>ltxref.dtx</code> for an extension of this mechanism.
<code>\cl@foo</code>	List of counters to be reset when foo stepped. Has format <code>\@elt{countera}\@elt{counterb}\@elt{counterc}</code> .

#### NOTE:

`\thefoo` and `\p@foo` *must* be defined in such a way that `\edef\bar{\thefoo}` or `\edef\bar{\p@foo}` defines `\bar` so that it will evaluate to the counter value at the

time of the `\edef`, even after `\foocounter` and any other counters have been changed. This will happen if you use the standard commands `\@arabic`, `\@Roman`, etc.

The following commands are used to define and modify counters.

`\refstepcounter{<foo>}`

Same as `\stepcounter`, but it also defines `\@currentreference` so that a subsequent `\label{<bar>}` command causes `\ref{<bar>}` to generate the current value of counter `<foo>`.

`\@definecounter{<foo>}`

Initializes counter `{<foo>}` (with empty reset list), defines `\p@foo` and `\thefoo` to be null. Also adds `<foo>` to `\cl@ckpt` – the reset list of a dummy counter `@ckpt` used for taking checkpoints for the `\include` system.

`\@addtoreset{<foo>}{<bar>}` : Adds counter `<foo>` to the list of counters `\cl@bar` to be reset when counter `<bar>` is stepped.

`\@removefromreset{<foo>}{<bar>}` : Removes counter `<foo>` to the list of counters `\cl@bar` to be reset when counter `<bar>` is stepped.

`\setcounter` `\setcounter{<foo>}{<val>}` : Globally sets `\foocounter` equal to `<val>`.

```
2 \def\setcounter#1#2{%
3   \@ifundefined{c@#1}%
4     {\@nocounterr{#1}}%
5     {\global\csname c@#1\endcsname#2\relax}}
```

(End definition for `\setcounter`. This function is documented on page ??.)

`\addtocounter` `\addtocounter{<foo>}{<val>}` Globally increments `\foocounter` by `<val>`.

```
6 \def\addtocounter#1#2{%
7   \@ifundefined{c@#1}%
8     {\@nocounterr{#1}}%
9     {\global\advance\csname c@#1\endcsname #2\relax}}
```

(End definition for `\addtocounter`. This function is documented on page ??.)

`\newcounter` `\newcounter{<newctr>}[<oldctr>]` Defines `<newctr>` to be a counter, which is reset when counter `<oldctr>` is stepped. If `<newctr>` already defined produces ‘`c@newctr` already defined’ error.

```
10 \def\newcounter#1{%
11   \expandafter\ifdefinable \csname c@#1\endcsname
12     {\@definecounter{#1}}%
13   \@ifnextchar[{\@newctr{#1}}{-}]}
```

(End definition for `\newcounter`. This function is documented on page ??.)

`\value` `\value{<ctr>}` produces the value of counter `<ctr>`, for use with a `\setcounter` or `\addtocounter` command.

```
14 \def\value#1{\csname c@#1\endcsname}
```

(End definition for `\value`. This function is documented on page ??.)

`\@newctr`

```
15 \def\@newctr#1[#2]{%
16   \@ifundefined{c@#2}{\@nocounterr{#2}}{\@addtoreset{#1}{#2}}}
```

(End definition for `\@newctr`. This function is documented on page ??.)

`\stepcounter` `\stepcounterfoo` Globally increments counter `\c@F00` and resets all subsidiary counters.

```

17 \def\stepcounter#1{%
18   \addtocounter{#1}\@ne
19   \begingroup
20     \let\@elt\@stpelt
21     \csname cl@#1\endcsname
22   \endgroup}

```

(End definition for `\stepcounter`. This function is documented on page ??.)

`\@stpelt` Rather than resetting the “within” counter to zero we set it to  $-1$  and then run `\stepcounter` that moves it to 0 and also initiates resetting the next level down.

```

23 </2ekernel>
24 <latexrelease>\IncludeInRelease{2015/01/01}{\@stpelt}
25 <latexrelease>                                     {Reset nested counters}%
26 <*2ekernel | latexrelease>
27 \def\@stpelt#1{\global\csname c@#1\endcsname \m@ne\stepcounter{#1}}%
28 <latexrelease>\EndIncludeInRelease
29 </2ekernel | latexrelease>
30 <latexrelease>\IncludeInRelease{0000/00/00}{\@stpelt}
31 <latexrelease>                                     {Reset nested counters}%%
32 <latexrelease>\def\@stpelt#1{\global\csname c@#1\endcsname \z@}%
33 <latexrelease>\EndIncludeInRelease
34 <*2ekernel>

```

(End definition for `\@stpelt`. This function is documented on page ??.)

`\cl@@ckpt`

```

35 \def\cl@@ckpt{\@elt{page}}

```

(End definition for `\cl@@ckpt`. This function is documented on page ??.)

`\@definecounter`

```

36 \def\@definecounter#1{\expandafter\newcount\csname c@#1\endcsname
37   \setcounter{#1}\z@
38   \global\expandafter\let\csname cl@#1\endcsname\@empty
39   \@addtoreset{#1}{@ckpt}%
40   \global\expandafter\let\csname p@#1\endcsname\@empty
41   \expandafter
42   \gdef\csname the#1\expandafter\endcsname\expandafter
43     {\expandafter\@arabic\csname c@#1\endcsname}}

```

(End definition for `\@definecounter`. This function is documented on page ??.)

`\@addtoreset`

```

44 \def\@addtoreset#1#2{\expandafter\@cons\csname cl@#2\endcsname {\{#1\}}}

```

(End definition for `\@addtoreset`. This function is documented on page ??.)

```

45 </2ekernel>

```

`\@removefromreset`

```

46 <latexrelease>\IncludeInRelease{2018-04-01}
47 <latexrelease>                                     {\@removefromreset}{Add interfaces}%
48 <*2ekernel | latexrelease>

```



```
49 \def\@removefromreset#1#2{%
```

Even through this is internal and the programmer should know what he/she is doing we test here if counter #2 is defined. If not, the execution would run into a tight loop.

```
50 \ifundefined{c@#2}\relax
51 {\begingroup
52 \expandafter\let\csname c@#1\endcsname\@removefromreset
53 \def\@elt##1{%
54 \expandafter\ifx\csname c@##1\endcsname\@removefromreset
55 \else
56 \noexpand\@elt{##1}%
57 \fi}%
58 \expandafter\xdef\csname cl@#2\endcsname
59 {\csname cl@#2\endcsname}%
60 \endgroup}}
```

(End definition for \@removefromreset. This function is documented on page ??.)

`\ifbothcounters` Test if arg #1 and #2 are counters and if so execute #3.

```
61 \def\@ifbothcounters#1#2#3{%
62 \ifundefined{c@#1}{\@nocounterr{#1}}%
63 {% else counter is defined
64 \ifundefined{c@#2}{\@nocounterr{#2}}%
65 {% else both counter and within are defined
66 #3}}
```

(End definition for \@ifbothcounters. This function is documented on page ??.)

`\counterwithout`

```
67 \def\counterwithout {\@ifstar\counterwithout@s\counterwithout@x}
68 \def\counterwithout@s#1#2{%
69 \@ifbothcounters{#1}{#2}{\@removefromreset{#1}{#2}}}
70 \def\counterwithout@x#1#2{%
71 \@ifbothcounters{#1}{#2}%
72 {\@removefromreset{#1}{#2}%
73 \expandafter
74 \gdef\csname the#1\expandafter\endcsname\expandafter
75 {\expandafter
76 \@arabic\csname c@#1\endcsname}}}
```

(End definition for \counterwithout. This function is documented on page ??.)

`\counterwithin`

```
77 \def\counterwithin{\@ifstar\counterwithin@s\counterwithin@x}
78 \def\counterwithin@s#1#2{%
79 \@ifbothcounters{#1}{#2}{\@addtoreset{#1}{#2}}}
80 \def\counterwithin@x#1#2{%
81 \@ifbothcounters{#1}{#2}%
82 {\@addtoreset{#1}{#2}%
83 \expandafter
84 \gdef\csname the#1\expandafter\endcsname\expandafter
85 {\csname the#2\expandafter\endcsname\expandafter
86 .\expandafter
87 \@arabic\csname c@#1\endcsname}}}
```

(End definition for `\counterwithin`. This function is documented on page ??.)

```

88 </2ekernel | latexrelease>
89 <latexrelease>\EndIncludeInRelease
90 <latexrelease>\IncludeInRelease{0000-00-00}
91 <latexrelease>          {\@removefromreset}{Add interfaces}%
92 <latexrelease>\let \@removefromreset \undefined
93 <latexrelease>\let \@ifbothcounters \undefined
94 <latexrelease>\let \counterwithout \undefined
95 <latexrelease>\let \counterwithout@s \undefined
96 <latexrelease>\let \counterwithout@x \undefined
97 <latexrelease>\let \counterwithin \undefined
98 <latexrelease>\let \counterwithin@s \undefined
99 <latexrelease>\let \counterwithin@x \undefined
100 <latexrelease>\EndIncludeInRelease
101 <*2ekernel>

```

Numbering commands for definitions of `\theCOUNTER` and `\list` arguments.  
All commands can now be used in text and math mode.

**\arabic** Representation of  $\langle counter \rangle$  as arabic numerals. Changed 29 Apr 86 to make it print the obvious thing if COUNTER not positive.

```
102 \def\arabic#1{\expandafter\@arabic\csname c@#1\endcsname}
```

(End definition for `\arabic`. This function is documented on page ??.)

**\roman** Representation of  $\langle counter \rangle$  as lower-case Roman numerals.

```
103 \def\roman#1{\expandafter\@roman\csname c@#1\endcsname}
```

(End definition for `\roman`. This function is documented on page ??.)

**\Roman** Representation of  $\langle counter \rangle$  as upper-case Roman numerals.

```
104 \def\Roman#1{\expandafter\@Roman\csname c@#1\endcsname}
```

(End definition for `\Roman`. This function is documented on page ??.)

**\alph** Representation of  $\langle counter \rangle$  as a lower-case letter: 1 = a, 2 = b, etc.

```
105 \def\alph#1{\expandafter\@alph\csname c@#1\endcsname}
```

(End definition for `\alph`. This function is documented on page ??.)

**\Alph** Representation of  $\langle counter \rangle$  as an upper-case letter: 1 = A, 2 = B, etc.

```
106 \def\Alph#1{\expandafter\@Alph\csname c@#1\endcsname}
```

(End definition for `\Alph`. This function is documented on page ??.)

**\fnsymbol** Representation of  $\langle COUNTER \rangle$  as a footnote symbol: 1 = \*, 2 = †, etc.

```
107 \def\fnsymbol#1{\expandafter\@fnsymbol\csname c@#1\endcsname}
```

(End definition for `\fnsymbol`. This function is documented on page ??.)

**\@arabic** `\@arabic\F00counter` Representation of `\F00counter` as arabic numerals.

```
108 \def\@arabic#1{\number #1} %% changed 29 Apr 86
```

(End definition for `\@arabic`. This function is documented on page ??.)

```

\@roman \@roman\F00counter Representation of \F00counter as lower-case Roman numerals.
109 \def\@roman#1{\romannumeral #1}

(End definition for \@roman. This function is documented on page ??.)

\@Roman \@Roman\F00counter Representation of \F00counter as upper-case Roman numerals.
110 \def\@Roman#1{\expandafter\@slowromancap\romannumeral #1\@}

(End definition for \@Roman. This function is documented on page ??.)

\@slowromancap Fully expandable macro to change a roman number to uppercase.
111 \def\@slowromancap#1{\ifx @#1% then terminate
112     \else
113         \if i#1I\else\if v#1V\else\if x#1X\else\if l#1L\else\if
114             c#1C\else\if d#1D\else \if m#1M\else#1\fi\fi\fi\fi\fi\fi
115             \expandafter\@slowromancap
116         \fi
117 }

(End definition for \@slowromancap. This function is documented on page ??.)

\@alph \@alph\F00counter Representation of \F00counter as a lower-case letter: 1 = a, 2 =
b, etc.
118 \def\@alph#1{%
119     \ifcase#1\or a\or b\or c\or d\or e\or f\or g\or h\or i\or j\or
120     k\or l\or m\or n\or o\or p\or q\or r\or s\or t\or u\or v\or w\or x\or
121     y\or z\else\@ctrerr\fi}

(End definition for \@alph. This function is documented on page ??.)

\@Alph \@Alph\F00counter Representation of \F00counter as an upper-case letter: 1 = A, 2
= B, etc.
122 \def\@Alph#1{%
123     \ifcase#1\or A\or B\or C\or D\or E\or F\or G\or H\or I\or J\or
124     K\or L\or M\or N\or O\or P\or Q\or R\or S\or T\or U\or V\or W\or X\or
125     Y\or Z\else\@ctrerr\fi}

(End definition for \@Alph. This function is documented on page ??.)

\@fnsymbol Typesetting old fashioned footnote symbols. This can be done both in text or math mode
now.

```

This macro is another example of an ever recurring problem in  $\text{\TeX}$ : Determining if something is text-mode or math-mode. It is imperative for the decision between text and math to be delayed until the actual typesetting is done as the code in question may go through an `\edef` or `\write` where an `\ifmmode` test would be executed prematurely. Hence in the implementation below, `\@fnsymbol` is not robust in itself but the parts doing the actual typesetting are.

In the case of `\@fnsymbol` we make use of the robust command `\TextOrMath` which takes two arguments and typesets the first if in text-mode and the second if in math-mode. Note that in order for this command to make the correct decision, it must insert a `\relax` token if run under regular  $\text{\TeX}$ , which ruins any kerning between the preceding characters and whatever awaits typesetting. If you use  $\text{\eTeX}$  as engine for  $\text{\LaTeX}$  (as recommended) this unfortunate side effect is not present.

```

126 </2ekernel>
127 <latexrelease>\IncludeInRelease{2015/01/01}{\@fnsymbol}{Use \TextOrMath}%
128 <*2ekernel | latexrelease>
129 \def\@fnsymbol#1{%
130   \ifcase#1\or \TextOrMath\textasteriskcentered *\or
131   \TextOrMath \textdagger \dagger\or
132   \TextOrMath \textdaggerdbl \ddagger \or
133   \TextOrMath \textsection \mathsection\or
134   \TextOrMath \textparagraph \mathparagraph\or
135   \TextOrMath \textbardbl \|\or
136   \TextOrMath {\textasteriskcentered\textasteriskcentered}{**}\or
137   \TextOrMath {\textdagger\textdagger}{\dagger\dagger}\or
138   \TextOrMath {\textdaggerdbl\textdaggerdbl}{\ddagger\ddagger}\else
139   \@ctrerr \fi
140 }%
141 </2ekernel | latexrelease>
142 <latexrelease>\EndIncludeInRelease
143 <latexrelease>\IncludeInRelease{0000/00/00}{\@fnsymbol}{Use \TextOrMath}%
144 <latexrelease>\def\@fnsymbol#1{\ensuremath{%
145   <latexrelease> \ifcase#1\or *\or \dagger\or \ddagger\or \mathsection\or
146   <latexrelease> \mathparagraph\or \|\or **\or \dagger\dagger
147   <latexrelease> \or \ddagger\ddagger \else\@ctrerr\fi}}%
148 <latexrelease>\EndIncludeInRelease
149 <*2ekernel>

```

(End definition for \@fnsymbol. This function is documented on page ??.)

**\TextOrMath** When using regular T<sub>E</sub>X, we make this command robust so that it always selects the correct branch in an \ifmmode switch with the usual disadvantage of ruining kerning. For the application we use it for here that shouldn't matter. The alternative would be to mimic \IeC from inputenc but then it will have the disadvantage of choosing the wrong branch if appearing at the beginning of an alignment cell. However, users of eT<sub>E</sub>X will be pleasantly surprised to get the best of both worlds and no bad side effects.

First some code for checking if we are running eT<sub>E</sub>X but making sure not to permanently turn \protected into \relax.

```

150 </2ekernel>
151 <latexrelease>\IncludeInRelease{2015/01/01}{\TextOrMath}{\TextOrMath}%
152 <*2ekernel | latexrelease>
153 \begingroup\expandafter\expandafter\expandafter\endgroup
154 \expandafter\ifx\csname protected\endcsname\relax

```

In case of ordinary T<sub>E</sub>X we define \TextOrMath as a robust command but make sure it always grabs its arguments. If we didn't do this it might very well gobble spaces in the input stream.

```

155 \DeclareRobustCommand\TextOrMath{%
156   \ifmmode \expandafter\@secondoftwo
157   \else \expandafter\@firstoftwo \fi
158 \protected@edef\TextOrMath#1#2{\TextOrMath{#1}{#2}}
159 \else

```

For eT<sub>E</sub>X the situation is similar. The robust macro is a hidden one so that we again avoid problems of gobbling spaces in the input.

```

160 \protected\expandafter\def\csname TextOrMath\space\endcsname{%
161   \ifmmode \expandafter\@secondoftwo

```

```

162 \else \expandafter\@firstoftwo \fi}
163 \edef\TextOrMath#1#2{%
164 \expandafter\noexpand\csname TextOrMath\space\endcsname
165 {#1}{#2}}
166 \fi
167 </2ekernel | latexrelease>
168 <latexrelease>\EndIncludeInRelease
169 <latexrelease>\IncludeInRelease{0000/00/00}{\TextOrMath}{\TextOrMath}%
170 <latexrelease>\let\TextOrMath\@undefined
171 <latexrelease>\EndIncludeInRelease
172 <*2ekernel>

(End definition for \TextOrMath. This function is documented on page ??.)

173 </2ekernel>

```

# File q

## ltnlength.dtx

### 1 Lengths

```

\newlength Declare #1 to be a new length command.
\setlength Set the length command, #1, to the value #2.
\addtolength Increase the value of the length command, #1, by the value #2.
\settowidth Set the length, #1 to the width of a box containing #2.
\settoheight Set the length, #1 to the height of a box containing #2.
\settodepth Set the length, #1 to the depth of a box containing #2.

1 <*2ekernel>
2 \message{lengths,}

\newlength

3 \def\newlength#1{\@ifdefinable#1{\newskip#1}}

(End definition for \newlength. This function is documented on page ??.)

\setlength

4 </2ekernel>
5 <latexrelease>\IncludeInRelease{2015/01/01}%
6 <latexrelease> \setlength}{Using \setlength with \dimen0}%
7 <*2ekernel | latexrelease>

8 \def\setlength#1#2{#1 #2\relax}
9 </2ekernel | latexrelease>
10 <latexrelease>\EndIncludeInRelease
11 <latexrelease>\IncludeInRelease{0000/00/00}%
12 <latexrelease> \setlength}{Using \setlength with \dimen0}%
13 <latexrelease>\def\setlength#1#2{#1#2\relax}
14 <latexrelease>\EndIncludeInRelease
15 <*2ekernel>

(End definition for \setlength. This function is documented on page ??.)

\addtolength \relax added 24 Mar 86

16 \def\addtolength#1#2{\advance#1 #2\relax}

(End definition for \addtolength. This function is documented on page ??.)

\settoheight The obvious analogs of \settowidth.
\settodepth
\settowidth
\@settodim
17 \def\@settodim#1#2#3{\setbox\@tempboxa\hbox{#{#3}}#2#1\@tempboxa}

Clear the memory afterwards (which might be a lot).

18 \setbox\@tempboxa\box\voidb@x}
19 \DeclareRobustCommand\settoheight{\@settodim\ht}
20 \DeclareRobustCommand\settodepth {\@settodim\dp}
21 \DeclareRobustCommand\settowidth {\@settodim\wd}

(End definition for \settoheight and others. These functions are documented on page ??.)

```

`\@settopoint` This macro takes the contents of the skip register that is supplied as its argument and removes the fractional part to make it a whole number of points. This can be used in class files to avoid values like 345.4666666pt when calculating a dimension.

```
22 \def\@settopoint#1{\divide#1\p@\multiply#1\p@}
23 \</2ekernel>
```

*(End definition for \@settopoint. This function is documented on page ??.)*

# File r

## ltfssbas.dtx

This file contains the main implementation of the ‘low level’ font selection commands. See other parts of the L<sup>A</sup>T<sub>E</sub>X distribution, or *The L<sup>A</sup>T<sub>E</sub>X Companion* for higher level documentation of the L<sup>A</sup>T<sub>E</sub>X ‘New’ Font Selection Scheme.

**Warning:** The macro documentation is still basically the documentation from the first NFSS release and therefore in some cases probably not completely accurate.

## 1 Preliminary macros

We define a number of macros that will be used later.

`\@nomath` `\@nomath` is used by most macros that will have no effect in math mode. It issues a warning message.

```

1  \<*2kernel>
2  \def\@nomath#1{\relax\ifmmode
3    \@font@warning{Command \noexpand#1invalid in math mode}\fi}

```

(End definition for \@nomath. This function is documented on page ??.)

`\no@alphabet@error` The macro `\no@alphabet@error` is called whenever the user requests a math *alphabet* that is not available in the current *version*. In math mode an error message is produced otherwise the command keeps silent. The argument is the name of the control sequence that identifies the math *alphabet*. The `\relax` at the beginning is necessary to prevent T<sub>E</sub>X from scanning too far in certain situations.

```

4  \gdef\no@alphabet@error#1{\relax \ifmmode
5    \@latex@error{Math\space alphabet\space identifier\space
6      \noexpand#1is\space undefined\space in\space math\space
7      version\space ‘\math@version’}%
8    {Your\space requested\space math\space alphabet\space
9      is\space undefined\space in\space the\space current\space
10     math\space version.^JCheck\space the\space spelling\space
11     or\space use\space the\space \noexpand\SetMathAlphabet\space
12     command.}
13    \fi}

```

(End definition for \no@alphabet@error. This function is documented on page ??.)

`\new@mathgroup` We also give a new name to `\newfam` and `\fam` to avoid verbal confusion (see the introduction).<sup>9</sup>

`\mathgroup`

```

14  %\def\new@mathgroup{\alloc@8\mathgroup\chardef\sixt@@n}
15  \let\mathgroup\fam
16  %\let\newfam\new@mathgroup
17  \@onlypreamble\new@mathgroup

```

(End definition for \new@mathgroup and \mathgroup. These functions are documented on page ??.)

<sup>9</sup>For the same reason it seems advisable to `\let\fam` and `\newfam` equal to `\relax`, but this is commented out to retain compatibility to existing style files.



## 2 Macros for setting up the tables

`\DeclareFontShape` The macro `\DeclareFontShape` takes 6 arguments:

```
18 \def\DeclareFontShape{\begingroup
```

First we restore the catcodes of all characters used in the syntax.

```
19 \nfss@catcodes
```

We use `\expandafter \endgroup` to restore catcode in case something goes wrong with the argument parsing (suggested by Tim Van Zandt)

```
20 \expandafter\endgroup
```

```
21 \DeclareFontShape@}
```

(End definition for `\DeclareFontShape`. This function is documented on page ??.)

`\DeclareFontShape@`

```
22 \</2kernel>
```

```
23 \<*2kernel | latexrelease>
```

```
24 \<latexrelease>\IncludeInRelease{2020/02/02}%
```

```
25 \<latexrelease> \<\DeclareFontShape@>\{Maybe drop one m\}%
```

```
26 \def\DeclareFontShape@#1#2#3#4#5#6{%
```

```
27 \expandafter\ifx\csname #1+#2\endcsname\relax
```

```
28 \<\latex@error{Font family ‘#1+#2’ unknown}\<\@eha
```

```
29 \else
```

If the series value is incorrectly specified with an extra “m”, e.g., “mc” instead of just “c”, drop the surplus “m” but keep the “m” if it is by its own. In that case also issue a warning that the declaration needs correction.

For this we compare the given value #3 with one where we may have dropped an “m”. If nothing has changes, fine. Otherwise there was a wrong value which is now corrected in `\reservedb` so we use that and also issue a warning.

```
30 \edef\reserved@a{#3}%
```

```
31 \series@maybe@drop@one@m\reserved@a\reserved@b
```

```
32 \ifx\reserved@a\reserved@b\else
```

```
33 \<\latex@warning{Font shape declaration has incorrect series
```

```
34 value ‘#3’.\MessageBreak It should not contain an ‘m’!
```

```
35 Please correct it.\MessageBreak Found\}%
```

```
36 \fi
```

```
37 \expandafter
```

```
38 \xdef\csname#1/#2/\reserved@b/#4\endcsname
```

```
39 {\expandafter\noexpand\csname #5\endcsname}%
```

```
40 %
```

Most of the time #6 is empty so using `\let` to `\@empty` saves on space compared to using `\def`. That’s really one of the old space saving techniques and probably not necessary these days.

```
41 \def\reserved@a{#6}%
```

```
42 \global
```

```
43 \expandafter\let\csname#5\endcsname\expandafter\endcsname
```

```
44 \ifx\reserved@a\@empty
```

```
45 \<\@empty
```

```
46 \else
```

```
47 \reserved@a
```

```
48 \fi
```

```
49 \fi
```

```
50 }
```

```

51 </2ekernel | latexrelease>
52 <latexrelease>\EndIncludeInRelease
53 <latexrelease>\IncludeInRelease{0000/00/00}%
54 <latexrelease>          {\DeclareFontShape@}{Maybe drop one m}%
55 <latexrelease>
56 <latexrelease>\def\DeclareFontShape@#1#2#3#4#5#6{%
57 <latexrelease>  \expandafter\ifx\csname #1+#2\endcsname\relax
58 <latexrelease>    \@latex@error{Font family ‘#1+#2’ unknown}\@eha
59 <latexrelease>  \else
60 <latexrelease>    \expandafter
61 <latexrelease>      \xdef\csname#1/#2/#3/#4\endcsname{\expandafter\noexpand
62 <latexrelease>                                     \csname #5\endcsname}%
63 <latexrelease>    \def\reserved@a{#6}%
64 <latexrelease>    \global
65 <latexrelease>    \expandafter\let\csname#5\endcsname\expandafter\endcsname
66 <latexrelease>    \ifx\reserved@a\@empty
67 <latexrelease>      \@empty
68 <latexrelease>    \else
69 <latexrelease>      \reserved@a
70 <latexrelease>    \fi
71 <latexrelease>  \fi
72 <latexrelease> }
73 <latexrelease>\EndIncludeInRelease
74 <*2ekernel>

```

(End definition for \DeclareFontShape@. This function is documented on page ??.)

**\DeclareFixedFont** Define a direct font switch that avoids all overhead.

```

75 \def\DeclareFixedFont#1#2#3#4#5#6{%
76   \begingroup
77   \math@fontsfalse
78   \every@math@size{}%
79   \fontsize{#6}\z@
80   \usefont{#2}{#3}{#4}{#5}%
81   \global\expandafter\let\expandafter#1\the\font
82   \endgroup
83 }

```

(End definition for \DeclareFixedFont. This function is documented on page ??.)

**\do@subst@correction**

```

84 \def\do@subst@correction{%
85   \xdef\subst@correction{%
86     \font@name
87     \global\expandafter\font
88     \csname \curr@fontshape/\f@size\endcsname
89     \noexpand\fontname\font
90     \relax}%

```

Calling \subst@correction after the current group means calling it after we have loaded the substitution font which is done inside a group.

```

91   \aftergroup\subst@correction
92 }

```

(End definition for \do@subst@correction. This function is documented on page ??.)

`\DeclareFontFamily`

```
93 \def\DeclareFontFamily#1#2#3{%
```

If we want fast checking for the encoding scheme we can just check for `\T@..` being defined.

```
94 % \@tempswafalse
95 % \def\reserved@b{#1}%
96 % \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%
97 %     \ifx\reserved@b\reserved@c \@tempswatrue\fi}%
98 % \cdp@list
99 % \if@tempswa
100 % \ifundefined{T@#1}%
101 % {
102 %     \latex@error{Encoding scheme ‘#1’ unknown}\@eha
103 % }%
104 % }
```

Now we have to define the macro `\(<#1>+<#2>)` to contain `#3`. But since most of the time `#3` will be empty we use `\let` in a tricky way rather than a simple `\def` since this will save internal memory. We store the argument `#3` in a temporary macro `\reserved@a`.

```
105     \def\reserved@a{#3}%
```

We compare `\reserved@a` with `\@empty`. If these two are the same we `\let` the ‘extra’ macro equal to `\@empty` which is not the same as doing a `\let` to `\reserved@a` — the latter would blow one extra memory location rather than reusing the one from `\@empty`.

```
106     \global
107     \expandafter\let\csname #1+#2\expandafter\endcsname
108         \ifx \reserved@a\@empty
109             \@empty
110         \else \reserved@a
111         \fi
112     }%
113 }
```

*(End definition for `\DeclareFontFamily`. This function is documented on page ??.)*

`\cdp@list` We initialize the code page list to be empty.

```
114 \let\cdp@list\@empty
115 \@onlypreamble\cdp@list
```

*(End definition for `\cdp@list`. This function is documented on page ??.)*

`\cdp@elt`

```
116 \let\cdp@elt\relax
117 \@onlypreamble\cdp@elt
```

*(End definition for `\cdp@elt`. This function is documented on page ??.)*

`\DeclareFontEncoding`

```
118 \def\DeclareFontEncoding{%
```

First we start with ignoring all blanks and newlines since every surplus space in the second or third argument will come out in a weird place in the document.

```

119 \begingroup
120 \nfss@catcodes
121 \expandafter\endgroup
122 \DeclareFontEncoding@
123 \@onlypreamble\DeclareFontEncoding

124 \def\DeclareFontEncoding@#1#2#3{%
125 \expandafter
126 \ifx\csname T@#1\endcsname\relax
127 \def\cdp@elt{\noexpand\cdp@elt}%
128 \xdef\cdp@list{\cdp@list\cdp@elt{#1}%
129 \{\default@family\}\{\default@series\}%
130 \{\default@shape\}}%

```

To support encoding dependent commands (like accents) we initialise the command `\encoding-cmd` to be `\@changed@cmd`. (See `ltoutenc.dtx` for details.)

```

131 \expandafter\let\csname#1-cmd\endcsname\@changed@cmd
132 \else
133 \@font@info{Redefining font encoding #1}%
134 \fi

135 \global\@namedef{T@#1}{#2}%
136 \global\@namedef{M@#1}{\default@M#3}%

```

Keep a record of the last encoding being declared:

```

137 \xdef\LastDeclaredEncoding{#1}%
138 }
139 \@onlypreamble\DeclareFontEncoding@

```

*(End definition for \DeclareFontEncoding. This function is documented on page ??.)*

`\LastDeclaredEncoding` The last encoding being declared by `\DeclareFontEncoding`.

```

140 \def\LastDeclaredEncoding{}

```

*(End definition for \LastDeclaredEncoding. This function is documented on page ??.)*

`\DeclareFontSubstitution`

```

141 \def\DeclareFontSubstitution#1#2#3#4{%
142 \expandafter
143 \ifx\csname T@#1\endcsname\relax
144 \@latex@error{Encoding scheme ‘#1’ unknown}\@eha
145 \else
146 \begingroup

```

We loop through the `\cdp@list` and rebuild it anew in `\toks@` thereby replacing the defaults for the encoding in question with the new defaults. It is important to store the encoding to test against expanded in `\reserved@a` since it might just be `\LastDeclaredEncoding` that is passed as `#1`.

```

147 \edef\reserved@a{#1}%
148 \toks@{}%
149 \def\cdp@elt##1##2##3##4{%
150 \def\reserved@b{##1}%
151 \ifx\reserved@a\reserved@b

```

Here we use the new defaults but we use `##1` (i.e., the encoding name already stored previously) since we know that it is expanded.

```

152         \addto@hook\toks@{\cdp@elt{##1}{#2}{#3}{#4}}%
153     \else
If \reserved@a and \reserved@b differ then we simply copy from the old list to the new.
154         \addto@hook\toks@{\cdp@elt{##1}{##2}{##3}{##4}}%
155     \fi}%
156     \cdp@list
157     \xdef\cdp@list{\the\toks@}%
158 \endgroup
159 \global
160 \@namedef{D@#1}{%
161     \def\default@family{#2}%
162     \def\default@series{#3}%
163     \def\default@shape{#4}%
164     }%
165 \fi
166 }
167 \@onlypreamble\DeclareFontSubstitution

```

*(End definition for \DeclareFontSubstitution. This function is documented on page ??.)*

`\DeclareFontEncodingDefaults`

```

168 \def\DeclareFontEncodingDefaults#1#2{%
169     \ifx\relax#1\else
170         \ifx\default@T\@empty\else
171             \@font@info{Overwriting encoding scheme text defaults}%
172             \fi
173             \gdef\default@T{#1}%
174         \fi
175     \ifx\relax#2\else
176         \ifx\default@M\@empty\else
177             \@font@info{Overwriting encoding scheme math defaults}%
178             \fi
179             \gdef\default@M{#2}%
180         \fi
181     }
182 \@onlypreamble\DeclareFontEncodingDefaults

```

*(End definition for \DeclareFontEncodingDefaults. This function is documented on page ??.)*

`\default@T`

`\default@M`

```

183 \let\default@T\@empty
184 \let\default@M\@empty

```

*(End definition for \default@T and \default@M. These functions are documented on page ??.)*

`\DeclarePreloadSizes`

```

185 \def\DeclarePreloadSizes#1#2#3#4#5{%
186     \@ifundefined{T@#1}%
187     {\@latex@error{Encoding scheme ‘#1’ unknown}\@eha}%
188     {%

```

Don't know at the moment what this group here does!

```
189 \begingroup
```

We define a macro `\reserved@f`<sup>10</sup> that grabs the next *size* and loads the corresponding font. This is done by delimiting `\reserved@f`'s only argument by the token `,` (comma).

```
190 \def\reserved@f##1,{%
```

The end of the list will be detected when there are no more elements, i.e. when `\reserved@f`'s argument is empty. The trick used here is explained in Appendix D of the *T<sub>E</sub>Xbook*: if the argument is empty the `\if` will select the first clause and `\let \reserved@f \relax`. (We use the `>` character here since it cannot appear in font file names.)

```
191 \if>##1>%
192 \let\reserved@f\relax
193 \else
```

Otherwise, we define `\font@name` appropriately and call `\pickup@font` to do the work. Note that the requested `\curr@fontshape` combination must have been defined, or you will get an error. The definition of `\font@name` is carried out globally to be consistent with the rest of the code in this file.

```
194 \xdef\font@name{\csname#1/#2/#3/#4/##1\endcsname}%
195 \pickup@font
```

Now we forget the name of the font just loaded. More precisely, we set the corresponding control sequence to `\relax`. This means that later on, when the font is first used, the macro `\define@newfont` is called again to execute the 'extra' macro for this font.

```
196 \global\expandafter\let\font@name\relax
197 \fi
```

Finally we call `\reserved@f` again to process the next *size*. If `\reserved@f` was `\let` equal to `\relax` this will end the macro.

```
198 \reserved@f}%
```

We finish with reinserting the list of sizes after the `\reserved@f` macro and appending an empty element so that the end of the list is recognized properly.

```
199 \reserved@f#5,,%
200 \endgroup
201 }%
202 }
203 \@onlypreamble\DeclarePreloadSizes
```

(End definition for `\DeclarePreloadSizes`. This function is documented on page ??.)

`\ifmath@fonts` We need a switch to decide if we have to switch math fonts. For this purpose we provide `\ifmath@fonts` that can be set to true or false by the `\S@...` macros depending on if math fonts are provided for this size or not. The default is of course to switch all fonts.

```
204 \newif\ifmath@fonts \math@fontstrue
```

(End definition for `\ifmath@fonts`. This function is documented on page ??.)

---

<sup>10</sup>We cannot use `\@tempa` since it is needed in `\pickup@font`.

`\DeclareMathSizes` `\DeclareMathSizes` takes the text size, math text size, math script size, and math scriptscript size as arguments and defines the right `\S@...` macro.

```

205 \def\DeclareMathSizes{%
206   \@ifstar{\@DeclareMathSizes\math@fontsfalse}%
207           {\@DeclareMathSizes{}}%
208   \@onlypreamble\DeclareMathSizes

```

*(End definition for `\DeclareMathSizes` and `\DeclareMathSizes*`. These functions are documented on page ??.)*

`\@DeclareMathSizes` This modification by Michael J. Downes on comp.text.tex on 2002/10/17 allows the user to have settings such as

`\DeclareMathSizes{9.5dd}{9.5dd}{7.4dd}{6.6dd}`.

```

209 \</2kernel>
210 \<latexrelease>\IncludeInRelease{2015/01/01}{\@DeclareMathSizes}%
211 \<latexrelease>           {Arbitrary units in \DeclareMathSizes}%
212 \<*2kernel | latexrelease>
213 \def\@DeclareMathSizes #1#2#3#4#5{%
214   \@defaultunits\dimen@ #2pt\relax\@nnil
215   \if $#3$%
216     \expandafter\let\csname S@\strip@pt\dimen@\endcsname\math@fontsfalse
217   \else
218     \@defaultunits\dimen@ii #3pt\relax\@nnil
219     \@defaultunits\@tempdima #4pt\relax\@nnil
220     \@defaultunits\@tempdimb #5pt\relax\@nnil
221     \toks@{#1}%
222     \expandafter\xdef\csname S@\strip@pt\dimen@\endcsname{%
223       \gdef\noexpand\tf@size{\strip@pt\dimen@ii}%
224       \gdef\noexpand\sfs@size{\strip@pt\@tempdima}%
225       \gdef\noexpand\ssf@size{\strip@pt\@tempdimb}%
226       \the\toks@
227     }%
228   \fi
229 }%
230 \</2kernel | latexrelease>
231 \<latexrelease>\EndIncludeInRelease
232 \<latexrelease>\IncludeInRelease{0000/00/00}{\@DeclareMathSizes}%
233 \<latexrelease>           {Arbitrary units in \DeclareMathSizes}%
234 \<latexrelease>\def\@DeclareMathSizes#1#2#3#4#5{%
235 \<latexrelease>   \@defaultunits\dimen@#2pt\relax\@nnil
236 \<latexrelease>   \if $#3$%
237 \<latexrelease>     \expandafter \let
238 \<latexrelease>       \csname S@\strip@pt\dimen@\endcsname
239 \<latexrelease>       \math@fontsfalse
240 \<latexrelease>   \else
241 \<latexrelease>     \expandafter \gdef
242 \<latexrelease>       \csname S@\strip@pt\dimen@\endcsname
243 \<latexrelease>         {\gdef\tf@size{#3}\gdef\sfs@size{#4}%
244 \<latexrelease>           \gdef\ssf@size{#5}%
245 \<latexrelease>       #1%
246 \<latexrelease>       }%
247 \<latexrelease>   \fi}%
248 \<latexrelease>\EndIncludeInRelease
249 \<*2kernel>

```

```
250 \@onlypreamble\@DeclareMathSizes
```

(End definition for \@DeclareMathSizes. This function is documented on page ??.)

## 3 Selecting a new font

### 3.1 Macros for the user

`\fontencoding` As we said in the introduction a font is described by four parameters. We first define macros to specify the wanted *family*, *series*, or *shape*. These are simply recorded in internal macros `\f@family`, `\f@series`, and `\f@shape`, resp. We use `\edef`'s so that the arguments can also be macros.

```
251 \DeclareRobustCommand\fontencoding[1]{%
252   \expandafter\ifx\csname T@#1\endcsname\relax
253   \latexerror{Encoding scheme '#1' unknown}\@eha
254   \else
255   \edef\f@encoding{#1}%
256   \ifx\cf@encoding\f@encoding
```

If the new encoding is the same as the old encoding we have nothing to do. However, in case we had a sequence of several encoding changes without a `\selectfont` in-between we can save processing by making sure that `\enc@update` is `\relax`.

```
257   \let\enc@update\relax
258   \else
```

If current and new encoding differ we define the macro `\enc@update` to contain all updates necessary at `\selectfont` time.

```
259   \let\enc@update\@enc@update
260   \fi
261   \fi
262 }
```

(End definition for `\fontencoding` and `\f@encoding`. These functions are documented on page ??.)

`\@enc@update`

```
263 \def\@enc@update{%
```

When `\@enc@update` is executed `\f@encoding` holds the encoding name for the new encoding and `\cf@encoding` the name of the last active encoding.

We start by setting the init command for encoding dependent macros to `\@changed@cmd`.

```
264   \expandafter
265   \let
266   \csname\cf@encoding-cmd\endcsname
267   \@changed@cmd
```

Then we turn the one for the new encoding to `\@current@cmd` (see `ltoutenc.dtx` for further explanations).

```
268   \expandafter
269   \let
270   \csname\f@encoding-cmd\endcsname
271   \@current@cmd
```

We execute the default settings `\default@T`, followed by the one for the new encoding.

```
272   \default@T
273   \csname T@\f@encoding\endcsname
```



Finally we change the default substitution values, disable `\enc@update` and make `\f@encoding` officially the current encoding.

```

274         \csname D@\f@encoding\endcsname
275         \let\enc@update\relax
276         \let\cf@encoding\f@encoding
277     }

```

*(End definition for \enc@update. This function is documented on page ??.)*

`\enc@update` The default action in `\selectfont` is to do nothing.

```

278 \let\enc@update\relax

```

*(End definition for \enc@update. This function is documented on page ??.)*

`\fontfamily`

`\f@family`

```

279 \DeclareRobustCommand\fontfamily[1]{\edef\f@family{#1}}

```

`\fontseries`

There are now defined later (and differently).

`\f@series`

```

280 %\DeclareRobustCommand\fontseries[1]{\edef\f@series{#1}}

```

`\fontshape`

```

281 %\DeclareRobustCommand\fontshape [1]{\edef\f@shape{#1}}

```

`\f@shape`

*(End definition for \fontfamily and others. These functions are documented on page ??.)*

`\usefont`

Some handy abbreviation if you want to get some particular font in the current size. If also the size should change one has to issue a `\fontsize` command first.

`\fontencoding` needs to do some setup work so we call that, but instead of calling `\fontfamily`, `\fontseries` and `\fontshape` it earlier versions of this code did, we now set `\f@family`, etc. directly. If we would call `\fontseries` or `\fontshape` as it was done in the past, they would now interact with the existing series and shape which is not desired if we intend to use an explicit font shape!

```

282 \DeclareRobustCommand\usefont[4]{\fontencoding{#1}%
283     \edef\f@family{#2}%
284     \edef\f@series{#3}%
285     \edef\f@shape{#4}\selectfont
286     \ignorespaces}

```

*(End definition for \usefont. This function is documented on page ??.)*

`\linespread`

The command `\linespread` changes the current `\baselinestretch` by calling `\set@fontsize`. The values for `\f@size` and `\f@baselineskip` will be left unchanged.

```

287 \DeclareRobustCommand\linespread[1]
288     {\set@fontsize{#1}\f@size\f@baselineskip}

```

*(End definition for \linespread. This function is documented on page ??.)*

`\fontsize`

We also define a macro that allows to specify a size. In this case, however, we also need the value of `\baselineskip`. As the first argument to `\set@fontsize` we pass the current value of `\baselinestretch`. This will either match the internal value (in which case nothing changes, or it will be an updated value due to a user change of that macro using `\renewcommand`. If we would pass the internal `\f@linespread` such a change would be effectively overwritten by a size change.

```

289 \DeclareRobustCommand\fontsize[2]
290     {\set@fontsize\baselinestretch{#1}{#2}}

```

*(End definition for \fontsize. This function is documented on page ??.)*

`\f@linespread` This macro holds the current internal value for `\baselinestretch`.

```
291 \let\f@family\@empty
292 \let\f@series\@empty
293 \let\f@shape\@empty
294 \let\f@size\@empty
295 \let\f@baselineskip\@empty
296 \let\f@linespread\@empty
```

(End definition for `\f@linespread`. This function is documented on page ??.)

`\cf@encoding`

```
297 \let\f@encoding\@empty
298 \let\cf@encoding\@empty
```

(End definition for `\cf@encoding`. This function is documented on page ??.)

`\@defaultunits` The function `\@defaultunits` when wrapped around a `dimen` or `skip` assignment supplies default units. Usage:

`\@defaultunits\dimen@=#1pt\relax\@nnil`

Note: the `\relax` is *important*. Other units can be substituted for the ‘pt’ if desired.

We use `\remove@to@nnil` as an auxiliary macros for `\@defaultunits`. It just has to gobble the supplied default unit ‘pt’ or whatever, if it wasn’t used in the assignment.

```
299 \def\@defaultunits{\afterassignment\remove@to@nnil}
```

(End definition for `\@defaultunits`. This function is documented on page ??.)

`\strip@pt` This macro strips the characters `pt` produced by using `\the` on a `dimen` register.

`\rem@pt`

```
300 \begingroup
301 \catcode‘P=12
302 \catcode‘T=12
303 \lowercase{
304 \def\x{\def\rem@pt##1.##2PT{##1\ifnum##2>\z@.##2\fi}}
305 \expandafter\endgroup\x
306 \def\strip@pt{\expandafter\rem@pt\the}
```

(End definition for `\strip@pt` and `\rem@pt`. These functions are documented on page ??.)

`\mathversion` `\mathversion` takes the math *version* name as argument, defines `\math@version` appropriately and switches to the font selected forcing a call to `\glb@settings` if the *version* is known to the system.

```
307 \DeclareRobustCommand\mathversion[1]
308 {\@nomath\mathversion
309 \expandafter\ifx\csname mv@#1\endcsname\relax
310 \@latex@error{Math version ‘#1’ is not defined}\@eha\else
311 \edef\math@version{#1}%
```

We need to force a math font setup both now and at the point where we return to the previous math version. Forcing a math font setup can simply be done by setting `\glb@currsz` to an invalid value since this will trigger the setup when the formula starts.

```
312 \gdef\glb@currsz{}%
```

When the scope of the current `\mathversion` ends we need to restore the old setup. However this time we need to force it directly at least if we are inside math, otherwise we could wait. Another way to enhance this code here is to do the setting only if the version really has changed after all. This might be interesting in case of `amstext` and `boldsymbol`.

```

313         \aftergroup\glb@settings
314     \fi}

```

*(End definition for \mathversion and \math@version. These functions are documented on page ??.)*

If  $\TeX$  would support a hook just before the end of a formula (opposite of `\everymath` so to speak) the implementation of the algorithm would be much simpler because in that case we would set up the correct math fonts at this point without having to worry about incorrect settings due to nesting. The same would be true if in  $\LaTeX$  the use of `$` (as the primitive  $\TeX$  command) would be impossible and instead only a higher-level interface would be available. Note that this does not mean that a `$` couldn't be the short-hand for starting and stopping that higher-level interface, it only means that the direct  $\TeX$  function must be hidden.

Anyway, since we don't have this and won't have it in  $\LaTeX 2_\epsilon$  we need to implement it in a somewhat slower way.

We test for the current math font setup on entry of a formula, i.e., on the hooks `\everymath` and `\everydisplay`. But since these hooks may contain user data we provide ourselves with an internal version of these hooks which stays frozen.

```

\frozen@everymath New internal names for \everymath and \everydisplay.
\frozen@everydisplay
315 \let\frozen@everymath\everymath
316 \let\frozen@everydisplay\everydisplay

```

*(End definition for \frozen@everymath and \frozen@everydisplay. These functions are documented on page ??.)*

```

\everymath Now we provide now user hooks that will be called in the frozen internals.
\everydisplay
317 \newtoks\everymath
318 \newtoks\everydisplay

```

*(End definition for \everymath and \everydisplay. These functions are documented on page ??.)*

```

\frozen@everymath Now we define the behaviour of the frozen hooks: first check the math setup then call
the user hook.

```

```

319 \frozen@everymath = {\check@mathfonts
320                     \the\everymath}

```

*(End definition for \frozen@everymath. This function is documented on page ??.)*

```

\frozen@everydisplay Ditto for the display hook.
321 \frozen@everydisplay = {\check@mathfonts
322                     \the\everydisplay}

```

*(End definition for \frozen@everydisplay. This function is documented on page ??.)*

```

\curr@math@size This holds locally the current math size.

```

```

323 \let\curr@math@size\@empty

```

*(End definition for \curr@math@size. This function is documented on page ??.)*

## 3.2 Macros for loading fonts

`\pickup@font` The macro `\pickup@font` which is used in `\selectfont` is very simple: if the font name is undefined (i.e. not known yet) it calls `\define@newfont` to load it.

```

324 \def\pickup@font{%
325     \expandafter \ifx \font@name \relax
326     \define@newfont
327     \fi}

```

(End definition for `\pickup@font`. This function is documented on page ??.)

`\split@name` `\pickup@font` assumes that `\font@name` is set but it is sometimes called when `\f@family`, `\f@series`, `\f@shape`, or `\f@size` may have the wrong settings (see, e.g., the definition of `\getanddefine@fonts`). Therefore we need a macro to extract font *family*, *series*, *shape*, and *size* from the font name. To this end we define `\split@name` which takes the font name as a list of characters of `\catcode 12` (without the backslash at the beginning) delimited by the special control sequence `\@nil`. This is not very complicated: we first ensure that `/` has the right `\catcode`

```

328 {\catcode'\/=12

```

and define `\split@name` so that it will define our private `\f@encoding`, `\f@family`, `\f@series`, `\f@shape`, and `\f@size` macros.

```

329 \gdef\split@name#1/#2/#3/#4/#5\@nil{\def\f@encoding{#1}%
330                                     \def\f@family{#2}%
331                                     \def\f@series{#3}%
332                                     \def\f@shape{#4}%
333                                     \def\f@size{#5}}

```

(End definition for `\split@name`. This function is documented on page ??.)

`\curr@fontshape` Abbreviation which may get removed again for speed.

```

334 \def\curr@fontshape{\f@encoding/\f@family/\f@series/\f@shape}

```

(End definition for `\curr@fontshape`. This function is documented on page ??.)

`\define@newfont` Now we can tackle the problem of defining a new font.

```

335 \def\define@newfont{%

```

We have already mentioned that the token list that `\split@name` will get as argument must not start with a backslash. To reach this goal we will set the `\escapechar` to `-1` so that the `\string` primitive will not generate an escape character. To keep this change local we open a group. We use `\begingroup` for this purpose since `\define@newfont` might be called in math mode, and an empty `\bgroup... \egroup` would add an empty Ord atom to the math list and thus affect the spacing.

Also locally redefine `\typeout` so that ‘No file ...fd’ Warnings become Font Info message just sent to the log file.

```

336 \begingroup
337 \let\typeout\@font@info
338 \escapechar\m@ne

```

Then we extract *encoding scheme*, *family*, *series*, *shape*, and *size* from the font name. Note the four `\expandafter`’s so that `\font@name` is expanded first, then `\string`, and finally `\split@name`.

```

339 \expandafter\expandafter\expandafter
340 \split@name\expandafter\string\font@name\@nil

```

If the `\curr@fontshape` combination is not available, (i.e. undefined) we call the macro `\wrong@fontshape` to take care of this case. Otherwise `\extract@font` will load the external font for us.

```

341 % \expandafter\ifx
342 % \csname\curr@fontshape\endcsname \relax
343 % \try@load@fontshape % try always
344 % \fi
345 % \expandafter\ifx
346 % \csname\curr@fontshape\endcsname \relax
347 % \wrong@fontshape\else

```

To allow substitution we call the `curr@fontshape` macro which usually will expand to `\relax` but may hold code for substitution (see `\subst@fontshape` definition).

```

348 % \csname\curr@fontshape\endcsname
349 % \extract@font\fi

```

We are nearly finished and must only restore the `\escapechar` by closing the group.

```

350 \endgroup}

351 \def\try@load@fontshape{%
352   \expandafter
353   \ifx\csname \f@encoding+\f@family\endcsname\relax
354     \font@info{Trying to load font information for
355               \f@encoding+\f@family}%

```

We predefine this combination to be `\@empty` which means that next time we don't try again unnecessary in case we don't find a `.fd` file. If the file contains a `\DeclareFontFamily` command than this setting will be overwritten.

```

356   \global\expandafter\let
357   \csname \f@encoding+\f@family\endcsname\@empty

```

Set the catcodes used in the syntax, but do it only once (this will be restored at the end of the font loading group).

```

358   \nfss@catcodes
359   \let\nfss@catcodes\relax

```

For increased portability make the external filename monospace, but look for the (old style) mixed case filename if the first attempt fails.

On any monospace system this means that the file is looked for twice which takes up time and string space, but at least for this release Check for both names to give people time to re-install their private fd files with lowercase names.

```

360   \edef\reserved@a{%
361     \lowercase{%
362       \noexpand\InputIfFileExists{\f@encoding\f@family.fd}}}%
363   \reserved@a\relax
364   {\input{\f@encoding\f@family.fd}}%
365 \fi}

```

*(End definition for `\define@newfont`. This function is documented on page ??.)*

**\nfss@catcodes** This macro should contain the standard `\catcode` assignments to all characters which are used in the commands found in an `.fd` file and which might have special `\catcodes` in the middle of a document. If necessary, this list can be extended in a package file using a suitable number of `\expandafter`, i.e.,

```

\expandafter\def\expandafter\nfss@catcodes
\expandafter{\nfss@catcodes <additional settings>}

```

Note, that this macro might get executed several times since it is also called by `\DeclareFontShape`, thus it probably should not be misused as a general purpose hook.

```

366 \def\nfss@catcodes{%

```

We start by making `@` a letter and ignoring all blanks and newlines.

```

367     \makeatletter
368     \catcode'\ 9%
369     \catcode'\^~I9%
370     \catcode'\^~M9%

```

Then we set up `\`, `{`, `}`, `#` and `%` in case an `.fd` file is loaded during a verbatim environment.

```

371     \catcode'\\\z@
372     \catcode'\{\@ne
373     \catcode'\}\tw@
374     \catcode'\#6%
375     \catcode'\^7%
376     \catcode'\%14%

```

Then we make sure that the important syntax parts have the right `\catcode`.

```

377     \@makeother\<%
378     \@makeother\>%
379     \@makeother\*%
380     \@makeother\.%
381     \@makeother\-%
382     \@makeother\/%
383     \@makeother\[%
384     \@makeother\]%
385     \@makeother\'%
386     \@makeother\'%
387     \@makeother\"%
388 }

```

(End definition for `\nfss@catcodes`. This function is documented on page ??.)

`\LoadFontDefinitionFile` Load and `.fd` files for some encoding and family (if it exists).

```

389 </2kernel>
390 <*2kernel | latexrelease>
391 <latexrelease>\IncludeInRelease{2020/02/02}%
392 <latexrelease>{\LoadFontDefinitionFile}{Loading .fd files}%
393 \def\LoadFontDefinitionFile#1#2{%
394     \begingroup
395     \edef\f@encoding{#1}%
396     \edef\f@family{#2}%
397     \try@load@fontshape
398     \endgroup
399 }
400 </2kernel | latexrelease>
401 <latexrelease>\EndIncludeInRelease
402 <latexrelease>\IncludeInRelease{0000/00/00}%
403 <latexrelease>{\LoadFontDefinitionFile}{Loading .fd files}%
404 <latexrelease>

```

```

405 \let\LoadFontDefinitionFile\@undefined
406 \let\EndIncludeInRelease
407 \*2ekernel)

```

(End definition for \LoadFontDefinitionFile. This function is documented on page ??.)

`\DeclareFontFamilySubstitution` The idea for this macro is stolen from the `substitutefont` package by Günter Milde, with some modifications and a new name.

Its purpose is to provide characters in a special encoding tht are not available in the current font family to be taken from a different family that is visually compatible (or not if you choose badly). For example, you can match the GFS Didot Greek characters with  $\TeX$  Gyre Pagella (Palatino) by specifying

```
\DeclareFontFamilySubstitution{LGR}{qpl}{udidot}
```

This way if you ask for the LGR encoding in for the `qpl` family you get the characters from the `udidot` family substituted.

We need to ensure that the macro is defined with `\nfss@catcodes` in force (not quite sure why at the moment to be honest).

```

408 \</2ekernel)
409 \*2ekernel | latexrelease)
410 \let\IncludeInRelease{2020/02/02}%
411 \let\DeclareFontFamilySubstitution\Provide family substitution}%
412 \begin{group}
413 \nfss@catcodes
414 \gdef\DeclareFontFamilySubstitution#1#2#3{%

```

We only provide a set of silent substitutions. The package also (re)declared the family, but this is incorrect in my eyes and it is better to handle that differently.

Of course the families may still need loading at this point and so we arrange for this. Otherwise we might run into trouble because the necessary `\DeclareFontFamily` has not been seen.

```

415 \LoadFontDefinitionFile{#1}{#2}%
416 \LoadFontDefinitionFile{#1}{#3}%
417 \DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{}%
418 \DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{}%
419 \DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{}%
420 \DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{}%

```

These days a few more shapes might be around, so we declare those too. If they don't exist then after the first substitution normal fallbacks will happen.

```

421 \DeclareFontShape{#1}{#2}{m}{sw}{<->ssub * #3/m/sw}{}%
422 \DeclareFontShape{#1}{#2}{m}{scit}{<->ssub * #3/m/scit}{}%
423 \DeclareFontShape{#1}{#2}{m}{scsl}{<->ssub * #3/m/scsl}{}%

```

Same game with `b` and `bx`, for other weights you are on your own:

```

424 \DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/b/it}{}%
425 \DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/b/n}{}%
426 \DeclareFontShape{#1}{#2}{b}{scit}{<->ssub * #3/b/scit}{}%
427 \DeclareFontShape{#1}{#2}{b}{scsl}{<->ssub * #3/b/scsl}{}%
428 \DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/b/sc}{}%
429 \DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/b/sl}{}%
430 \DeclareFontShape{#1}{#2}{b}{sw}{<->ssub * #3/b/sw}{}%
431 \DeclareFontShape{#1}{#2}{bx}{it}{<->ssub * #3/bx/it}{}%

```

```

432 \DeclareFontShape{#1}{#2}{bx}{n}{<->ssub * #3/bx/n}{}%
433 \DeclareFontShape{#1}{#2}{bx}{scit}{<->ssub * #3/bx/scit}{}%
434 \DeclareFontShape{#1}{#2}{bx}{scsl}{<->ssub * #3/bx/scsl}{}%
435 \DeclareFontShape{#1}{#2}{bx}{sc}{<->ssub * #3/bx/sc}{}%
436 \DeclareFontShape{#1}{#2}{bx}{sl}{<->ssub * #3/bx/sl}{}%
437 \DeclareFontShape{#1}{#2}{bx}{sw}{<->ssub * #3/bx/sw}{}%
438 }
439 \endgroup
440 </2ekernel | latexrelease>
441 <latexrelease>\EndIncludeInRelease
442 <latexrelease>\IncludeInRelease{0000/00/00}%
443 <latexrelease> \DeclareFontFamilySubstitution{Provide family substitution}%
444 <latexrelease>
445 <latexrelease>\let\DeclareFontFamilySubstitution\@undefined
446 <latexrelease>\EndIncludeInRelease
447 <*2ekernel>

```

(End definition for `\DeclareFontFamilySubstitution`. This function is documented on page ??.)

**\DeclareErrorFont** Declare the last resort shape! We assume that in this fontshape there is a 10pt font but it doesn't really matter. We only loose one macro name if the assumption is false. But at least the font should be there!

```

448 </2ekernel>
449 <*2ekernel | latexrelease>
450 <latexrelease>\IncludeInRelease{2019/10/01}%
451 <latexrelease> \DeclareErrorFont{No side effects please}%
452 \def\DeclareErrorFont#1#2#3#4#5{%
453 \xdef\error@fontshape{%
454 \noexpand\expandafter\noexpand\split@name\noexpand\string
455 \expandafter\noexpand\csname#1/#2/#3/#4/#5\endcsname
456 \noexpand\@nil}%

```

Initialize all those internal variables which may or may not have values in the first seconds of NFSS' bootstrapping process. Later on such values will be updated when an encoding is selected, etc.

We definitely don't want to set `\f@encoding`; we can set all the others since if they are left "blank" any selection would grap "error default values" as well. However, this probably should go also—and now it did.

```

457 % \gdef\f@encoding{#1}%
458 \gdef\default@family{#2}%
459 \gdef\default@series{#3}%
460 \gdef\default@shape{#4}%
461 }
462 </2ekernel | latexrelease>
463 <latexrelease>\EndIncludeInRelease
464 <latexrelease>\IncludeInRelease{0000/00/00}%
465 <latexrelease> \DeclareErrorFont{No side effects please}%
466 <latexrelease>
467 <latexrelease>\def\DeclareErrorFont#1#2#3#4#5{%
468 <latexrelease> \xdef\error@fontshape{%
469 <latexrelease> \noexpand\expandafter\noexpand\split@name\noexpand\string
470 <latexrelease> \expandafter\noexpand\csname#1/#2/#3/#4/#5\endcsname
471 <latexrelease> \noexpand\@nil}%
472 <latexrelease> \gdef\default@family{#2}%

```



```

473 <latexrelease> \gdef\default@series{#3}%
474 <latexrelease> \gdef\default@shape{#4}%
475 <latexrelease> \global\let\f@family\default@family
476 <latexrelease> \global\let\f@series\default@series
477 <latexrelease> \global\let\f@shape\default@shape
478 <latexrelease> \gdef\f@size{#5}%
479 <latexrelease> \gdef\f@baselineskip{#5pt}%
480 <latexrelease>}
481 <latexrelease>\EndIncludeInRelease
482 (*2ekernel)
483 \@onlypreamble\DeclareErrorFont

```

(End definition for \DeclareErrorFont. This function is documented on page ??.)

**\wrong@fontshape** Before we come to the macro \extract@font we have to take care of unknown \curr@fontshape combinations. The general strategy is to issue a warning and to try a default *shape*, then a default *series*, and finally a default *family*. If this last one also fails T<sub>E</sub>X will go into an infinite loop. But if the defaults are set incorrectly one deserves nothing else!

```

484 </2ekernel>
485 <latexrelease>\IncludeInRelease{2015/01/01}{\wrong@fontshape}%
486 <latexrelease> \Font substitution in preamble}%
487 (*2ekernel | latexrelease)
488 \def\wrong@fontshape{%
489 \csname D@f@encoding\endcsname % install defaults if in math

```

We remember the wanted \curr@fontshape combination which we will need in a moment.

```

490 \edef\reserved@a{\csname\curr@fontshape\endcsname}%
491 \ifx\last@fontshape\reserved@a
492 \errmessage{Corrupted NFSS tables}%
493 \error@fontshape
494 \else

```

Then we warn the user about the mess and set the shape to its default.

```

495 \let\f@shape\default@shape

```

If the combination is not known, try the default *series*.

```

496 \expandafter\ifx\csname\curr@fontshape\endcsname\relax
497 \let\f@series\default@series

```

If this is still undefined, try the default *family*. Otherwise give up. We never try to change the encoding scheme!

```

498 \expandafter
499 \ifx\csname\curr@fontshape\endcsname\relax
500 \let\f@family\default@family

```

If we change the font family and we are in the preamble then the corresponding .fd file may not been loaded yet. Therefore we try this now. Otherwise equating the requested font shape with the finally selected fontshape below will fail and can result in “NFSS tables corrupted”. After begin document that will not happen as all .fd files involved in substitution are loaded at \begin{document}.

```

501 \begingroup
502 \try@load@fontshape
503 \endgroup
504 \fi \fi
505 \fi

```

At this point a valid `\curr@fontshape` combination must have been found. We inform the user about this fact.

The `\expandafter\string` here stops  $\TeX$  adding the space that it usually puts after command names in messages. The similar construction with `\@undefined` just produces ‘undefined’, but saves a few tokens.

`\@wrong@font@char` is locally redefined in `\UseTextSymbol` from its normal (empty) definition, to report the symbol generating the font switch.

```
506 \font@warning{Font shape ‘\expandafter\string\reserved@a’
507 \expandafter\@gobble\string\@undefined\MessageBreak
508 using ‘\curr@fontshape’ instead\@wrong@font@char}%
509 \global\let\last@fontshape\reserved@a
```

We change `\@defaultsubs` to produce a warning at the end of the document. The macro `\@defaultsubs` is initially `\relax` but gets changed here if some default font substitution happens. It is then executed in `\enddocument`.

```
510 \gdef\@defaultsubs{%
511 \font@warning{Some font shapes were not available, defaults
512 substituted.\@gobbletwo}}%
```

If we substitute a `\curr@fontshape` combination by the default one we don’t want the warning to be printed out whenever this (unknown) combination is used. Therefore we globally `\let` the macro corresponding to the wanted combination equal to its substitution. This requires the use of four `\expandafter`’s since `\csname...\endcsname` has to be expanded before `\reserved@a` (i.e. the requested combination), and this must happen before the `\let` is executed.

```
513 \global\expandafter\expandafter\expandafter\let
514 \expandafter\reserved@a
515 \csname\curr@fontshape\endcsname
```

Now we can redefine `\font@name` accordingly. This *must* be done globally since it might occur in the group opened by `\define@newfont`. If we would this definition were local the closing `\endgroup` there would restore the old meaning of `\font@name` and then switch to the wrong font at the end of `\selectfont` although the correct font was loaded.

```
516 \xdef\font@name{%
517 \csname\curr@fontshape/\f@size\endcsname}%
```

The last thing this macro does is to call `\pickup@font` again to load the font if it is not defined yet. At this point this code will loop endlessly if the defaults are not well defined.

```
518 \pickup@font}
519 </2ekernel|latexrelease>
520 <latexrelease>\EndIncludeInRelease
521 <latexrelease>\IncludeInRelease{0000/00/00}{\wrong@fontshape}%
522 <latexrelease> {Font substitution in preamble}%
523 <latexrelease>\def\wrong@fontshape{%
524 <latexrelease> \csname D@f@encoding\endcsname
525 <latexrelease> \edef\reserved@a{\csname\curr@fontshape\endcsname}%
526 <latexrelease> \ifx\last@fontshape\reserved@a
527 <latexrelease> \errmessage{Corrupted NFSS tables}%
528 <latexrelease> \error@fontshape
529 <latexrelease> \else
530 <latexrelease> \let\f@shape\default@shape
531 <latexrelease> \expandafter\ifx\csname\curr@fontshape\endcsname\relax
532 <latexrelease> \let\f@series\default@series
533 <latexrelease> \expandafter
```

```

534 <latexrelease>          \ifx\curname\curr@fontshape\endcsname\relax
535 <latexrelease>          \let\f@family\default@family
536 <latexrelease>          \fi \fi
537 <latexrelease>          \fi
538 <latexrelease>          \@font@warning{Font shape
539 <latexrelease>          '\expandafter\string\reserved@a'
540 <latexrelease>          \expandafter\@gobble\string\@undefined
541 <latexrelease>          \MessageBreak
542 <latexrelease>          using '\curr@fontshape' instead\@wrong@font@char}%
543 <latexrelease>          \global\let\last@fontshape\reserved@a
544 <latexrelease>          \gdef\@defaultsubs{%
545 <latexrelease>          \@font@warning{Some font shapes were not available,
546 <latexrelease>          defaults substituted.\@gobbletwo}}%
547 <latexrelease>          \global\expandafter\expandafter\expandafter\let
548 <latexrelease>          \expandafter\reserved@a
549 <latexrelease>          \curname\curr@fontshape\endcsname
550 <latexrelease>          \xdef\font@name{%
551 <latexrelease>          \curname\curr@fontshape/\f@size\endcsname}%
552 <latexrelease>          \pickup@font}
553 <latexrelease>\EndIncludeInRelease
554 (*2ekernel)

```

(End definition for \wrong@fontshape. This function is documented on page ??.)

\@wrong@font@char Normally empty but redefined in \UseTextSymbol so that the Font shape undefined message can refer to the symbol causing the problem.

```
555 \let\@wrong@font@char\@empty
```

(End definition for \@wrong@font@char. This function is documented on page ??.)

\@@defaultsubs See above.

```
\@defaultsubs 556 \let\@defaultsubs\relax
```

(End definition for \@@defaultsubs and \@defaultsubs. These functions are documented on page ??.)

\strip@prefix In \extract@font we will need a way to recover the replacement text of a macro. This is done by the primitive \meaning together with the macro \strip@prefix (for the details see appendix D of the T<sub>E</sub>Xbook, p. 382).

```
557 \def\strip@prefix#1>{\}
```

(End definition for \strip@prefix. This function is documented on page ??.)

## 4 Assigning math fonts to *versions*

\install@mathalphabet This is just another name for \gdef but we can redefine it if necessary later on.

```
558 \let\install@mathalphabet\gdef
```

(End definition for \install@mathalphabet. This function is documented on page ??.)

\math@fonts

```
559 \let\math@fonts\@empty
```

(End definition for \math@fonts. This function is documented on page ??.)

`\select@group` `\select@group` has four arguments: the new  $\langle\textit{math alphabet identifier}\rangle$  (a control sequence), the  $\langle\textit{math group number}\rangle$ , the extra macro for math mode and the `\curr@fontshape` definition macro name. We first check if we are in math mode.

```
560 %\def\select@group#1#2#3{\relax\ifmmode
```

We do these things locally using `\begingroup` instead of `\bgroup` to avoid the appearance of an empty Ord atom on the math list.

```
561 % \begingroup
```

We set the math fonts for the *family* in question by calling `\getanddefine@fonts` in the correct environment.

```
562 % \escapechar\m@ne
```

```
563 % \getanddefine@fonts{\csname c@mv@\math@version\endcsname}#3%
```

We globally select the math fonts...

```
564 % \globaldefs\@ne \math@fonts
```

... and close the group to restore `\globaldefs` and `\escapechar`.

```
565 % \endgroup
```

As long as no *size* or *version* change occurs the  $\langle\textit{math alphabet identifier}\rangle$  should simply switch to the installed *math group* instead of calling `\select@group` unnecessarily. So we globally redefine the first argument (the new  $\langle\textit{math alphabet identifier}\rangle$ ) to expand into a `\mathgroup` switch and then select this *alphabet*. Note that this redefinition will be overwritten by the next call to a *version* macro. The original code for the end of `\select@group` was

```
\gdef#1{#3\mathgroup #2}#1\fi}
```

i.e. first redefining the  $\langle\textit{math alphabet identifier}\rangle$  and then calling the new definition to switch to the wanted  $\langle\textit{math group}\rangle$ . Now we define the  $\langle\textit{math alphabet identifier}\rangle$  as a call to the `\use@mathgroup` command.

```
566 % \xdef#1{\noexpand\use@mathgroup\noexpand#2%
```

```
567 % {\number\csname c@mv@\math@version\endcsname}}%
```

But this is not sufficient, as we learned the hard way. The problem here is that the loading of the fonts that comprise the alphabet identifier `#1`, as well as the necessary math font assignments is deferred until it is used. This is OK so far, but if the fonts are switched within the current formula (which may happen if a sub-formula is a box that contains a math version switch) the font assignments for `#1` are not restored unless `#1` is used again. This is disastrous since TeX sees the wrong fonts at the end of the math formula, when it converts the math list into a horizontal list.

This is taken into account as follows: When a math alphabet identifier is used for the first time in a certain version it modifies the corresponding macro `\mv@<version>` so that it calls `\getanddefine@fonts` directly in future as well. We use the macro `\extract@alph@from@version` to do this. It takes the math alphabet identifier `#1` and the math version macro as arguments.

```
568 % \expandafter\extract@alph@from@version
```

```
569 % \csname mv@\math@version\expandafter\endcsname
```

```
570 % \expandafter{\number\csname c@mv@\math@version\endcsname}}%
```

```
571 % #1%
```

```
572 % \stepcounter{mv@\math@version}}%
```

Finally, it is not possible to simply call the new definition since we have an argument (the third argument of `\use@mathgroup` or more exactly the argument of `\math@egroup` if the `margid` option is in force) which would swallow our closing `\fi`. So we use the `\expandafter` technique to remove the `\fi` before the `\use@mathgroup` is expanded.

```
573 %\expandafter #1\fi}
```

(End definition for `\select@group`. This function is documented on page ??.)

`\extract@alph@from@version`

We proceed to the definition of the macro `\extract@alph@from@version`. As stated above, it takes a math alphabet identifier and a math version macro (e.g. `\mv@normal`) as its arguments.

```
574 \def\extract@alph@from@version#1#2#3{%
```

To extract and replace the definition of math alphabet identifier `#3` in macro `#1` we have to recall how this definition looks like: Somewhere in the replacement text of `#1` there is the sequence

```
\install@mathalphabet<math alphabet identifier> #3{%
  <Definitions for >#3}
```

Hence, the first thing we do is to extract the tokens preceding this definitions, the definition itself, and the tokens following it. To this end we define one auxiliary macro `\reserved@a`.

```
575 \def\reserved@a##1\install@mathalphabet#3##2##3\@nil{%
```

When `\reserved@a` is expanded, it will have the tokens preceding the definition in question in its first argument (`##1`), the following tokens in its third argument (`##3`), and the replacement text for the math alphabet identifier `#3` in its second argument. (`##2`). This is then recorded for later use in a temporary macro `\reserved@b`.

```
576 \def\reserved@b{##2}%
```

Additionally, we define a macro `\reserved@c` to reconstruct the definitions for the math version in question from the tokens that will remain unchanged (`##1` and `##3`) and the yet to build new definitions for the math alphabet identifier `#3`.

```
577 \def\reserved@c####1{\gdef#1{##1####1##3}}%
```

Then we execute our auxiliary macro.

```
578 \expandafter\reserved@a#1\@nil
```

OK, so now we have to build the new definition for `#3`. To do so, we first extract the interesting parts out of the old one. The old definition looks like:

```
\select@group<math alphabet identifier>
  <math group number><math extra part>
<curr@fontshape definition>
```

So we define a new temporary macro `\reserved@a` that extracts these parts.

```
579 \def\reserved@a\select@group#3##1##2\@nil{%
```

This macro can now directly rebuild the math version definition by calling `\reserved@c`:

```
580 \reserved@c{%
581 \getanddefine@fonts{#2}##2%
582 \install@mathalphabet#3{%
583 \relax\ifmmode \else \non@alpherr#3\fi
584 \use@mathgroup##1{#2}}%
```

In addition it defines the alphabet the way it should be used from now on.

```
585 \gdef#3{\relax\ifmmode \else \non@alpherr#3\fi
586 \use@mathgroup##1{#2}}}%
```

Finally, we only have to call this macro `\reserved@a` on the old definitions recorded in `\reserved@b`:

```
587 \expandafter\reserved@a\reserved@b\@nil
588 }
```

*(End definition for \extract@alph@from@version. This function is documented on page ??.)*

`\math@bgroup` Here are the default definitions for `\math@bgroup` and `\math@egroup`. We use `\bgroup` instead of `\begingroup` to avoid ‘leaking out’ of style changes. This has the side effect of always producing mathord atoms.

```
589 \let\math@bgroup\bgroup
590 \def\math@egroup#1{#1\egroup}
```

*(End definition for \math@bgroup and \math@egroup. These functions are documented on page ??.)*

`\calculate@math@sizes` Here is the default definition for `\calculate@math@sizes` a more elaborate interface is under testing in `mthscale.sty`.

```
591 \gdef\calculate@math@sizes{%
592 \font@info{Calculating\space math\space sizes\space for\space
593 size\space <\f@size>}%
594 \dimen@ \f@size \p@
595 \tempdimb \defaultscriptratio \dimen@
596 \dimen@ \defaultscriptscriptratio \dimen@
597 \expandafter\xdef\csname S@\f@size\endcsname{%
598 \gdef\noexpand\tf@size{\f@size}%
599 \gdef\noexpand\sf@size{\strip@pt\tempdimb}%
600 \gdef\noexpand\ssf@size{\strip@pt\dimen@}%
601 \noexpand\math@fontstrue}}
```

*(End definition for \calculate@math@sizes. This function is documented on page ??.)*

`\defaultscriptratio` The default ratio for math sizes is:  
`\defaultscriptscriptratio` 1 to `\defaultscriptratio` to `\defaultscriptscriptratio`.  
 By default this is 1 to .7 to .5.

```
602 \def\defaultscriptratio{.7}
603 \def\defaultscriptscriptratio{.5}
```

*(End definition for \defaultscriptratio and \defaultscriptscriptratio. These functions are documented on page ??.)*

`\noaccents@` If we don’t have a definition for `\noaccents@` we provide a dummy.

```
604 \ifx\noaccents@\@undefined
605 \let\noaccents@\@empty
606 \fi
```

*(End definition for \noaccents@. This function is documented on page ??.)*

`\showhyphens` The `\showhyphens` command must be redefined since the version in `plain.tex` uses `\tenrm`. We have also made some further adjustments for its use in L<sup>A</sup>T<sub>E</sub>X.

```

607 </2ekernel>
608 <latexrelease>\IncludeInRelease{2017/01/01}{\showhyphens}%
609 <latexrelease>                {XeTeX support for \showhyphens}%
610 <*2ekernel|latexrelease>
611 \ifx\XeTeXcharclass\@undefined

```

Version for engines other than XeT<sub>E</sub>X.

```

612 \DeclareRobustCommand\showhyphens[1]{%
613   \setbox0\vbox{%
614     \color@begingroup
615     \everypar{}%
616     \parfillskip\z@skip\hsize\maxdimen
617     \normalfont
618     \pretolerance\m@ne\tolerance\m@ne\hbadness\z@\showboxdepth\z@\ #1%
619     \color@endgroup}}
620 \else

```

XeT<sub>E</sub>X version. When using system fonts XeT<sub>E</sub>X reports consecutive runs of characters as a single item in box logging, which means the standard `\showhyphens` does not work. This version typesets the text into a narrow box to force hyphenation and then reconstructs a horizontal list with explicit hyphens to generate the display. Note that the `lmr` OpenType font is forced, this works even if the characters are not in the font as hyphenation is attempted due to the width of the space and hyphen character. It may generate spurious Missing Character warnings in the log, these are however suppressed from the terminal output by ensuring that `\tracingonline` is locally zero.

```

621 \DeclareRobustCommand\showhyphens[1]{%
622   \setbox0\vbox{%
623     \usefont{TU}{lmr}{m}{n}%
624     \hsize 1sp %
625     \hbadness\@M
626     \hfuzz\maxdimen
627     \tracingonline\z@
628     \everypar={}%
629     \leftskip\z@skip
630     \rightskip\z@skip
631     \parfillskip\z@skip
632     \hyphenpenalty=-\@M
633     \pretolerance\m@ne
634     \interlinepenalty\z@
635     \clubpenalty\z@
636     \widowpenalty\z@
637     \brokenpenalty1127 %
638     \setbox\z@\hbox{}%
639     \noindent
640     \hskip\z@skip
641     #1%
642     \par

```

Note here we stop the loop if made no progress, non-removable items may mean that we can not process the whole list (which would be testable as `\lastnodetype=-1`).

```

643   \loop
644   \@tempwafalse

```

```

645 \ifnum\lastnodetype=11\unskip\@tempwattrue\fi
646 \ifnum\lastnodetype=12\unkern\@tempwattrue\fi
647 \ifnum\lastnodetype=13 %
648 \count@\lastpenalty
649 \unpenalty\@tempwattrue
650 \fi
651 \ifnum\lastnodetype=\@ne
652 \setbox\tw@\lastbox\@tempwattrue
653 \setbox0\hbox{\unhbox\tw@\unskip\unskip\unpenalty
654 \ifnum\count@=1127 \else\ \fi
655 \unhbox0}%
656 \count@\z@
657 \fi
658 \if@tempswa
659 \repeat
660 \hbadness\z@
661 \hsize\maxdimen
662 \showboxdepth\z@
663 \tolerance\m@ne
664 \hyphenpenalty\z@
665 \noindent\unhbox\z@
666 }}
667 \fi
668 </2ekernel | latexrelease>
669 <latexrelease>\EndIncludeInRelease
670 <latexrelease>\IncludeInRelease{0000/00/00}{\showhyphens}%
671 <latexrelease> {XeTeX support for \showhyphens}%
672 <latexrelease>\gdef\showhyphens#1{%
673 <latexrelease> \setbox0\vbox{%
674 <latexrelease> \color@begingroup
675 <latexrelease> \everypar{%
676 <latexrelease> \parfillskip\z@skip\hsize\maxdimen
677 <latexrelease> \normalfont
678 <latexrelease> \pretolerance\m@ne\tolerance\m@ne
679 <latexrelease> \hbadness\z@\showboxdepth\z@\ #1%
680 <latexrelease> \color@endgroup}}
681 <latexrelease>\EndIncludeInRelease
682 <*2ekernel>

```

(End definition for \showhyphens. This function is documented on page ??.)

\addto@hook We need a macro to add tokens to a hook.

```

683 \long\def\addto@hook#1#2{#1\expandafter{\the#1#2}}

```

(End definition for \addto@hook. This function is documented on page ??.)

\@vpt

```

684 \def\@vpt{5}

```

(End definition for \@vpt. This function is documented on page ??.)

\@vipt

```

685 \def\@vipt{6}

```



(End definition for \@vipt. This function is documented on page ??.)

**\@viipt**

686   \def\@viipt{7}

(End definition for \@viipt. This function is documented on page ??.)

**\@viipt**

687   \def\@viipt{8}

(End definition for \@viipt. This function is documented on page ??.)

**\@ixpt**

688   \def\@ixpt{9}

(End definition for \@ixpt. This function is documented on page ??.)

**\@xpt**

689   \def\@xpt{10}

(End definition for \@xpt. This function is documented on page ??.)

**\@xipt**

690   \def\@xipt{10.95}

(End definition for \@xipt. This function is documented on page ??.)

**\@xiipt**

691   \def\@xiipt{12}

(End definition for \@xiipt. This function is documented on page ??.)

**\@xivpt**

692   \def\@xivpt{14.4}

(End definition for \@xivpt. This function is documented on page ??.)

**\@xvipt**

693   \def\@xvipt{17.28}

(End definition for \@xvipt. This function is documented on page ??.)

**\@xxpt**

694   \def\@xxpt{20.74}

(End definition for \@xxpt. This function is documented on page ??.)

**\@xxvpt**

695   \def\@xxvpt{24.88}

(End definition for \@xxvpt. This function is documented on page ??.)

696   </2kernel>

# File s

## ltfssaxes.dtx

This file contains the implementation for handling extra axes splitting the series and the values into sub-categories. selection commands. See other parts of the L<sup>A</sup>T<sub>E</sub>X distribution, or *The L<sup>A</sup>T<sub>E</sub>X Companion* for higher level documentation of the L<sup>A</sup>T<sub>E</sub>X Font Selection Scheme.

Everything in the this file got introduced 2020/02/02, so we do a single rollback (for now).

```
1 <*2ekernel>
2 </2ekernel>
3 <*2ekernel | latexrelease>
4 <latexrelease>\IncludeInRelease{2020/02/02}%
5 <latexrelease>    {\DeclareFontSeriesChangeRule}{Series change rules}%
```

## 1 Changing the font series

In the original NFSS implementation the series was a single attribute stored in `\f@series` and so one always had to specify both weight and width together. This means it was impossible to typeset, a paragraph in a condensed font and inside have a few words in bold weight (but still condensed) without doing this manually by requesting `\fontseries{bc}\selectfont`.

The new implementation now works differently by looking both at the current value of `\f@series` and the requested new series and out of that combination selects a resulting series value. Thus, if the current series is `c` and we ask for `b` we now get `bc`.

This is done by consulting a simple lookup table. This table is configurable (though most likely that flexibility will seldom of ever be needed) Adding or changing entries in this table are done with `\DeclareFontSeriesChangeRule`.

### 1.1 The series lookup table

`\DeclareFontSeriesChangeRule` The `\DeclareFontSeriesChangeRule` defines entries in a simple database (implemented as a set of commands) that define mappings between from an existing series and requested new series and maps that to a result series (and additionally offers an alternative if the desired one is not existing):

```
#1 current \f@series
#2 requested new series
#3 result (if that exist for the given font family
#4 alternative result (if #3 does not exist)
```

If an `.fd` file has its own substitution rules then `#3` exist and thus `#4` is not applied.

If there is no matching database entry or if neither the result nor the alternate result exist in the font family the requested new series is used (which then may trigger substitutions later on.

```
6 \def\DeclareFontSeriesChangeRule#1#2#3#4{%
7   \namedef{series@#1@#2}{#{#3}#{#4}}}
```

(End definition for `\DeclareFontSeriesChangeRule`. This function is documented on page ??.)

## 1.2 Mapping rules for series changes

The rules set up use explicit series values not `\. .default` indirections; my current feeling is that this is in fact better.

With 9 weights and 9 width classes this table is getting a bit large in the end (324 entries) but on the other hand it doesn't change and accessing speed and it is fast this way.

We could alternatively split the axis and maintain weight and width separately, but that would take more processing time and would not allow for setting up explicit exceptions nicely (not sure that this would ever get used though).

Design considerations for mapping entries:

- We make `m` to reset both weight and width (as this is how it always worked). To reset just the width `?m` is provided and to reset just the weight `m?`.
- We do support “*mwidth*” and “*weightm*”, e.g., `mec` to mean “go to medium weight and extra-condensed width”. At the end of the process we automatically drop any leftover `m` in the series name (unless it is just a single `m`).
- If there is no table entry then the target series is used unconditionally. This means that any request to set both weight and width (e.g. `bx` or `ulc`) needs no table entries. For that reason there are no entries which have a weight+width as request (i.e., second argument).

In particular this is also true for cases involving `m`, e.g., `bm` (bold medium width) which automatically gets reduced result in `b` or `mc` (medium weight condensed) which becomes `c` as a result.

- Only a few entries have “alternative” values and perhaps most of them should get dropped. Or maybe not ... needs some thought perhaps.

The idea is that you don't want the normal substitution to kick in because that would reset the shape first and it may be better to stay with `b` when a change to `c` is requested and `bc` doesn't exist, than to go to first change the shape to `n` and then find that `bc/n` doesn't exist either and thus ending up with `m/n`.

- Also: while I did set up all nine standard weight values from `ul` to `ub` I only bothered to provide entries for `ec`, `sc`, `c` and `x`, because other levels of compression/expansion are not in any real fonts that I know.

Could and perhaps should be eventually extended to cover the whole set.

```
8 \DeclareFontSeriesChangeRule {bc}{b}{bc}{}
9 \DeclareFontSeriesChangeRule {bc}{c}{bc}{}
10 \DeclareFontSeriesChangeRule {bc}{eb}{ebc}{}
11 \DeclareFontSeriesChangeRule {bc}{ec}{bec} {bc}
12 \DeclareFontSeriesChangeRule {bc}{el}{elc}{}
13 \DeclareFontSeriesChangeRule {bc}{l}{lc}{}
14 \DeclareFontSeriesChangeRule {bc}{sb}{sbc}{}
15 \DeclareFontSeriesChangeRule {bc}{sc}{bsc} {bc}
16 \DeclareFontSeriesChangeRule {bc}{sl}{slc}{}
17 \DeclareFontSeriesChangeRule {bc}{ub}{ubc}{}
18 \DeclareFontSeriesChangeRule {bc}{ul}{ulc}{}
19 \DeclareFontSeriesChangeRule {bc}{x}{bx}{}

```

```

20 \DeclareFontSeriesChangeRule {bx}{b}{bx}{}
21 \DeclareFontSeriesChangeRule {bx}{c} {bc} {bx} %<-----
22 \DeclareFontSeriesChangeRule {bx}{eb}{ebx}{}
23 \DeclareFontSeriesChangeRule {bx}{ec} {bec} {bx} %<-----
24 \DeclareFontSeriesChangeRule {bx}{el}{elx}{}
25 \DeclareFontSeriesChangeRule {bx}{l}{lx}{}
26 \DeclareFontSeriesChangeRule {bx}{sb} {sbx} {}
27 \DeclareFontSeriesChangeRule {bx}{sc} {bsc} {bx} %<-----
28 \DeclareFontSeriesChangeRule {bx}{sl}{slx} {}
29 \DeclareFontSeriesChangeRule {bx}{ub}{ubx}{}
30 \DeclareFontSeriesChangeRule {bx}{ul}{ulx}{}
31 \DeclareFontSeriesChangeRule {bx}{x}{bx}{}

32 \DeclareFontSeriesChangeRule {b}{bx} {bx} {b} %<-----
33 \DeclareFontSeriesChangeRule {b}{c} {bc} {b} %<-----
34 \DeclareFontSeriesChangeRule {b}{ec} {bec} {b} %<-----
35 \DeclareFontSeriesChangeRule {b}{sb} {sb} {b} %<-----
36 \DeclareFontSeriesChangeRule {b}{sc} {bsc} {b} %<-----
37 \DeclareFontSeriesChangeRule {b}{x} {bx} {b} %<-----

38 \DeclareFontSeriesChangeRule {c}{bx} {bx} {b} %<-----
39 \DeclareFontSeriesChangeRule {c}{b}{bc}{}
40 \DeclareFontSeriesChangeRule {c}{eb}{ebc}{}
41 \DeclareFontSeriesChangeRule {c}{el}{elc}{}
42 \DeclareFontSeriesChangeRule {c}{l}{lc}{}
43 \DeclareFontSeriesChangeRule {c}{sb}{sbc}{}
44 \DeclareFontSeriesChangeRule {c}{sl}{slc}{}
45 \DeclareFontSeriesChangeRule {c}{ub}{ubc}{}
46 \DeclareFontSeriesChangeRule {c}{ul}{ulc}{}
47 \DeclareFontSeriesChangeRule {c}{x}{x}{m} %<-----

48 \DeclareFontSeriesChangeRule {ebc}{b}{bc}{}
49 \DeclareFontSeriesChangeRule {ebc}{c}{ebc}{}
50 \DeclareFontSeriesChangeRule {ebc}{eb}{ebc}{}
51 \DeclareFontSeriesChangeRule {ebc}{ec}{ebec}{ebc}
52 \DeclareFontSeriesChangeRule {ebc}{el}{elc}{}
53 \DeclareFontSeriesChangeRule {ebc}{l}{lc}{}
54 \DeclareFontSeriesChangeRule {ebc}{sb}{sbc}{}
55 \DeclareFontSeriesChangeRule {ebc}{sc}{ebsc}{ebc}
56 \DeclareFontSeriesChangeRule {ebc}{sl}{slc}{}
57 \DeclareFontSeriesChangeRule {ebc}{ub}{ubc}{}
58 \DeclareFontSeriesChangeRule {ebc}{ul}{ulc}{}
59 \DeclareFontSeriesChangeRule {ebc}{x}{ebx}{}

60 \DeclareFontSeriesChangeRule {ec}{bx} {bx} {b} %<-----
61 \DeclareFontSeriesChangeRule {ec}{b}{bec}{}
62 \DeclareFontSeriesChangeRule {ec}{eb}{ebec}{}
63 \DeclareFontSeriesChangeRule {ec}{el}{elec}{}
64 \DeclareFontSeriesChangeRule {ec}{l}{lec}{}
65 \DeclareFontSeriesChangeRule {ec}{sb}{sbec}{}
66 \DeclareFontSeriesChangeRule {ec}{sl}{slec}{}
67 \DeclareFontSeriesChangeRule {ec}{ub}{ubec}{}
68 \DeclareFontSeriesChangeRule {ec}{ul}{ulec}{}
69 \DeclareFontSeriesChangeRule {ec}{x}{x}{m} %<-----

70 \DeclareFontSeriesChangeRule {sc}{bx} {bx} {b} %<-----
71 \DeclareFontSeriesChangeRule {sc}{b}{bsc}{}

```

```

72 \DeclareFontSeriesChangeRule {sc}{eb}{ebsc}{}
73 \DeclareFontSeriesChangeRule {sc}{el}{elsc}{}
74 \DeclareFontSeriesChangeRule {sc}{l}{lsc}{}
75 \DeclareFontSeriesChangeRule {sc}{sb}{sbsc}{}
76 \DeclareFontSeriesChangeRule {sc}{sl}{slsc}{}
77 \DeclareFontSeriesChangeRule {sc}{ub}{ubsc}{}
78 \DeclareFontSeriesChangeRule {sc}{ul}{ulsc}{}
79 \DeclareFontSeriesChangeRule {sc}{x}{x}{m} %<-----

80 \DeclareFontSeriesChangeRule {ebx}{b}{bx}{}
81 \DeclareFontSeriesChangeRule {ebx}{c}{ebc}{}
82 \DeclareFontSeriesChangeRule {ebx}{eb}{ebx}{}
83 \DeclareFontSeriesChangeRule {ebx}{ec}{ebec}{}
84 \DeclareFontSeriesChangeRule {ebx}{el}{elx}{}
85 \DeclareFontSeriesChangeRule {ebx}{l}{lx}{}
86 \DeclareFontSeriesChangeRule {ebx}{sb}{sbx}{}
87 \DeclareFontSeriesChangeRule {ebx}{sc}{ebsc}{}
88 \DeclareFontSeriesChangeRule {ebx}{sl}{slx}{}
89 \DeclareFontSeriesChangeRule {ebx}{ub}{ubx}{}
90 \DeclareFontSeriesChangeRule {ebx}{ul}{ulx}{}
91 \DeclareFontSeriesChangeRule {ebx}{x}{ebx}{}

92 \DeclareFontSeriesChangeRule {eb}{c}{ebc}{}
93 \DeclareFontSeriesChangeRule {eb}{ec}{ebec}{}
94 \DeclareFontSeriesChangeRule {eb}{sc}{ebsc}{}
95 \DeclareFontSeriesChangeRule {eb}{x}{ebx}{}

96 \DeclareFontSeriesChangeRule {elc}{b}{bc}{}
97 \DeclareFontSeriesChangeRule {elc}{c}{elc}{}
98 \DeclareFontSeriesChangeRule {elc}{eb}{ebc}{}
99 \DeclareFontSeriesChangeRule {elc}{ec}{elec}{}
100 \DeclareFontSeriesChangeRule {elc}{el}{elc}{}
101 \DeclareFontSeriesChangeRule {elc}{l}{lc}{}
102 \DeclareFontSeriesChangeRule {elc}{sb}{sbc}{}
103 \DeclareFontSeriesChangeRule {elc}{sc}{elsc}{}
104 \DeclareFontSeriesChangeRule {elc}{sl}{slc}{}
105 \DeclareFontSeriesChangeRule {elc}{ub}{ubc}{}
106 \DeclareFontSeriesChangeRule {elc}{ul}{ulc}{}
107 \DeclareFontSeriesChangeRule {elc}{x}{elx}{}

108 \DeclareFontSeriesChangeRule {elx}{b}{bx}{}
109 \DeclareFontSeriesChangeRule {elx}{c}{elc}{}
110 \DeclareFontSeriesChangeRule {elx}{eb}{ebx}{}
111 \DeclareFontSeriesChangeRule {elx}{ec}{elec}{}
112 \DeclareFontSeriesChangeRule {elx}{el}{elx}{}
113 \DeclareFontSeriesChangeRule {elx}{l}{lx}{}
114 \DeclareFontSeriesChangeRule {elx}{sb}{sbx}{}
115 \DeclareFontSeriesChangeRule {elx}{sc}{elsc}{}
116 \DeclareFontSeriesChangeRule {elx}{sl}{slx}{}
117 \DeclareFontSeriesChangeRule {elx}{ub}{ubx}{}
118 \DeclareFontSeriesChangeRule {elx}{ul}{ulx}{}
119 \DeclareFontSeriesChangeRule {elx}{x}{elx}{}

120 \DeclareFontSeriesChangeRule {el}{c}{elc}{}
121 \DeclareFontSeriesChangeRule {el}{ec}{elec}{}
122 \DeclareFontSeriesChangeRule {el}{sc}{elsc}{}
123 \DeclareFontSeriesChangeRule {el}{x}{elx}{}

```

```

124 \DeclareFontSeriesChangeRule {lc}{b}{bc}{}
125 \DeclareFontSeriesChangeRule {lc}{c}{lc}{}
126 \DeclareFontSeriesChangeRule {lc}{eb}{ebc}{}
127 \DeclareFontSeriesChangeRule {lc}{ec}{lec}{}
128 \DeclareFontSeriesChangeRule {lc}{el}{elc}{}
129 \DeclareFontSeriesChangeRule {lc}{l}{lc}{}
130 \DeclareFontSeriesChangeRule {lc}{sb}{sbc}{}
131 \DeclareFontSeriesChangeRule {lc}{sc}{lsc}{}
132 \DeclareFontSeriesChangeRule {lc}{sl}{slc}{}
133 \DeclareFontSeriesChangeRule {lc}{ub}{ubc}{}
134 \DeclareFontSeriesChangeRule {lc}{ul}{ulc}{}
135 \DeclareFontSeriesChangeRule {lc}{x}{lx}{}

136 \DeclareFontSeriesChangeRule {lx}{b}{bx}{}
137 \DeclareFontSeriesChangeRule {lx}{c}{lc}{}
138 \DeclareFontSeriesChangeRule {lx}{eb}{ebx}{}
139 \DeclareFontSeriesChangeRule {lx}{ec}{lec}{}
140 \DeclareFontSeriesChangeRule {lx}{el}{elx}{}
141 \DeclareFontSeriesChangeRule {lx}{l}{lx}{}
142 \DeclareFontSeriesChangeRule {lx}{sb}{sbx}{}
143 \DeclareFontSeriesChangeRule {lx}{sc}{lsc}{}
144 \DeclareFontSeriesChangeRule {lx}{sl}{slx}{}
145 \DeclareFontSeriesChangeRule {lx}{ub}{ubx}{}
146 \DeclareFontSeriesChangeRule {lx}{ul}{ulx}{}
147 \DeclareFontSeriesChangeRule {lx}{x}{lx}{}

148 \DeclareFontSeriesChangeRule {l}{bx} {bx} {b} %<-----
149 \DeclareFontSeriesChangeRule {l}{b} {b} {bx} %<-----
150 \DeclareFontSeriesChangeRule {l}{c} {lc} {l} % ? %<-----
151 \DeclareFontSeriesChangeRule {l}{ec} {lec} {l} % ? %<-----
152 \DeclareFontSeriesChangeRule {l}{sb} {sb} {b} % ? %<-----
153 \DeclareFontSeriesChangeRule {l}{sc} {lsc} {l} % ? %<-----
154 \DeclareFontSeriesChangeRule {l}{x} {lx} {l} % ? %<-----

155 \DeclareFontSeriesChangeRule {m}{bx} {bx} {b} %<-----
156 \DeclareFontSeriesChangeRule {m}{b} {b} {bx} %<-----
157 \DeclareFontSeriesChangeRule {m}{c} {c} {m} %<-----
158 \DeclareFontSeriesChangeRule {m}{ec} {ec} {m} %<-----
159 \DeclareFontSeriesChangeRule {m}{l} {l} {m} %<-----
160 \DeclareFontSeriesChangeRule {m}{sb} {sb} {b} %<-----
161 \DeclareFontSeriesChangeRule {m}{sc} {sc} {m} %<-----
162 \DeclareFontSeriesChangeRule {m}{x} {x} {m} %<-----

163 \DeclareFontSeriesChangeRule {sbc}{b}{bc}{}
164 \DeclareFontSeriesChangeRule {sbc}{c}{sbc}{}
165 \DeclareFontSeriesChangeRule {sbc}{eb}{ebc}{}
166 \DeclareFontSeriesChangeRule {sbc}{ec}{sbec}{sbc}
167 \DeclareFontSeriesChangeRule {sbc}{el}{elc}{}
168 \DeclareFontSeriesChangeRule {sbc}{l}{lc}{}
169 \DeclareFontSeriesChangeRule {sbc}{sb}{sbc}{}
170 \DeclareFontSeriesChangeRule {sbc}{sc}{sbsc}{sbc}
171 \DeclareFontSeriesChangeRule {sbc}{sl}{slc}{}
172 \DeclareFontSeriesChangeRule {sbc}{ub}{ubc}{}
173 \DeclareFontSeriesChangeRule {sbc}{ul}{ulc}{}
174 \DeclareFontSeriesChangeRule {sbc}{x}{sbx}{}

175 \DeclareFontSeriesChangeRule {sbx}{b}{bx}{}

```

```

176 \DeclareFontSeriesChangeRule {sbx}{c}{sbc}{ }
177 \DeclareFontSeriesChangeRule {sbx}{eb}{ebx}{ }
178 \DeclareFontSeriesChangeRule {sbx}{ec}{sbec}{ }
179 \DeclareFontSeriesChangeRule {sbx}{el}{elx}{ }
180 \DeclareFontSeriesChangeRule {sbx}{l}{lx}{ }
181 \DeclareFontSeriesChangeRule {sbx}{sb}{sbs}{ }
182 \DeclareFontSeriesChangeRule {sbx}{sc}{sbsc}{ }
183 \DeclareFontSeriesChangeRule {sbx}{sl}{slx}{ }
184 \DeclareFontSeriesChangeRule {sbx}{ub}{ubx}{ }
185 \DeclareFontSeriesChangeRule {sbx}{ul}{ulx}{ }
186 \DeclareFontSeriesChangeRule {sbx}{x}{sbx}{ }

187 \DeclareFontSeriesChangeRule {sb}{c} {sbc} {bc} %? %<-----
188 \DeclareFontSeriesChangeRule {sb}{ec} {sbec} {sbc} %? %<-----
189 \DeclareFontSeriesChangeRule {sb}{sc} {sbsc} {sbc} %? %<-----
190 \DeclareFontSeriesChangeRule {sb}{x} {sbx} {bx} %? %<-----

191 \DeclareFontSeriesChangeRule {slc}{b}{bc}{ }
192 \DeclareFontSeriesChangeRule {slc}{c}{slc}{ }
193 \DeclareFontSeriesChangeRule {slc}{eb}{ebc}{ }
194 \DeclareFontSeriesChangeRule {slc}{ec}{slec}{ }
195 \DeclareFontSeriesChangeRule {slc}{el}{elc}{ }
196 \DeclareFontSeriesChangeRule {slc}{l}{lc}{ }
197 \DeclareFontSeriesChangeRule {slc}{sb}{sbc}{ }
198 \DeclareFontSeriesChangeRule {slc}{sc}{slsc}{ }
199 \DeclareFontSeriesChangeRule {slc}{sl}{slc}{ }
200 \DeclareFontSeriesChangeRule {slc}{ub}{ubc}{ }
201 \DeclareFontSeriesChangeRule {slc}{ul}{ulc}{ }
202 \DeclareFontSeriesChangeRule {slc}{x}{slx}{ }

203 \DeclareFontSeriesChangeRule {slx}{b}{bx}{ }
204 \DeclareFontSeriesChangeRule {slx}{c}{slc}{ }
205 \DeclareFontSeriesChangeRule {slx}{eb}{ebx}{ }
206 \DeclareFontSeriesChangeRule {slx}{ec}{slec}{ }
207 \DeclareFontSeriesChangeRule {slx}{el}{elx}{ }
208 \DeclareFontSeriesChangeRule {slx}{l}{lx}{ }
209 \DeclareFontSeriesChangeRule {slx}{sb}{sbs}{ }
210 \DeclareFontSeriesChangeRule {slx}{sc}{slsc}{ }
211 \DeclareFontSeriesChangeRule {slx}{sl}{slx}{ }
212 \DeclareFontSeriesChangeRule {slx}{ub}{ubx}{ }
213 \DeclareFontSeriesChangeRule {slx}{ul}{ulx}{ }
214 \DeclareFontSeriesChangeRule {slx}{x}{slx}{ }

215 \DeclareFontSeriesChangeRule {sl}{c}{slc}{ }
216 \DeclareFontSeriesChangeRule {sl}{ec}{slec}{ }
217 \DeclareFontSeriesChangeRule {sl}{sc}{slsc}{ }
218 \DeclareFontSeriesChangeRule {sl}{x}{slx}{ }

219 \DeclareFontSeriesChangeRule {ubc}{b}{bc}{ }
220 \DeclareFontSeriesChangeRule {ubc}{c}{ubc}{ }
221 \DeclareFontSeriesChangeRule {ubc}{eb}{ebc}{ }
222 \DeclareFontSeriesChangeRule {ubc}{ec}{ubec}{ }
223 \DeclareFontSeriesChangeRule {ubc}{el}{elc}{ }
224 \DeclareFontSeriesChangeRule {ubc}{l}{lc}{ }
225 \DeclareFontSeriesChangeRule {ubc}{sb}{sbc}{ }
226 \DeclareFontSeriesChangeRule {ubc}{sc}{ubsc}{ }
227 \DeclareFontSeriesChangeRule {ubc}{sl}{slc}{ }

```

```

228 \DeclareFontSeriesChangeRule {ubc}{ub}{ubc}{ }
229 \DeclareFontSeriesChangeRule {ubc}{ul}{ulc}{ }
230 \DeclareFontSeriesChangeRule {ubc}{x}{ubx}{ }

231 \DeclareFontSeriesChangeRule {ubx}{b}{bx}{ }
232 \DeclareFontSeriesChangeRule {ubx}{c}{ubc}{ }
233 \DeclareFontSeriesChangeRule {ubx}{eb}{ebx}{ }
234 \DeclareFontSeriesChangeRule {ubx}{ec}{ubec}{ }
235 \DeclareFontSeriesChangeRule {ubx}{el}{elx}{ }
236 \DeclareFontSeriesChangeRule {ubx}{l}{lx}{ }
237 \DeclareFontSeriesChangeRule {ubx}{sb}{sbx}{ }
238 \DeclareFontSeriesChangeRule {ubx}{sc}{ubsc}{ }
239 \DeclareFontSeriesChangeRule {ubx}{sl}{slx}{ }
240 \DeclareFontSeriesChangeRule {ubx}{ub}{ubx}{ }
241 \DeclareFontSeriesChangeRule {ubx}{ul}{ulx}{ }
242 \DeclareFontSeriesChangeRule {ubx}{x}{ubx}{ }

243 \DeclareFontSeriesChangeRule {ub}{c}{ubc}{ }
244 \DeclareFontSeriesChangeRule {ub}{ec}{ubec}{ }
245 \DeclareFontSeriesChangeRule {ub}{sc}{ubsc}{ }
246 \DeclareFontSeriesChangeRule {ub}{x}{ubx}{ }

247 \DeclareFontSeriesChangeRule {ulc}{b}{bc}{ }
248 \DeclareFontSeriesChangeRule {ulc}{c}{ulc}{ }
249 \DeclareFontSeriesChangeRule {ulc}{eb}{ebc}{ }
250 \DeclareFontSeriesChangeRule {ulc}{ec}{ulec}{ulc}{ }
251 \DeclareFontSeriesChangeRule {ulc}{el}{elc}{ }
252 \DeclareFontSeriesChangeRule {ulc}{l}{lc}{ }
253 \DeclareFontSeriesChangeRule {ulc}{sb}{sbc}{ }
254 \DeclareFontSeriesChangeRule {ulc}{sc}{ulsc}{ulc}{ }
255 \DeclareFontSeriesChangeRule {ulc}{sl}{slc}{ }
256 \DeclareFontSeriesChangeRule {ulc}{ub}{ubc}{ }
257 \DeclareFontSeriesChangeRule {ulc}{ul}{ulc}{ }
258 \DeclareFontSeriesChangeRule {ulc}{x}{ulx}{ }

259 \DeclareFontSeriesChangeRule {ulx}{b}{bx}{ }
260 \DeclareFontSeriesChangeRule {ulx}{c}{ulc}{ }
261 \DeclareFontSeriesChangeRule {ulx}{eb}{ebx}{ }
262 \DeclareFontSeriesChangeRule {ulx}{ec}{ulec}{ }
263 \DeclareFontSeriesChangeRule {ulx}{el}{elx}{ }
264 \DeclareFontSeriesChangeRule {ulx}{l}{lx}{ }
265 \DeclareFontSeriesChangeRule {ulx}{sb}{sbx}{ }
266 \DeclareFontSeriesChangeRule {ulx}{sc}{ulsc}{ }
267 \DeclareFontSeriesChangeRule {ulx}{sl}{slx}{ }
268 \DeclareFontSeriesChangeRule {ulx}{ub}{ubx}{ }
269 \DeclareFontSeriesChangeRule {ulx}{ul}{ulx}{ }
270 \DeclareFontSeriesChangeRule {ulx}{x}{ulx}{ }

271 \DeclareFontSeriesChangeRule {ul}{c}{ulc}{ }
272 \DeclareFontSeriesChangeRule {ul}{ec}{ulec}{ }
273 \DeclareFontSeriesChangeRule {ul}{sc}{ulsc}{ }
274 \DeclareFontSeriesChangeRule {ul}{x}{ulx}{ }

275 \DeclareFontSeriesChangeRule {x}{b}{bx}{ }
276 \DeclareFontSeriesChangeRule {x}{c}{c}{ }
277 \DeclareFontSeriesChangeRule {x}{eb}{ebx}{ }
278 \DeclareFontSeriesChangeRule {x}{ec}{ec}{ }
279 \DeclareFontSeriesChangeRule {x}{el}{elx}{ }

```



```

280 \DeclareFontSeriesChangeRule {x}{l}{lx}{}
281 \DeclareFontSeriesChangeRule {x}{sb}{sbx}{}
282 \DeclareFontSeriesChangeRule {x}{sc}{sc}{}
283 \DeclareFontSeriesChangeRule {x}{sl}{slx}{}
284 \DeclareFontSeriesChangeRule {x}{ub}{ubx}{}
285 \DeclareFontSeriesChangeRule {x}{ul}{ulx}{}

```

Special rules for `lm` etc. aren't needed because if the target `lm` is request it will used if there is no rule and that id then reduced to `l` automatically. Same for `mc` and friends. Only `?m` and `m?` need rules.

So here are the special rules for `m?`:

```

286 \DeclareFontSeriesChangeRule {bc}{m?}{c}{}
287 \DeclareFontSeriesChangeRule {bec}{m?}{ec}{}
288 \DeclareFontSeriesChangeRule {bsc}{m?}{sc}{}
289 \DeclareFontSeriesChangeRule {bx}{m?}{x}{}
290 \DeclareFontSeriesChangeRule {b}{m?}{m}{}
291 \DeclareFontSeriesChangeRule {c}{m?}{c}{}
292 \DeclareFontSeriesChangeRule {ebc}{m?}{c}{}
293 \DeclareFontSeriesChangeRule {ebec}{m?}{ec}{}
294 \DeclareFontSeriesChangeRule {ebsc}{m?}{sc}{}
295 \DeclareFontSeriesChangeRule {ebx}{m?}{x}{}
296 \DeclareFontSeriesChangeRule {eb}{m?}{m}{}
297 \DeclareFontSeriesChangeRule {ec}{m?}{ec}{}
298 \DeclareFontSeriesChangeRule {elc}{m?}{c}{}
299 \DeclareFontSeriesChangeRule {elec}{m?}{ec}{}
300 \DeclareFontSeriesChangeRule {elsc}{m?}{sc}{}
301 \DeclareFontSeriesChangeRule {elx}{m?}{x}{}
302 \DeclareFontSeriesChangeRule {el}{m?}{m}{}
303 \DeclareFontSeriesChangeRule {lc}{m?}{c}{}
304 \DeclareFontSeriesChangeRule {lec}{m?}{ec}{}
305 \DeclareFontSeriesChangeRule {lsc}{m?}{sc}{}
306 \DeclareFontSeriesChangeRule {lx}{m?}{x}{}
307 \DeclareFontSeriesChangeRule {l}{m?}{m}{}
308 \DeclareFontSeriesChangeRule {m}{m?}{m}{}
309 \DeclareFontSeriesChangeRule {sbc}{m?}{c}{}
310 \DeclareFontSeriesChangeRule {sbec}{m?}{ec}{}
311 \DeclareFontSeriesChangeRule {bsc}{m?}{sc}{}
312 \DeclareFontSeriesChangeRule {sbx}{m?}{x}{}
313 \DeclareFontSeriesChangeRule {sb}{m?}{m}{}
314 \DeclareFontSeriesChangeRule {sc}{m?}{sc}{}
315 \DeclareFontSeriesChangeRule {slc}{m?}{c}{}
316 \DeclareFontSeriesChangeRule {slec}{m?}{ec}{}
317 \DeclareFontSeriesChangeRule {slsc}{m?}{sc}{}
318 \DeclareFontSeriesChangeRule {slx}{m?}{x}{}
319 \DeclareFontSeriesChangeRule {sl}{m?}{m}{}
320 \DeclareFontSeriesChangeRule {ubc}{m?}{c}{}
321 \DeclareFontSeriesChangeRule {ubec}{m?}{ec}{}
322 \DeclareFontSeriesChangeRule {ubsc}{m?}{sc}{}
323 \DeclareFontSeriesChangeRule {ubx}{m?}{x}{}
324 \DeclareFontSeriesChangeRule {ub}{m?}{ub}{}
325 \DeclareFontSeriesChangeRule {ulc}{m?}{c}{}
326 \DeclareFontSeriesChangeRule {ulec}{m?}{ec}{}
327 \DeclareFontSeriesChangeRule {ulsc}{m?}{sc}{}
328 \DeclareFontSeriesChangeRule {ulx}{m?}{x}{}

```

```

329 \DeclareFontSeriesChangeRule {ul}{m?}{m}{-}
330 \DeclareFontSeriesChangeRule {x}{m?}{x}{-}
    And there the special rules for ?m:
331 \DeclareFontSeriesChangeRule {bc}{?m}{b}{-}
332 \DeclareFontSeriesChangeRule {bec}{?m}{b}{-}
333 \DeclareFontSeriesChangeRule {bsc}{?m}{b}{-}
334 \DeclareFontSeriesChangeRule {bsc}{?m}{b}{-}
335 \DeclareFontSeriesChangeRule {bx}{?m}{b}{-}
336 \DeclareFontSeriesChangeRule {b}{?m}{b}{-}
337 \DeclareFontSeriesChangeRule {c}{?m}{m}{-}
338 \DeclareFontSeriesChangeRule {ebc}{?m}{eb}{-}
339 \DeclareFontSeriesChangeRule {ebec}{?m}{eb}{-}
340 \DeclareFontSeriesChangeRule {ebsc}{?m}{eb}{-}
341 \DeclareFontSeriesChangeRule {ebsc}{?m}{eb}{-}
342 \DeclareFontSeriesChangeRule {ebx}{?m}{eb}{-}
343 \DeclareFontSeriesChangeRule {eb}{?m}{eb}{-}
344 \DeclareFontSeriesChangeRule {ec}{?m}{m}{-}
345 \DeclareFontSeriesChangeRule {elc}{?m}{el}{-}
346 \DeclareFontSeriesChangeRule {elec}{?m}{el}{-}
347 \DeclareFontSeriesChangeRule {elsc}{?m}{el}{-}
348 \DeclareFontSeriesChangeRule {elsc}{?m}{el}{-}
349 \DeclareFontSeriesChangeRule {elx}{?m}{el}{-}
350 \DeclareFontSeriesChangeRule {el}{?m}{el}{-}
351 \DeclareFontSeriesChangeRule {lc}{?m}{l}{-}
352 \DeclareFontSeriesChangeRule {lec}{?m}{l}{-}
353 \DeclareFontSeriesChangeRule {lsc}{?m}{l}{-}
354 \DeclareFontSeriesChangeRule {lsc}{?m}{l}{-}
355 \DeclareFontSeriesChangeRule {lx}{?m}{l}{-}
356 \DeclareFontSeriesChangeRule {l}{?m}{l}{-}
357 \DeclareFontSeriesChangeRule {m}{?m}{m}{-}
358 \DeclareFontSeriesChangeRule {sbc}{?m}{sb}{-}
359 \DeclareFontSeriesChangeRule {sbec}{?m}{sb}{-}
360 \DeclareFontSeriesChangeRule {bsbc}{?m}{sb}{-}
361 \DeclareFontSeriesChangeRule {bsbc}{?m}{sb}{-}
362 \DeclareFontSeriesChangeRule {sbc}{?m}{sb}{-}
363 \DeclareFontSeriesChangeRule {sb}{?m}{sb}{-}
364 \DeclareFontSeriesChangeRule {sc}{?m}{m}{-}
365 \DeclareFontSeriesChangeRule {sc}{?m}{m}{-}
366 \DeclareFontSeriesChangeRule {slc}{?m}{sl}{-}
367 \DeclareFontSeriesChangeRule {slec}{?m}{sl}{-}
368 \DeclareFontSeriesChangeRule {slsc}{?m}{sl}{-}
369 \DeclareFontSeriesChangeRule {slsc}{?m}{sl}{-}
370 \DeclareFontSeriesChangeRule {slx}{?m}{sl}{-}
371 \DeclareFontSeriesChangeRule {sl}{?m}{sl}{-}
372 \DeclareFontSeriesChangeRule {ubc}{?m}{ub}{-}
373 \DeclareFontSeriesChangeRule {ubec}{?m}{ub}{-}
374 \DeclareFontSeriesChangeRule {ubsc}{?m}{ub}{-}
375 \DeclareFontSeriesChangeRule {ubsc}{?m}{ub}{-}
376 \DeclareFontSeriesChangeRule {ubx}{?m}{ub}{-}
377 \DeclareFontSeriesChangeRule {ub}{?m}{m}{-}
378 \DeclareFontSeriesChangeRule {ulc}{?m}{ul}{-}
379 \DeclareFontSeriesChangeRule {ulec}{?m}{ul}{-}
380 \DeclareFontSeriesChangeRule {ulsc}{?m}{ul}{-}
381 \DeclareFontSeriesChangeRule {ulsc}{?m}{ul}{-}

```

```

382 \DeclareFontSeriesChangeRule {ulx}{?m}{ul}{-}
383 \DeclareFontSeriesChangeRule {ul}{?m}{ul}{-}
384 \DeclareFontSeriesChangeRule {x}{?m}{m}{-}

```

### 1.3 Changing to a new series

`\if@forced@series` If the series gets forced we need to know that fact later on.

```

385 \newif\if@forced@series

```

*(End definition for \if@forced@series. This function is documented on page ??.)*

`\fontseriesforce` To change unconditionally to a new series you can use `\fontseriesforce`. Of course, if the series doesn't exist for the current family substitution still happens, but there is not dependency on the current series.

```

386 \DeclareRobustCommand\fontseriesforce[1]{\@forced@seriestrue\edef\f@series{#1}}

```

*(End definition for \fontseriesforce. This function is documented on page ??.)*

`\fontseries` The `\fontseries` command takes one argument which is the requested new font series. In the original implementation it simply saved the expanded value in `\f@series`. Now we do a bit more processing and look up the final value in the font series data base. This is done by `\merge@font@series`.

```

387 \DeclareRobustCommand\fontseries[1]{\@forced@seriesfalse\merge@font@series{#1}}

```

*(End definition for \fontseries. This function is documented on page ??.)*

`\merge@font@series` We look up the data base value by expanding the right command twice. If no such value exist then the result will be `\relax` otherwise it will be the two brace groups: the desired result and the alternate result. The first case means that the third argument to `\merge@font@series` will be empty.

```

388 \def\merge@font@series#1{%
389   \expandafter\expandafter\expandafter
390   \merge@font@series@
391   \csname series@\f@series @#1\endcsname
392   {#1}%
393   \@nil
394 }

```

*(End definition for \merge@font@series. This function is documented on page ??.)*

`\merge@font@series@` This now defines the new `\f@series`:

```

395 \def\merge@font@series@#1#2#3\@nil{%

```

If the third argument is empty there is no database entry for the combination and the second argument holds the new series so we return that.

Originally the test was simply `\ifx!#3!` but that actually dies if `#3` starts with a conditional and in the definition of `\AmSfont` that is actually the case.

```

396 %\ifcat\expandafter X\detokenize{#1}X%
397 \def\reserved@a{#3}%
398 \ifx\reserved@a\@empty
399   \set@target@series{#2}%
400 \else

```

Otherwise we check if the desired result for the series (#1) exists for the font family and the current shape. As the .fd is perhaps not loaded yet, we first have to do that, otherwise the test would fail even if the face is actually available.

```

401     \maybe@load@fontshape
402     \edef\reserved@a{\f@encoding /\f@family /#1/\f@shape}%
403     \ifcsname \reserved@a \endcsname

```

If the desired result is available then we use that. However, we do need some post-processing because we need to drop surplus ms due to the way naming convention was designed in the '90s (sigh).

```

404         \set@target@series{#1}%

```

If not, then we try the alternate result (#2).

```

405     \else
406         \ifcsname \f@encoding /\f@family /#2/\f@shape \endcsname

```

If the alternate result exist we use that and also issue a warning (or rather a log entry) that we didn't managed to change to the desired font.

```

407         \set@target@series{#2}%
408         \@font@shape@subst@warning

```

If that doesn't exist either, then we use the requested series unmodified (again with a warning).

```

409     \else
410         \set@target@series{#3}%
411         \@font@shape@subst@warning
412     \fi
413 \fi
414 \fi
415 }

```

It is possible that the previous font and the new one are actually identical (and the font was not found because it still needs loading) in which case a warning would look rather odd. So we make a quick check for that (which is the reason why we defined \@reserved@a above).

```

416 \def\@font@shape@subst@warning{%
417     \edef\reserved@b{\curr@fontshape}%
418     \ifx\reserved@a\reserved@b \else
419         \@font@warning{Font shape '\reserved@a' undefined\MessageBreak
420                        using '\reserved@b' instead}%
421     \fi
422 }

```

*(End definition for \merge@font@series@. This function is documented on page ??.)*

**\maybe@load@fontshape** A small helper that we use a couple of times: try loading a fontshape (in a group because \try@load@fontshape normalizes catcodes).

```

423 \def\maybe@load@fontshape{\begingroup\try@load@fontshape\endgroup}

```

*(End definition for \maybe@load@fontshape. This function is documented on page ??.)*

**\set@target@series** Finally the code for normalizing the \f@series value.

The combined series value determined by the mapping may still contain an m that we have to remove (as the .fd files use c not mc to denote a medium weight condensed series, etc.). We do this in all branches above because a user might have written

```
eclareFontSeriesChangeRule {m}{sc}{msc}{mc}
```

instead of using `sc` and `c` as needed in the `.fd` file.

```
424 \def\set@target@series#1{%
```

We need to `\edef` the argument first in case it starts with a conditional. Then we check (and perhaps drop) an “m” from the value and assign the result to `\f@series`.

```
425 \edef\f@series{#1}%
```

```
426 \series@maybe@drop@one@m\f@series\f@series
```

```
427 }
```

*(End definition for `\set@target@series`. This function is documented on page ??.)*

```
\series@maybe@drop@one@m
```

If the series value is in NFSS notation then it should not contain any “m” unless it is just an “m” by it own. So we need to drop surplus “m”s. But we better don’t do this for full names, such as “`semibold`” as used by `autoinst`, for example. So we test against the possible explicit values that should drop an “m”. After that we assign the result to `#2` for further use.

```
428 \def\series@maybe@drop@one@m#1{%
```

```
429 \expandafter\series@maybe@drop@one@m@x\expandafter{#1}}
```

```
430
```

```
431 \def\series@maybe@drop@one@m@x#1#2{%
```

The code below is an inline version of the `\in@` macro without the group, so that it works in `\accent`.

```
432 \def\in@@##1,#1,{}%
```

```
433 \series@check@toks\expandafter{\in@@
```

```
434 ,ulm,elm,lm,slm,mm,sbm,bm,ebm,ubm,muc,mec,mc,msc,msx,mx,mex,mux,{},{},#1,}%
```

```
435 \edef\in@{\the\series@check@toks}%
```

```
436 \ifx\in@@\empty
```

The default definition for `\bfdefault` etc is actually `b\empty` so that we can detect if the user has changed the default. However that means a) the above test will definitely fail (maybe something to change) and b) we better use `\edef` on the next line to get rid of it as otherwise the test against `#2` (e.g. `\bfdef@ult`) will fail in other places.

```
437 \edef#2{#1}%
```

```
438 \else
```

```
439 \edef#2{\expandafter\series@drop@one@m #1m\series@drop@one@m}%
```

```
440 \fi
```

```
441 }
```

As a precaution we use a private `toks` register not `\toks@` as that is no longer hidden inside the group.

```
442 \newtoks\series@check@toks
```

*(End definition for `\series@maybe@drop@one@m`. This function is documented on page ??.)*

```
\series@drop@one@m
```

Drop up to two ms but keep one if that makes the series value empty. Actually, with the current implementation we know that there is at least one in the series value itself and we added one after it, so all we have to do is now returning `#1#2` and dropping the rest.

```
443 \def\series@drop@one@m#1#2m#3\series@drop@one@m{%
```

```
444 % \ifx\relax#1#2\relax m\else#1#2\fi
```

```
445 #1#2%
```

```
446 }
```

*(End definition for `\series@drop@one@m`. This function is documented on page ??.)*

## 2 Changing the shape

Shapes are also split in two axes (though it could be more if that is desirable), essentially building in an “sc” axis).

`\DeclareFontShapeChangeRule` The database for shapes is done in exactly the same way, only that it is much smaller and we usually have no alternative shape (or rather it is empty thus not used).

```
447 \def\DeclareFontShapeChangeRule #1#2#3#4{%
448   \@namedef{shape@#1@#2}{#{#3}#{#4}}}
```

*(End definition for \DeclareFontShapeChangeRule. This function is documented on page ??.)*

There is kind of the same problem with returning back from `sc` to normal. It sort of needs its own letter. In `fontspec` this was solved by the first time `\upshape` changes it or `sl` back (so only `sc` remains) and second time it changes then `sc` back to normal. Maybe that’s not a bad way to handle it, but decided for a slightly different approach: `n` always returns to “normal”, ie resets everything and `up` changes italic or slanted to upright and `ulc` undoes small caps.

So we now offer `\normalshape` (using `\shapedefault` which is normally the same as calling both `\ulcshape` and `\upshape`, only more efficient.

`\ulcshape` To request going back to upper/lowercase we need a new command. It uses `ulc` as shape name but this shape is virtual, i.e., it doesn’t exist as a real shape, it is only used as part of the database table entries and thus only appears in the second argument there (but not in the first).

```
449 \DeclareRobustCommand\ulcshape
450   {\not@math@alphabet\ulcshape\relax
451    \fontshape\ulcdefault\selectfont}
452 \let\ulcdefault\@undefined      % for rollback
453 \newcommand\ulcdefault{ulc}
```

*(End definition for \ulcshape, \textulc, and \ulcdefault. These functions are documented on page ??.)*

`\swshape` New command to select a swash shape. The standard rules put this in the same category as italics or slanted, i.e., if you ask for it then italics are undone. One could provide more complicated rules so that `it + sw` becomes `swit` but given that there are only very few fonts that have swash letters that level of flexibility (these days) would be just resulting in a lot of combinations that do not exist.

```
454 \DeclareRobustCommand\swshape
455   {\not@math@alphabet\swshape\relax
456    \fontshape\swdefault\selectfont}
457 \let\swdefault\@undefined      % for rollback
458 \newcommand\swdefault{sw}
```

*(End definition for \swshape, \textsw, and \swdefault. These functions are documented on page ??.)*

`\sscshape` New command to select spaced small capitals. This is only here because `fontaxes` offered it. There isn’t a single free font that supports it. However, some commercial ones do, so we offer it so that at some point `fontaxes` could be retired.

So far there aren’t any rules for it—probably there should be some putting it in the same category as `sc`.

```
459 \DeclareRobustCommand\sscshape
460   {\not@math@alphabet\sscshape\relax
```

```

461 \fontshape\sscdefault\selectfont}
462 \let\sscdefault\@undefined % for rollback
463 \newcommand\sscdefault{ssc}

```

(End definition for \sscshape, \textssc, and \sscdefault. These functions are documented on page ??.)

## 2.1 Mapping rules for shape combinations

Many of the entries are commented out as we will get that result without any entry.

```

464 %\DeclareFontShapeChangeRule {n}{n} {n} {}
465 \DeclareFontShapeChangeRule {n}{it} {it} {sl}
466 \DeclareFontShapeChangeRule {n}{sl} {sl} {it}
467 %\DeclareFontShapeChangeRule {n}{sw} {sw} {}
468 %\DeclareFontShapeChangeRule {n}{sc} {sc} {}
469 \DeclareFontShapeChangeRule {n}{ulc} {n} {}
470 \DeclareFontShapeChangeRule {n}{up} {n} {}

471 %\DeclareFontShapeChangeRule {it}{n} {n} {}
472 %\DeclareFontShapeChangeRule {it}{it} {it} {}
473 \DeclareFontShapeChangeRule {it}{sl} {sl} {it}
474 %\DeclareFontShapeChangeRule {it}{sw} {sw} {}

```

If neither scit nor scsl exist then sc will be used as a fallback albeit with a log entry, so except for the latter there will be no change for CM or Latin Modern fonts.

```

475 \DeclareFontShapeChangeRule {it}{sc} {scit} {scsl}
476 \DeclareFontShapeChangeRule {it}{ulc} {it} {}
477 \DeclareFontShapeChangeRule {it}{up} {n} {}

478 %\DeclareFontShapeChangeRule {sl}{n} {n} {}
479 \DeclareFontShapeChangeRule {sl}{it} {it} {sl}
480 %\DeclareFontShapeChangeRule {sl}{sl} {sl} {}
481 %\DeclareFontShapeChangeRule {sl}{sw} {sw} {}
482 \DeclareFontShapeChangeRule {sl}{sc} {scsl} {scit}
483 \DeclareFontShapeChangeRule {sl}{ulc} {sl} {}
484 \DeclareFontShapeChangeRule {sl}{up} {n} {}

485 %\DeclareFontShapeChangeRule {sc}{n} {n} {}
486 \DeclareFontShapeChangeRule {sc}{it} {scit} {scsl}
487 \DeclareFontShapeChangeRule {sc}{sl} {scsl} {scit}
488 \DeclareFontShapeChangeRule {sc}{sw} {scsw} {sw}
489 %\DeclareFontShapeChangeRule {sc}{sc} {sc} {}
490 \DeclareFontShapeChangeRule {sc}{ulc} {n} {}

```

The next rule might be a bit surprising and rightly so. Correct would be that `sc` is not affected by `up`, i.e., remains `sc` as showed in the commented out rule. However, for nearly three decades commands such as `sc` or `\textup` changed small caps back to the “normal” shape. So for backward compatibility we keep hat behavior.

As a result you are currently typesetting in `scit` or `scsl` using `\upshape` twice will return you to the normal shape too, the first will change to `sc` and the second (because of the rule below) change that to `n`. This is the way `fontspec` implemented its version on this interface, so this rule means we are also compatible with the way `fontspec` behaved. Still it remains an odditywhic I would rather liked to have avoided.

```

491 %\DeclareFontShapeChangeRule {sc}{up} {sc} {}
492 \DeclareFontShapeChangeRule {sc}{up} {n} {}

```

```

493 %\DeclareFontShapeChangeRule {scit}{n} {n} {}
494 \DeclareFontShapeChangeRule {scit}{it} {scit} {}
495 \DeclareFontShapeChangeRule {scit}{sl} {scsl} {scit}
496 \DeclareFontShapeChangeRule {scit}{sw} {scsw} {sc} % or scit?
497 \DeclareFontShapeChangeRule {scit}{sc} {scit} {}
498 \DeclareFontShapeChangeRule {scit}{ulc} {it} {}
499 \DeclareFontShapeChangeRule {scit}{up} {sc} {}

```

The previous rule assumes that if `scit` exists then it exists as well. If not, the mechanism will save `ulc` in `\f@series` which most certainly doesn't exist. So when a font is later selected that would result in a substitution (so no harm done really). Alternatively, we could in this case use `n` as alternative, which may be a bit faster, but such a setup would be so weird in the first place that this isn't worth the effort.

```

500 %\DeclareFontShapeChangeRule {scsl}{n} {n} {}
501 \DeclareFontShapeChangeRule {scsl}{it} {scit} {scsl}
502 \DeclareFontShapeChangeRule {scsl}{sl} {scsl} {}
503 \DeclareFontShapeChangeRule {scsl}{sw} {scsw} {sc} % or scsl?
504 \DeclareFontShapeChangeRule {scsl}{sc} {scsl} {}
505 \DeclareFontShapeChangeRule {scsl}{ulc} {sl} {}
506 \DeclareFontShapeChangeRule {scsl}{up} {sc} {}

507 %\DeclareFontShapeChangeRule {scsw}{n} {n} {}
508 \DeclareFontShapeChangeRule {scsw}{it} {scit} {scsw}
509 \DeclareFontShapeChangeRule {scsw}{sl} {scsl} {}
510 \DeclareFontShapeChangeRule {scsw}{sw} {scsw} {}
511 \DeclareFontShapeChangeRule {scsw}{sc} {scsw} {}
512 \DeclareFontShapeChangeRule {scsw}{ulc} {sw} {}
513 \DeclareFontShapeChangeRule {scsw}{up} {sc} {}

514 %\DeclareFontShapeChangeRule {sw}{n} {n} {}
515 %\DeclareFontShapeChangeRule {sw}{it} {it} {}
516 %\DeclareFontShapeChangeRule {sw}{sl} {sl} {}
517 %\DeclareFontShapeChangeRule {sw}{sw} {sw} {}
518 \DeclareFontShapeChangeRule {sw}{sc} {scsw} {}
519 \DeclareFontShapeChangeRule {sw}{ulc} {sw} {}
520 \DeclareFontShapeChangeRule {sw}{up} {n} {}

```

## 2.2 Changing to a new shape

`\fontshape` Again the `\fontshape` now has to do a lookup to get to its new value in `\f@shape`. The method is exactly the same as in `\fontseries`.

```

521 \DeclareRobustCommand\fontshape[1]{\merge@font@shape{#1}}

```

*(End definition for \fontshape. This function is documented on page ??.)*

`\fontshapeforce` The unconditional version:

```

522 \DeclareRobustCommand\fontshapeforce[1]{\edef\f@shape{#1}}

```

*(End definition for \fontshapeforce. This function is documented on page ??.)*

`\merge@font@shape` Look up the database entry (if existing) and act accordingly.

```

523 \def\merge@font@shape#1{%
524   \expandafter\expandafter\expandafter
525   \merge@font@shape@
526   \csname shape@\f@shape @#1\endcsname

```



```

527     {#1}%
528     \@nil
529 }

```

(End definition for `\merge@font@shape`. This function is documented on page ??.)

`\merge@font@shape@` Same game now, except that we look at shapes not series values and we can set the shape without the complication of dropping “m”s from the name as we had to for the series.

```

530 \def\merge@font@shape@#1#2#3\@nil{%
531   \def\reserved@a{#3}%
532   \ifx\reserved@a\@empty
533     \edef\f@shape{#2}%
534   \else
535     \maybe@load@fontshape
536     \edef\reserved@a{\f@encoding /\f@family /\f@series/#1}%
537     \ifcsname \reserved@a\endcsname
538       \edef\f@shape{#1}%
539     \else
540       \ifcsname \f@encoding /\f@family /\f@series/#2\endcsname
541         \edef\f@shape{#2}%
542         \@font@shape@subst@warning
543       \else
544         \edef\f@shape{#3}%
545         \@font@shape@subst@warning
546       \fi
547     \fi
548   \fi
549 }

```

(End definition for `\merge@font@shape@`. This function is documented on page ??.)

`\normalshape` `\normalshape` resets both sub-axes if the default rules are used.

```

550 \protected\def\normalshape
551   {\not@math@alphabet\normalshape\relax
552    \fontshape\shapedefault\selectfont}%

```

(End definition for `\normalshape`. This function is documented on page ??.)

### 3 Make sure we win ...

This code implements one aspect of what the package `fontaxes` provide. So its redefinitions for the various shape commands, such as `\itshape` should no longer happen. We therefore force the standard definitions at `\AtBeginDocument` (later when this is defined. Once `fontaxes` is no longer doing such redefinitions that could be taken out again.

We use a separate macro so that we can easily disable this (in case of rollback).

`\reinstall@nfss@defs` I use `\protected` here not `\DeclareRobustCommand` to avoid extra status lines.

```

553 \def\reinstall@nfss@defs{%
554   \protected\def\upshape
555     {\not@math@alphabet\upshape\relax
556      \fontshape\updefault\selectfont}%
557   \protected\def\slshape
558     {\not@math@alphabet\slshape\relax

```

```

559         \fontshape\sldefault\selectfont}%
560 \protected\def\scshape
561     {\not@math@alphabet\scshape\relax
562     \fontshape\scdefault\selectfont}%
563 \protected\def\itshape
564     {\not@math@alphabet\itshape\mathit
565     \fontshape\itdefault\selectfont}%
566 \protected\def\ulcshape
567     {\not@math@alphabet\ulcshape\relax
568     \fontshape\ulc\selectfont}%
569 \protected\def\swshape
570     {\not@math@alphabet\swshape\relax
571     \fontshape\swdefault\selectfont}%
572 \protected\def\sscshape
573     {\not@math@alphabet\sscshape\relax
574     \fontshape\sscdefault\selectfont}%
575 }

```

(End definition for \reinstall@nfss@defs. This function is documented on page ??.)

Supporting rollback ...

```

576 </2ekernel | latexrelease>
577 <latexrelease>\EndIncludeInRelease
578 <latexrelease>\IncludeInRelease{0000/00/00}%
579 <latexrelease>    {\DeclareFontSeriesChangeRule}{Series change rules}%
580 <latexrelease>
581 <latexrelease>\DeclareRobustCommand\fontseries[1]{\edef\f@series{#1}}
582 <latexrelease>\DeclareRobustCommand\fontshape [1]{\edef\f@shape{#1}}
583 <latexrelease>\let\fontseriesforce\@undefined
584 <latexrelease>\let\fontshapeforce\@undefined
585 <latexrelease>
586 <latexrelease>\let\DeclareFontSeriesChangeRule\@undefined
587 <latexrelease>\let\merge@font@series\@undefined
588 <latexrelease>\let\merge@font@series@\@undefined
589 <latexrelease>\let\@font@shape@subst@warning\@undefined
590 <latexrelease>\let\maybe@load@fontshape\@undefined
591 <latexrelease>\let\set@target@series\@undefined
592 <latexrelease>\let\series@maybe@drop@one@m\@undefined
593 <latexrelease>\let\series@drop@one@m\@undefined
594 <latexrelease>\let\DeclareFontShapeChangeRule\@undefined
595 <latexrelease>\let\merge@font@shape\@undefined
596 <latexrelease>\let\merge@font@shape@\@undefined
597 <latexrelease>\let\normalshape\@undefined
598 <latexrelease>\let\ulcshape\@undefined
599 <latexrelease>\let\ulcdefault\@undefined
600 <latexrelease>\let\swshape\@undefined
601 <latexrelease>\let\swdefault\@undefined
602 <latexrelease>\let\sscshape\@undefined
603 <latexrelease>\let\sscdefault\@undefined
604 <latexrelease>\let\normalshape\@undefined

```

This is always called in \document so don't make it undefined.

```

605 <latexrelease>
606 <latexrelease>\let\reinstall@nfss@defs\relax
607 <latexrelease>\EndIncludeInRelease
608 <*2ekernel>

```

This initializes the 2020/02/02 extensions to NFSS after any changes in the preamble.

```

609 </2ekernel>
610 <*2ekernel | latexrelease>
611 <latexrelease>\IncludeInRelease{2020/10/01}%
612 <latexrelease>          {\reinstall@nfss@defs}{NFSS series init}%
613 \g@addto@macro\@kernel@after@begindocument@before
614          {\reinstall@nfss@defs\init@series@setup}
615 </2ekernel | latexrelease>
616 <latexrelease>\EndIncludeInRelease
        The initialization was introduced in 2020/02/02 but
617 <latexrelease>\IncludeInRelease{2020/02/02}%
618 <latexrelease>          {\reinstall@nfss@defs}{NFSS series init}%
619 <latexrelease>\AtBeginDocument{\reinstall@nfss@defs\init@series@setup}
620 <latexrelease>\EndIncludeInRelease
621 <latexrelease>\IncludeInRelease{0000/00/00}%
622 <latexrelease>          {\reinstall@nfss@defs}{NFSS series init}%
623 <latexrelease>\EndIncludeInRelease
624 <*2ekernel>
625 </2ekernel>

```

# File t

## ltfsstrc.dtx

### 1 Introduction

This package contains the code for tracing font loading and font changes. It basically overlays some of the low-level functions of NFSS with additional code used for tracing.

The package accepts the following options:

**errorshow** Write all information about font changes etc. only to the transcript file unless an error happens. This means that information about font substitution will not be shown on the terminal.

**warningshow** Show all NFSS warnings on the terminal. This setting corresponds to the default behaviour of NFSS if the `tracefnt` package is *not* loaded!

**infoshow** Show all NFSS warning and all NFSS info messages (that are normally only written to the transcript file) also on the terminal. This is the default if the `tracefnt` package is loaded.

**debugshow** In addition to **infoshow** show also changing of math fonts as far as possible (this option can produce a large amount of output).

**loading** Show the name of external fonts when they are loaded. This option shows only “newly” loaded fonts not those already preloaded in the format or the class file before the `tracefnt` package became active.

**pausing** Turn all font warnings into errors so that L<sup>A</sup>T<sub>E</sub>X will stop.

### 2 A driver for this document

The next bit of code contains the documentation driver file for T<sub>E</sub>X, i.e., the file that will produce the documentation you are currently reading. It will be extracted from this file by the DOCSTRIP program.

When this file is processed directly by L<sup>A</sup>T<sub>E</sub>X this will produce the documentation as well.

```
1 <*driver>
2 \documentclass{ltxdoc}
3
4
5 %\OnlyDescription % comment out for implementation details
6
7 \begin{document}
8   \DocInput{ltfsstrc.dtx}
9 \end{document}
10 </driver>
```

### 3 The Implementation

**Warning:** Read the macro documentation with a grain of salt. It is still basically the documentation from the first NFSS release and therefore in some cases probably not completely accurate.

If we are making a package file it is a good idea to test whether we are running under 2e. This code is actually placed at the very beginning of this file for easier maintenance, thus commented out here.

```
11 <*package>
12 %\NeedsTeXFormat{LaTeX2e}
13 %\ProvidesPackage{tracefnt}[??/??/?? v?.??]
14 %
15 </package>
16 % Standard LaTeX package (font tracing)
```

The debug module makes use of commands contained in a special package file named `trace.sty`.<sup>11</sup>

```
16 <+debug> \input trace.sty
```

### 4 Handling Options

`\tracingfonts` Here is the definition of the integer register for the font trace. As a default in a package file we use 1 to give error messages if fonts are substituted. If this code is used for debugging or tracing reasons in the format file (i.e. in `fam.dtx`) we use 0 as the default. But if no font trace is used we build a definition that will produce a warning message.

```
17 <*2ekernel>
18 \def\tracingfonts{%
19   \@font@warning{Command \noexpand\tracingfonts
20     not provided.\MessageBreak
21     Use the ‘tracefnt’ package.\MessageBreak Command found:}%
22   \count@}
23 </2ekernel>
```

The `\count@` in the line above will remove the number after `\tracingfonts`. Note that this definition will be overwritten by the next line if one of these modules are included.

```
24 <*package, trace, debug>
25 \newcount\tracingfonts
26 \tracingfonts=0
27 </package, trace, debug>
```

*(End definition for \tracingfonts. This function is documented on page ??.)*

The option `errorshow` turns off all warnings so that only real errors are shown. `warningshow` corresponds to the NFSS default (when `tracefnt` is not loaded). `infoshow` is the default for this package here; and `debugshow`, `loading`, and `pausing` extend the amount of information even further.

```
28 <*package>
29 \DeclareOption{errorshow}{%
30   \def\@font@info#1{%
31     \GenericInfo{(Font)\@spaces\@spaces\@spaces\space\space}%
32     {LaTeX Font Info: \space\space\space#1}}%
```

---

<sup>11</sup>This package is not in distribution at the moment (and probably doesn't any longer work). Think of this part of the code as being historical artefacts.

```

33 \def\@font@warning#1{%
34     \GenericInfo{(Font)\@spaces\@spaces\@spaces\space\space}%
35     {LaTeX Font Warning: #1}}%
36 }
37 \DeclareOption{warningshow}{%
38     \def\@font@info#1{%
39         \GenericInfo{(Font)\@spaces\@spaces\@spaces\space\space}%
40         {LaTeX Font Info: \space\space\space#1}}%
41     \def\@font@warning#1{%
42         \GenericWarning{(Font)\@spaces\@spaces\@spaces\space\space}%
43         {LaTeX Font Warning: #1}}%
44     }
45 \DeclareOption{infoshow}{%
46     \def\@font@info#1{%
47         \GenericWarning{(Font)\@spaces\@spaces\@spaces\space\space}%
48         {LaTeX Font Info: \space\space\space#1}}%
49     \def\@font@warning#1{%
50         \GenericWarning{(Font)\@spaces\@spaces\@spaces\space\space}%
51         {LaTeX Font Warning: #1}}%
52     }
53 \DeclareOption{loading}{%
54     \tracingfonts\tw@
55 }
56 \DeclareOption{debugshow}{%
57     \ExecuteOptions{infoshow}%
58     \tracingfonts\thr@@
59 }
60 \DeclareOption{pausing}{%
61     \def\@font@warning#1{%
62         \GenericError
63         {(Font)\@spaces\@spaces\@spaces\space\space}%
64         {LaTeX Font Warning: #1}%
65         {See the LaTeX Companion for details.}%
66         {I'll stop for every LaTeX Font Warning because
67          you requested\MessageBreak the 'pausing' option
68          to the tracefont package.}}%
69     }

```

We make `infoshow` the default, which in turn defines `\font@warning` and `\font@info`.

```

70 \ExecuteOptions{infoshow}
71 \ProcessOptions
72 \</package>

```

We also need a default definition inside the kernel:

```

73 \<*2kernel>
74 \def\@font@info#1{%
75     \GenericInfo{(Font)\@spaces\@spaces\@spaces\space\space}%
76     {LaTeX Font Info: \space\space\space#1}}%
77 \def\@font@warning#1{%
78     \GenericWarning{(Font)\@spaces\@spaces\@spaces\space\space}%
79     {LaTeX Font Warning: #1}}%
80 \</2kernel>

```

## 5 Macros common to fam.tex and tracefmt.sty

In the first versions of `tracefmt.dtx` some macros of `fam.dtx`<sup>12</sup> were redefined to include the extra tracing information. Now these macros are all defined in this file (i.e. removed from `fam.dtx`) and different production versions can be obtained simply by specifying a different set of modules to include when generating `lftss.dtx`.

### 5.1 General font loading

`\extract@font` This macro organizes the font loading. It first calls `\get@external@font` which will return in `\external@font` the name of the external font file (the `.tfm`) as it was determined by the NFSS tables.

```
81 <*2ekernel|package>
82 \def\extract@font{%
83   \get@external@font
```

Then the external font is loaded and assigned to the font identifier stored inside `\font@name` (for this reason we need `\expandafter`).

```
84   \global\expandafter\font\font@name\external@font\relax
```

When tracing we typeout the internal and external font name.

```
85 <*trace>
86   \ifnum \tracingfonts >\@ne
87     \@font@info{External font ‘\external@font’
88               loaded as\MessageBreak \font@name}\fi
89 </trace>
```

Finally we call the corresponding “loading action” macros to finish things. First the font is locally selected to allow the use of `\font` inside the loading action macros.

```
90   \font@name \relax
```

The next two lines execute the “loading actions” for the family and then for the individual font shape.

```
91   \csname \f@encoding+\f@family\endcsname
92   \csname\curr@fontshape\endcsname
93   \relax
94   }
95 </2ekernel|package>
```

The `\relax` at the end needs to be explained. This is inserted to prevent `TEX` from scanning too far when it is executing the replacement text of the loading code macros.

*(End definition for `\extract@font`. This function is documented on page ??.)*

`\get@external@font` This function tries to find an external font name. It will place the name into the macro `\external@font`. If no font is found it will return the one that was defined via `\DeclareErrorFont`.

```
96 <*2ekernel>
97 \def\get@external@font{%
```

We don’t know the external font name at the beginning.

```
98   \let\external@font\@empty
99   \edef\font@info{\expandafter\expandafter\expandafter\string
100                 \csname \curr@fontshape \endcsname}%
101   \try@size@range
```

---

<sup>12</sup>This file is currently not distributed in documented form. Its code is part of `lftss.dtx`.

If this failed, we'll try to substitute another size of the same font. This is done by the `\try@size@substitution` macro. It “knows about” `\do@extract@font`, `\font@name`, `\f@size`, and so on.

```

102   \ifx\external@font\@empty
103     \try@size@substitution
104     \ifx\external@font\@empty
105       \@latex@error{Font \expandafter \string\font@name\space
106         not found}\@eha
107       \error@fontshape
108       \get@external@font
109   \fi\fi
110 }
111 </2ekernel>

```

(End definition for `\get@external@font`. This function is documented on page ??.)

`\selectfont` The macro `\selectfont` is called whenever a font change must take place.

```

112 <*2ekernel | package>
113 \DeclareRobustCommand\selectfont
114   {%

```

When `debug` is specified we actually want something like ‘undebug’. The font selection is now stable so that using `\tracingall` on some other macros will show us a lot of unwanted information about font loading. Therefore we disable tracing during font loading as long as `\tracingfonts` is less than 4.

```

115 <+debug> \pushtracing
116 <+debug> \ifnum\tracingfonts<4 \tracingoff
117 <+debug> \else \tracingon\p@selectfont \fi

```

If `\baselinestretch` was redefined by the user it will not longer match its internal counterpart `\f@linespread`. If so we call `\set@fontsize` to prepare `\size@update`.

```

118   \ifx\f@linespread\baselinestretch \else
119     \set@fontsize\baselinestretch\f@size\f@baselineskip \fi

```

Then we generate the internal name of the font by concatenating *family*, *series*, *shape*, and current *size*, with slashes as delimiters between them. This is much more readable than standard L<sup>A</sup>T<sub>E</sub>X's `\twfbf`, etc. We define `\font@name` globally, as always. The reason for this is explained later on.

```

120   \xdef\font@name{%
121     \csname\curr@fontshape/\f@size\endcsname}%

```

We call the macro `\pickup@font` which will load the font if necessary.

```

122   \pickup@font

```

Then we select the font.

```

123   \font@name

```

If `\tracingfonts` is greater than 2 we also show the font switch. We do this before `\glb@settings` is called since this macro might redefine `\font@name`.

```

124 <*trace>
125   \ifnum \tracingfonts>\tw@
126     \@font@info{Switching to \font@name}\fi
127 </trace>

```



Finally we call `\size@update`. This macro is normally empty but will contain actions (like setting the `\baselineskip`) that have to be carried out when the font size, the base `\baselineskip` or the `\baselinestretch` have changed.

```
128 \size@update
```

A similar function is called to handle anything related to encoding updates. This one is changed from `\relax` by `\fontencoding`.

```
129 \enc@update
```

Just before ending this macro we have to pop the tracing stack if it was pushed before.

```
130 <+debug> \poptracing
131 }
```

(End definition for `\selectfont`. This function is documented on page ??.)

`\set@fontsize` The macro `\set@fontsize` does the actual work. First it assigns new values to `\f@size`, `\f@baselineskip` and `\f@linespread`.

```
132 \def\set@fontsize#1#2#3{%
133 \@defaultunits\@tempdimb#2pt\relax\@nnil
134 \edef\f@size{\strip@pt\@tempdimb}%
135 \@defaultunits\@tempskipa#3pt\relax\@nnil
136 \edef\f@baselineskip{\the\@tempskipa}%
137 \edef\f@linespread{#1}%
```

For backward compatibility and for later testing within `\selectfont` the internal value of `\f@linespread` is passed back to `\baselinestretch`.

```
138 \let\baselinestretch\f@linespread
```

Additional processing will happen within `\selectfont`. For this reason the macro `\size@update` (which will be called in `\selectfont`) will be defined to be:

```
139 \def\size@update{%
```

First calculate the new `\baselineskip` and also store it in `normalbaselineskip`

```
140 \baselineskip\f@baselineskip\relax
141 \baselineskip\f@linespread\baselineskip
142 \normalbaselineskip\baselineskip
```

then to set up a new `\strutbox`

```
143 \setbox\strutbox\hbox{%
144 \vrule\@height.7\baselineskip
145 \@depth.3\baselineskip
146 \@width\z@}%
```

We end with a bit of tracing information.

```
147 <*trace>
148 \ifnum \tracingfonts>\tw@
149 \ifx\f@linespread\@empty
150 \let\reserved@a\@empty
151 \else
152 \def\reserved@a{\f@linespread x}%
153 \fi
154 \@font@info{Changing size to \f@size/\reserved@a
155 \f@baselineskip}%
156 \aftergroup\type@restoreinfo \fi
157 </trace>
```

When all this is processed `\size@update` redefines itself to `\relax` so that in later calls of `\selectfont` no extra code will be executed.

```
158      \let\size@update\relax}%
159    }
```

Instead of defining this macro internally we might speed things up by placing the code into a separate macro and use `\let`!

*(End definition for \set@fontsize. This function is documented on page ??.)*

**\size@update** Normally this macro does nothing; it will be redefined by `\set@fontsize` to initiate an update.

```
160 \let\size@update\relax
```

*(End definition for \size@update. This function is documented on page ??.)*

**\type@restoreinfo** This macro produces some info when a font size and/or baseline change will get restored.

```
161 <*trace>
162   \def\type@restoreinfo{%
163     \ifx\f@linespread\empty
164       \let\reserved@a\empty
165     \else
166       \def\reserved@a{f@linespread x}%
167     \fi
168     \@font@info{Restoring size to
169                \f@size/\reserved@a\f@baselineskip}}
170 </trace>
```

*(End definition for \type@restoreinfo. This function is documented on page ??.)*

**\glb@settings** The macro `\glb@settings` globally selects all math fonts for the current size if necessary.

**\glb@currsize** `\def\glb@settings{%`

When `\glb@settings` gains control a size change was requested and all previous font assignments need to be replaced. Therefore the old values of the fonts are no longer needed. For every *math group* the new assignments are appended to `\math@fonts`. But this happens only if the `\math@fonts` switch is set to true. However, we always set up the correct math sizes for script and scriptscript fonts since they may be needed even if we don't set up the whole math machinery.

Here we set the math size, script size and scriptscript size. If the `S@...` macro is not defined we have to first calculate the three sizes.

```
172   \expandafter\ifx\csname S@\f@size\endcsname\relax
173     \calculate@math@sizes
174   \fi
```

The effect of this is that `\calculate@math@sizes` may or may not define the `S@...` macro. In the first case the next time the same size is requested this macro is used, otherwise `\calculate@math@sizes` is called again. This also sets the `\math@fonts` switch. If it is true we must switch the math fonts.

```
175     \csname S@\f@size\endcsname
176     \ifmath@fonts
177 <*trace>
178       \ifnum \tracingfonts>\tw@
179         \@font@info{Setting up math fonts for
```

```

180 \f@size/\f@baselineskip}\fi
181 </trace>

```

Inside a group we execute the macro for the current math *version*. This sets `\math@fonts` to a list of `\textfont...` assignments. `\getanddefine@fonts` (which may be called at this point) needs the `\escapechar` parameter to be set to `-1`.

```

182 \begingroup
183 \escapechar\m@ne
184 \csname mv@\math@version \endcsname

```

Then we set `\globaldefs` to 1 so that all following changes are done globally. The math font assignments recorded in `\math@fonts` are executed and `\glb@currsiz` is set equal to `\f@size`. This signals that the fonts for math in this size are set up.

```

185 \globaldefs\@ne
186 \math@fonts
187 \let \glb@currsiz \f@size
188 \endgroup

```

Finally we execute any code that is supposed to happen whenever the math font setup changes. This register will be executed in local mode which means that everything that is supposed to have any effect should be done globally inside. We can't execute it within `\globaldefs\@ne` as we don't know what ends up inside this register, e.g., it might contain calculations which use some local registers to calculate the final (global) value.

```

189 \the\every@math@size

```

Otherwise we announce that the math fonts are not set up for this size.

```

190 <*trace>
191 \else
192 \ifnum \tracingfonts>\tw@
193 \font@info{No math setup for
194 \f@size/\f@baselineskip}\fi
195 </trace>
196 \fi
197 }
198 </2ekernel | package>

```

(End definition for `\glb@settings` and `\glb@currsiz`. These functions are documented on page ??.)

**\baselinestretch** In `\selectfont` we used `\baselinestretch` as a factor when assigning a value to `\baselineskip`. We use 1 as a default (i.e. no stretch).

```

199 <*2ekernel>
200 \def\baselinestretch{1}

```

(End definition for `\baselinestretch`. This function is documented on page ??.)

**\every@math@size** We must still define the hook `\every@math@size` we used in `\glb@settings`. We initialize it to nothing. It is important to remember that everything that goes into this hook should to global updates, local changes will have weird effects.

```

201 \newtoks\every@math@size
202 \every@math@size={}
203 </2ekernel>

```

(End definition for `\every@math@size`. This function is documented on page ??.)

## 5.2 Math fonts setup

### 5.2.1 Outline of algorithm for math font sizes

$\TeX$  uses the math fonts that are current when the end of a formula is reached. If we don't want to keep font setups local to every formula (which would result in an enormous overhead, we have to be careful not to end up with the wrong setup in case formulas are nested, e.g., we need to be able to handle

$\$ a=b+c \mathrel{\mathop{\boxtimes}} \small \text{ for all } b \text{ and } c \text{ in } \mathbb{Z} \$$

Here the inner formulae  $b$  and  $c \text{ in } \mathbb{Z}$  are typeset in `\small` but we have to return to `\normalsize` before we reach the closing `\$` of the outer formula.

This is handled in the following way:

1. At any point in the document the global variable `\gbl@currsz` contains the point size for which the math fonts currently are set up.
2. Whenever we start a formula we compare its value with the local variable `\f@size` that describes the current text font size.
3. If both are the same we assume that we can use the current math font setup without adjustment.
4. If they differ we call `\gbl@settings` which changes the math font setup and updates `\gbl@currsz`.
  - (a) If we are recursively inside another formula (`\if@inmath`) we ensure that `\gbl@settings` is executed again in the outer formula, so that the old setup is automatically restored.
  - (b) Otherwise, we set the switch `@inmath` locally to `true` so that all nested formulae will be able to detect that they are nested in some outer formula.

The above algorithm has the following features:

- For sizes which are not containing any formula no math setup is done. Compared to the original algorithm of NFSS this results in the following savings:
  - No unnecessary loading of math fonts for sizes that are not used to typeset any math formulae (explicit or implicit ones).
  - No time overhead due to unnecessary changes of the math font setup on entrance and exit of the text font size.
- Math font setup changes for top-level formulae will survive (there is no restoration after the formula) thus any following formula in the same size will be directly typesettable. Compared to original implementation in NFSS2 the new algorithm has the overhead of one test per formula to see if the current math setup is valid (in the original algorithm the setup was always valid, thus no test was necessary).
- In nested formulae the math font setup is restored in the outer formula by a series of `\aftergroup` commands and checks. Compared to the original algorithm this involves additional checks ( $2 \times \langle \text{non-math levels} \rangle$  per inner formula).

## 5.2.2 Code for math font size setting

`\check@mathfonts` In the `\check@mathfonts` macros we implement the steps 2 to 4 except that instead of a switch the macro `\init@restore@glb@settings` is used.

```

204 <*2kernel|package>
205 \def\check@mathfonts{%
206   \ifx \glb@currsz \f@size
207   <*trace>
208     \ifnum \tracingfonts>\thr@@
209       \@font@info{*** MATH: no change \f@size\space
210         curr/global (\curr@math@size/\glb@currsz)}\fi
211   </trace>
212   \else
213   <*trace>
214     \ifnum \tracingfonts>\thr@@
215       \@font@info{*** MATH: setting up \f@size\space
216         curr/global (\curr@math@size/\glb@currsz)}\fi
217   </trace>
218     \glb@settings
219     \init@restore@glb@settings
220   \fi
221   \let\curr@math@size\f@size
222   \def\init@restore@glb@settings{\aftergroup\restglb@settings}%
223 }

```

(End definition for `\check@mathfonts`. This function is documented on page ??.)

`\init@restore@glb@settings` This macros does by default nothing but get redefined inside `\check@mathfonts` to initiate fontsize restoring in nested formulas.

```

224 <-trace>\let\init@restore@glb@settings\relax
225 <*trace>
226 \def\init@restore@glb@settings{%
227   \ifnum \tracingfonts>\thr@@
228     \@font@info{*** MATH: no resetting (not in
229       nested math)}\fi
230 }
231 </trace>

```

(End definition for `\init@restore@glb@settings`. This function is documented on page ??.)

`\restglb@settings` This macro will be executed the first time after the current formula.

```

232 \def\restglb@settings{%
233 <*trace>
234   \ifnum \tracingfonts>\thr@@
235     \@font@info{*** MATH: restoring}\fi
236 </trace>
237   \begingroup
238     \let\f@size\curr@math@size
239     \ifx\glb@currsz \f@size
240   <*trace>
241     \ifnum \tracingfonts>\thr@@
242       \@font@info{*** MATH: ... already okay (\f@size)}\fi
243   </trace>
244   \else

```

```

245 <*trace>
246   \ifnum \tracingfonts>\thr@@
247     \@font@info{*** MATH: ... to \f@size}\fi
248 </trace>
249   \glb@settings
250   \fi
251 \endgroup
252 }

```

(End definition for `\restglb@settings`. This function is documented on page ??.)

### 5.2.3 Other code for math

`\use@mathgroup` The `\use@mathgroup` macro should be used in user macros to select a math group. Depending on whether or not the `margid` option is in force it has two or three arguments. For this reason it should be called as the last macro.

First we test if we are inside math mode since we don't want to apply a useless definition.

```

253 \def\use@mathgroup#1#2{\relax\ifmmode
254 <*trace>
255   \ifnum \tracingfonts>\tw@
256     \count@#2\relax
257     \@font@info{Using \noexpand\mathgroup
258               (\the\count@) #2}\fi
259 </trace>

```

If so we first call the '=' macro (i.e. argument three) to set up special things for the selected math group. Then we call `\mathgroup` to select the group given by argument two and finally we place #1 (i.e. the argument of the *math alphabet identifier*) at the end. This part of the code is surrounded by two commands which behave like `\begingroup` and `\endgroup` if we want *math alphabet identifier*s but will expand into `\@empty` if we want simply switches to a new math group. Since argument number 2 may be a digit instead of a control sequence we add a `\relax`. Otherwise something like `\mit{1}` would switch to math group 11 (and back) instead of printing an oldstyle 1.

```

260   \math@bgroup
261   \expandafter\ifx\csname M@\f@encoding\endcsname#1\else
262     #1\fi
263   \mathgroup#2\relax

```

Before we reinsert the swallowed token (arg. three) into the input stream, in the case that the *math alphabet identifier* isn't called in math mode, we remove the `\fi` with the `\expandafter` trick. This is necessary if the token is actually an macro with arguments. In such a case the `\fi` will be misinterpreted as the first argument which would be disastrous.

```

264   \expandafter\math@egroup\fi}%

```

The surrounding macros equal `\begingroup` and `\endgroup`. But using internal names makes it possible to overwrite their meaning in certain cases. This is for example used in  $\mathscr$ -TeX macros for placing accents.

(End definition for `\use@mathgroup`. This function is documented on page ??.)

`\math@egroup` If the `margid` option is in force (which can be tested by looking at the definition of `\math@bgroup` we change the `\math@egroup` command a bit to display the current *math group number* after it closes the scope of *math alphabet* with `\endgroup`.

```

265 \*trace)
266   \ifx\math@bgroup\bgroup
267     \def\math@egroup#1{#1\egroup
268       \ifnum \tracingfonts>\tw@
269         \@font@info{Restoring \noexpand\mathgroup
270           (\ifnum\mathgroup=\m@ne default\else \the\mathgroup \fi)%
271           }\fi}
272   \fi
273 \*trace)

```

(End definition for `\math@egroup`. This function is documented on page ??.)

`\getanddefine@fonts` `\getanddefine@fonts` has two arguments: the *math group number* and the *family/series/shape* name as a control sequence.

```

274 \def\getanddefine@fonts#1#2{%
First we turn of tracing when \tracingfonts is less than 4.
275 \*debug) \pushtracing
276 \*debug) \ifnum\tracingfonts<4 \tracingoff
277 \*debug) \else \tracingon\getanddefine@fonts \fi
278 \*trace)
279   \ifnum \tracingfonts>\tw@
280     \count@#1\relax
281     \@font@info{\noexpand\mathgroup (\the\count@) #1 :=\MessageBreak
282       \string#2 \tf@size/\sf@size/\ssf@size}\fi
283 \*trace)

```

We append the current `\tf@size` to `#2` to obtain the font name.<sup>13</sup> Again, `font@name` is defined globally, for the reasons explained in the description of `\wrong@fontshape`.

```

284 \xdef\font@name{\csname \string#2/\tf@size\endcsname}%

```

Then we call `\pickup@font` to load it if necessary. We remember the internal name as `\textfont@name`.

```

285 \pickup@font \let\textfont@name\font@name

```

Same game for `\scriptfont` and `\scriptscriptfont`:

```

286 \xdef\font@name{\csname \string#2/\sf@size\endcsname}%
287 \pickup@font \let\scriptfont@name\font@name
288 \xdef\font@name{\csname \string#2/\ssf@size\endcsname}%
289 \pickup@font

```

Then we append the new `\textfont...` assignments to the `\math@fonts`.

```

290 \edef\math@fonts{\math@fonts
291   \textfont#1\textfont@name
292   \scriptfont#1\scriptfont@name
293   \scriptscriptfont#1\font@name}%

```

<sup>13</sup>One might ask why this expansion does not generate a macro name that starts with an additional `\` character. The solution is that `\escapechar` is set to `-1` before `\getanddefine@fonts` is called.

Just before ending this macro we have to pop the tracing stack if it was pushed before.

```

294 <+debug> \poptracing
295     }
296 </2ekernel | package>

```

(End definition for \getanddefine@fonts. This function is documented on page ??.)

## 6 Scaled font extraction

**\ifnot@nil** We begin with a simple auxiliary macro. It checks whether its argument is the token `\@nil`. If so, it expands to `\@gobble` which discards the following argument, otherwise it expands to `\@firstofone` which reproduces its argument.

```

297 <*2ekernel>
298 \def\ifnot@nil#1{\def\reserved@a{#1}%
299   \ifx\reserved@a\@nnil \expandafter\@gobble
300   \else \expandafter\@firstofone\fi}

```

(End definition for \ifnot@nil. This function is documented on page ??.)

**\remove@to@nnil** Three other auxiliary macros will be needed in the following: `\remove@to@nnil` gobbles up everything up to, and including, the next `\@nnil` token, and `\remove@angles` and `\remove@star` do the same for the character `>` and `*`, respectively, instead of `\@nnil`.

```

301 \def\remove@to@nnil#1\@nnil{}
302 \def\remove@angles#1>{\set@simple@size@args}
303 \def\remove@star#1*{#1}

```

(End definition for `\remove@to@nnil`, `\remove@angles`, and `\remove@star`. These functions are documented on page ??.)

**\extract@sizefn** This macro takes a size specification and parses it into size function and the optional and mandatory arguments.

```

304 \def\extract@sizefn#1*#2\@nil{%
305   \if>#2>\set@size@funct@args#1\@nil
306     \let\sizefn@info\@empty
307   \else\expandafter\set@size@funct@args\remove@star#2\@nil
308     \def\sizefn@info{#1}\fi
309   }

```

(End definition for \extract@sizefn. This function is documented on page ??.)

**\try@simple@size** This function tries to extract the given size (specified by `\f@size`) for the requested font shape. The font information must already be present in `\font@info`. The central macro that does the real work is `\extract@fontinfo`. We will first give a simple example how this macro works, and describe it in full generality later.

Assume that the requested parameters are: *encoding scheme* ‘OT1’, *family* ‘cm’, *series* ‘sansserif’, *shape* ‘normal’, and *size* ‘12’. The corresponding font definitions have already been extracted from the macro `\OT1/cm/sansserif/normal` and stored in `font@info`. (Otherwise `\extract@fontinfo` doesn’t get called.) This information consists of a token list made of characters of category code 12 of the form

```
<10*>cmss10<12*>cmss12<17*>cmss17
```



For reasonable packages one usually needs more sizes but this is sufficient to get the flavour. We will define a macro `\extract@fontinfo` to find the external font name (`'cmss12'`) for us:

```
\def\extract@fontinfo#1<12*#2>#3<#4\@nnil{%
  \set@simple@size@args#3<#4\@nnil
  \execute@size@function{#2}}
```

so that when it gets called via

```
\extract@fontinfo<10*>cmss10<12*>cmss12<17*>cmss17\@nnil
```

`#1` will contain all characters before `<12*>`, `#2` will be empty, `#3` will be exactly `cmss12`, and `#4` will be `17>cmss17`. The expansion is therefore

```
\set@simple@size@args cmss12<17*>cmss17\@nnil
\execute@size@function{}
```

This means: the default (empty) size function will be executed, with its optional argument set to empty and its mandatory argument set to `cmss12` by `\set@simple@size@args`. As we discussed earlier, the effect of the default size function is to load the given external font (`cmss12`) at the specified size (12)—which is exactly what was intended.

But this is only part of the whole story. It may be that the size requested does not occur in the token list `\font@info`. And the simple definition of `\extract@fontinfo` we gave above does not allow to specify give more than one size specification in front of the external font name.

Let's address these two problems separately. The first one is solved with the following trick: We define `\extract@fontinfo` as follows:

```
\def\extract@fontinfo#1<12*#2>#3<#4\@nnil{%
  \ifnot@nil{#3}%
  {\set@simple@size@args#3<#4\@nnil
   \execute@size@function{#2}%
  }%
}
```

How does this work? We call `\extract@fontinfo` via

```
\expandafter\extract@fontinfo\font@info<12*>\@nil\@nnil
```

i.e. by appending `<12*>\@nil\@nnil`. If the size (`'12'` in this case) appears in `\font@info` everything works as explained above, the only difference being that argument `#4` of `\extract@fontinfo` additionally gets the tokens `<12*>\@nil\@nnil`. However, if the size is not found everything up to the final `<12*>` is in argument `#1`, `#3` gets `\@nil`, and `#2` and `#4` are empty. The macro `\ifnot@nil` will discard the calls to `\set@simple@size@args` and `execute@size@function`, and hence `\font@info` will continue to be equal to `\@empty`. This means that no simple size specification matching the requested size could be found.

The second problem (more than one simple size specification for one external font name) will be addressed in `\set@simple@size@args` below.

The macros are hidden inside other control sequences so that we have to build `\extract@fontinfo` in several steps.

So here's the actual definition of `\extract@font` in `\try@simple@size`.

310 % % this could be replaced by `\try@size@range` making the subst slower!

311 \def\try@simple@size{%

`\reserved@a` is made an abbreviation for the head of the definition of the macro `\extract@fontinfo`.

```
312 \def\reserved@a{\def\extract@fontinfo###1}%
```

Now we can define `\extract@fontinfo`. Here we handle a small but convenient variation: in case of the default (empty) size function it is allowed to omit the `*` character.

```
313 \expandafter\reserved@a\expandafter<\f@size>##2<##3\@nnil{%
314 \ifnot@nil{##2}%
315 {\set@simple@size@args##2<##3\@nnil
316 \execute@size@function\sizefn@info
317 }%}
```

Now we call `\extract@fontinfo`. Note the `<\@nil` tokens at the end.

```
318 \expandafter\expandafter
319 \expandafter\extract@fontinfo\expandafter\font@info
320 \expandafter<\f@size>\@nil<\@nnil
321 }
```

*(End definition for `\try@simple@size`. This function is documented on page ??.)*

`\set@simple@size@args` As promised above, the macro `\set@simple@size@args` will handle the case of several size specifications in a row. If another size specification follows, the very first token of its argument list is the character `<`. By starting the definition as follows,

```
322 \def\set@simple@size@args#1<{%
```

parameter `#1` is empty in this case, and contains the size function's arguments otherwise. We distinguish these two cases (Note that the character `<` cannot appear in `#1`) by calling `\remove@angles` for empty `#1` and `\extract@sizefn` otherwise. In the latter case we have to take care of the remaining character tokens and discard them. This is done by `\remove@to@nnil`. Note also the use of Kabelschacht's method.

```
323 \if<#1<%
324 \expandafter\remove@angles
325 \else
326 \extract@sizefn#1*\@nil
327 \expandafter\remove@to@nnil
328 \fi}
```

*(End definition for `\set@simple@size@args`. This function is documented on page ??.)*

Now, we are through with the case of a simple size, except for calling the size function. This will be handled later, as it is the same mechanism for all types of size specification. We will now proceed to macros for extraction of size range specification.

`\extract@range@fontinfo` `\extract@range@fontinfo` goes through a font shape definition in the input until it recognizes the tokens `<\@nil->`. It looks for font ranges with font size functions. Its operation is rather simple: it discards everything up to the next size specification and passes this on to `\is@range` for inspection. The specification (parameter `#2` is inserted again, in case it is needed later.

```
329 \def\extract@range@fontinfo#1<#2>{%
330 \is@range#2->\@nil#2>}
```

*(End definition for `\extract@range@fontinfo`. This function is documented on page ??.)*

`\is@range` `\is@range` is again a sort of dispatcher macro: if the size specification it is looking at is not a range specification it discards it and calls `\extract@rangefontinfo` to continue the search. Otherwise it calls `\check@range` to check the requested size against the specified range.

From the way `\is@range` is called inside `\extract@rangefontinfo` we see that `#2` is the character `>` if the size specification found is a simple one (as it does not contain a `-` character. This is checked easily enough and `\extract@rangefontinfo` called again. Note that the extra tokens inserted after the `\@nil` in the call to `\is@range` appear at the beginning of the first argument to `\extract@rangefontinfo` and are hence ignored.

```
331 \def\is@range#1-#2\@nil{%
332   \if>#2\expandafter\check@single\else
333     \expandafter\check@range\fi}
```

(End definition for `\is@range`. This function is documented on page ??.)

`\check@range` `\check@range` takes lower bound as parameter `#1`, upper bound as `#2`, size function as `#3` and the size function's arguments as `#4`. If `#3` is the special token `\@nil \font@info` is exhausted and we can stop searching.

```
334 \def\check@range#1-#2>#3<#4\@nnil{%
335   \ifnot@nil{#3}{%
```

If `#3` wasn't `\@nil` we have a range. We start by assuming that we have to recurse. Note that we have to reinsert an `<` as it was already removed by scanning.

```
336     \def\reserved@f{\extract@rangefontinfo<#4\@nnil}%
```

We have to make sure that both boundaries are present, if not we have to set them. Here we check the upper bound. If `\upper@bound` is zero after the assignment we set it to `\maxdimen` (upper open range). We need to use a `<dimen>` register for the scan since we may have a decimal number as the boundary.

```
337     \upper@bound0#2\p@
338     \ifdim\upper@bound=\z@ \upper@bound\maxdimen\fi
```

Now we check the upper boundary against `\f@size`. If it is larger or equal than `\f@size` this range is no good and we have to recurse.

```
339     \ifdim \f@size \p@<\upper@bound
```

Otherwise we have to check the lower bound. This time it is not necessary to scan the boundary value into a register because if it is empty we get zero as desired. We could even omit the `0` which would result in `1pt` as default lower boundary. If `\f@size` is smaller than the boundary we have to recurse.

```
340     \lower@bound0#1\p@
341     \ifdim \f@size \p@<\lower@bound
342     \else
```

If both tests are passed we can try executing the size function.

```
343     \set@simple@size@args#3<#4\@nnil
344     \execute@size@function\sizefn@info
```

If the function was successful it should have left an external font name in `\external@font`. We use this to see if we can stop scanning. Otherwise we recurse.

```
345     \ifx\external@font\@empty
346     \else
347     \let\reserved@f\@empty
348     \fi
349     \fi
```

```

350     \fi
351     \reserved@f}}

```

(End definition for `\check@range`. This function is documented on page ??.)

`\lower@bound` We use two dimen registers `\lower@bound` and `\upper@bound` to store the lower and upper endpoints of the range we found.

```

352 \newdimen\lower@bound
353 \newdimen\upper@bound

```

(End definition for `\lower@bound` and `\upper@bound`. These functions are documented on page ??.)

`\check@single` `\check@single` takes the size as parameter #1, size function as #2 and the size function's arguments as #3. We can assume that there is always something in the pipeline since the very last entry is a faked range (see above).

```

354 \def\check@single#1>#2<#3\@nnil{%

```

We start by assuming that we have to recurse. Note that we have to reinsert an < as it was already removed by scanning.

```

355     \def\reserved@f{\extract@rangefontinfo<#3\@nnil}%

```

Now we check the size against `\f@size`. If it is not equal `\f@size` it is no good and we have to recurse.

```

356     \ifdim \f@size \p@=#1\p@

```

Otherwise if this test is passed we can try executing the size function.

```

357         \set@simple@size@args#2<#3\@nnil
358         \execute@size@function\sizefn@info

```

If the function was successful it should have left an external font name in `\external@font`. We use this to see if we can stop scanning. Otherwise we recurse.

```

359         \ifx\external@font\@empty
360         \else
361             \let\reserved@f\@empty
362         \fi
363     \fi
364     \reserved@f}

```

(End definition for `\check@single`. This function is documented on page ??.)

`\set@size@funct@args` This macro sets the optional and mandatory arguments for a size function. If the optional argument is not present it is set to the empty token list. The mandatory argument is delimited by the token `\@nil`.

```

365 \def\set@size@funct@args{\@ifnextchar[%
366     \set@size@funct@args@{\set@size@funct@args@[]}}
367 \def\set@size@funct@args@[#1]#2\@nil{%
368     \def\mandatory@arg{#2}%
369     \def\optional@arg{#1}}
370 </2ekernel>

```

(End definition for `\set@size@funct@args` and `\set@size@funct@args@`. These functions are documented on page ??.)

**\DeclareSizeFunction** This function defines a new size function hiding the internal from the designer. The body of the size function may use **\optional@arg** and **\mandatory@arg** denoting the optional and mandatory argument that may follow the size specification <...>.

```

371 <*2ekernel>
372 \def\DeclareSizeFunction#1#2{\@namedef{s@fct@#1}{#2}}
373 \@onlypreamble\DeclareSizeFunction
374 </2ekernel>

```

(End definition for \DeclareSizeFunction. This function is documented on page ??.)

**\execute@size@function** This macro is very simple. The only point worth noting is that calling an undefined size function will do nothing (actually execute a **\relax**).

```

375 <*2ekernel | package>
376 \def\execute@size@function#1{%
377 <*trace>
378     \ifundefined{s@fct@#1}%
379     {\errmessage{Undefined font size function #1}%
380      \s@fct@}%
381     {\csname s@fct@#1\endcsname}%
382 </trace>
383 <-trace>     \csname s@fct@#1\endcsname
384 }
385 </2ekernel | package>

```

(End definition for \execute@size@function. This function is documented on page ??.)

**\try@size@range** This macro tries to find a suitable range for requested size (specified by **\f@size**) in **\font@info**. All the relevant action is done in **\extract@rangefontinfo**. All that needs to be done is to stuff in the token list in **\font@info** so that **\extract@rangefontinfo** can inspect it. Note the <-\*\@nil> token at the end to stop scanning.

```

386 <*2ekernel>
387 \def\try@size@range{%
388     \expandafter\extract@rangefontinfo\font@info <-*\@nil<\@nnil
389 }

```

(End definition for \try@size@range. This function is documented on page ??.)

**\try@size@substitution** This is the last thing that can be tried. If the desired **\f@size** is found neither among the simple size specifications nor in one of the ranges the whole list of size specifications is searched for a nearby simple size.

```

390 \gdef\try@size@substitution{%

```

First we do some initializations. **\@tempdimb** will hold the difference between the wanted size and the best solution found so far, so we initialise it with **\maxdimen**. The macro **\best@size** will hold the best size found, nothing found is indicated by the empty value.

```

391     \@tempdimb \maxdimen
392     \let \best@size \@empty

```

Now we loop over the specification

```

393     \expandafter \try@simples \font@info <\number\M>\@nil<\@nnil
394 }

```

(End definition for \try@size@substitution. This function is documented on page ??.)

`\font@submax` The macro `\font@submax` records the maximal deviation from the desired size encountered so far. Its value is used in a warning message at `\end{document}`. The macro `\fontsubfuzz` contains the amount that will not cause terminal warnings (warnings still go into the transcript file).

```

395 \def\font@submax{0pt}
396 \def\fontsubfuzz{.4pt}
397 \if2kernel
398 \ifx\font@submax\fontsubfuzz\def\fontsubfuzz{0pt}

```

*(End definition for `\font@submax` and `\fontsubfuzz`. These functions are documented on page ??.)*

`\try@simples` `\try@simples` goes through a font shape definition in the input until it recognizes the tokens `<*\@nil>`. It looks for simple sizes to determine the two closest sizes. It is assumed that simple sizes are in increasing order.

```

399 \if2kernel
400 \gdef\try@simples#1<#2>{%
401   \tryif@simple#2->\tryif@simple}

```

*(End definition for `\try@simples`. This function is documented on page ??.)*

`\tryis@simple` `\tryis@simple` is similar to `\is@range`. If it sees a simple size, it checks it against the value of `\f@size` and sets `\lower@font@size` or `\higher@font@size`. In the latter case, it stops the iteration. By adding `<\number\@M>` at the end of the line we always have an end point. This is a hack which probably should be corrected.

First it checks whether it is finished already, then whether the size specification in question is a simple one.

```

402 \gdef\tryif@simple#1-#2\tryif@simple{%

```

Most common case for `\reserved@f` first:

```

403   \let \reserved@f \try@simples
404   \if>#2%

```

If so, it compares it to the value of `\f@size`. This is done using a `\dimen` register since there may be fractional numbers.

```

405     \dimen@ #1\p@
406     \ifdim \dimen@<\@M\p@

```

If `\dimen@` is `\@M\p@` we have reached the end of the fontspec (hopefully) otherwise we compare the value with `\f@size` and compute in `\@tempdimc` the absolute value of the difference between the two values.

```

407     \ifdim \f@size\p@<\dimen@
408       \@tempdimc \dimen@
409       \advance\@tempdimc -\f@size\p@
410     \else
411       \@tempdimc \f@size\p@
412       \advance\@tempdimc -\dimen@
413     \fi

```

The result is then compared with the smallest difference we have encountered, if the new value (in `\@tempdimc` is smaller) we have found a size which is a better approximation so we make it the `\best@size` and adjust `\@tempdimb`.

```

414     \ifdim \@tempdimc<\@tempdimb
415       \@tempdimb \@tempdimc
416     \def \best@size{#1}%
417   \fi

```

When we have reached the end of the fontspec we substitute the best size found (if any). We code this inline to save macro space; in the past this was done by a macro called `\subst@size`.

```
418 \else
```

This macro substitutes the size recorded in `\best@size` for the unavailable size `\f@size`. `\subst@size` `\font@submax` records the maximum difference between desired size and selected size in the whole run.

```
419 % \subst@size %% coded inline
420 % \def\subst@size{%
421 \ifx \external@font\@empty
422 \ifx \best@size\@empty
423 \else
424 \ifdim \@tempdimb>\font@submax \relax
425 \xdef \font@submax {\the\@tempdimb}%
426 \fi
427 \let \f@user@size \f@size
428 \let \f@size \best@size
429 \ifdim \@tempdimb>\fontsubfuzz\relax
430 \@font@warning{Font\space shape\space
431 'curr@fontshape'\space in\space size\space
432 <\f@user@size>\space not\space available\MessageBreak
433 size\space <\f@size>\space substituted}%
434 \fi
435 \try@simple@size
436 \do@subst@correction
437 \fi
438 \fi
439 % %}
```

This brings us back into the main part of `\tryif@simple`. Finally we get rid of any rubbish left over on the input stack.

```
440 \let \reserved@f \remove@to@nnil
441 \fi
442 \fi
```

If it's a range iterate also.

```
443 \reserved@f}
```

*(End definition for `\tryis@simple` and `\subst@size`. These functions are documented on page ??.)*

## 6.1 Sizefunctions

In the following we define some useful size functions.

`\sfct@` This is the default size function. Mandatory argument is an external font name, optional argument a scale factor. The font is scaled to `\f@size` if no optional argument is present, and to `\f@size` multiplied by the optional argument otherwise.

```
444 \DeclareSizeFunction{}\empty@sfcnt\@font@warning}
445 \DeclareSizeFunction{s}\empty@sfcnt\@font@info}
```

```

446 \def\empty@sfcnt#1{%
447     \@tempdimb \f@size\p@
448     \ifx\optional@arg\@empty
449     \else
450         \@tempdimb \optional@arg\@tempdimb
451         #1{Font\space shape\space '\curr@fontshape'\space
452         will\space be\MessageBreak
453         scaled\space to\space size\space \the\@tempdimb}%
454     \fi
455     \edef\external@font{\mandatory@arg\space at\the\@tempdimb}}

```

(End definition for \s@fct@. This function is documented on page ??.)

**\s@fct@gen** This size function generates the external name from the mandatory argument and the requested user size, and thus can be used for external names where the size is encoded in the font name. The optional argument a scale factor. The font is scaled to \f@size if no optional argument is present, and to \f@size multiplied by the optional argument otherwise.

```

456 \DeclareSizeFunction{gen}{\gen@sfcnt\@font@warning}
457 \DeclareSizeFunction{sgen}{\gen@sfcnt\@font@info}

458 \def\gen@sfcnt{%
459     \edef\mandatory@arg{\mandatory@arg\f@size}%
460     \empty@sfcnt}

```

(End definition for \s@fct@gen and \s@fct@sgen. These functions are documented on page ??.)

**\s@fct@genb** This size function is similar to gen, but for fonts where the size is encoded in the font name in centipoints, as in the DC fonts version 1.2. The font is scaled to \f@size if no optional argument is present, and to \f@size multiplied by the optional argument otherwise.

```

461 \DeclareSizeFunction{genb}{\genb@sfcnt\@font@warning}
462 \DeclareSizeFunction{sgenb}{\genb@sfcnt\@font@info}

463 \def\genb@sfcnt{%
464     \edef\mandatory@arg{\mandatory@arg\expandafter\genb@x\f@size..\@{}}%
465     \empty@sfcnt}

```

(End definition for \s@fct@genb and \s@fct@sgenb. These functions are documented on page ??.)

**\genb@x** The auxiliary macros \genb@x and \genb@y are used to convert the \f@size into centipoints.

```

466 \def\genb@x#1.#2.#3\@{\two@digits{#1}\genb@y#200\@{}}
467 \def\genb@y#1#2#3\@{\#1#2}

```

(End definition for \genb@x and \genb@y. These functions are documented on page ??.)

**\s@fct@sub** This size function handles font substitution. The mandatory argument is a family/series/shape combination, the optional argument (if present) is ignored. The font encoding scheme cannot be changed. Therefore, the first thing we do is to prepend the encoding scheme.

```

468 \DeclareSizeFunction{sub}{\sub@sfcnt\@font@warning}
469 \DeclareSizeFunction{ssub}{\sub@sfcnt\@font@info}

470 \def\sub@sfcnt#1{%
471     \edef\mandatory@arg{\f@encoding/\mandatory@arg}%

```



Next action is split the arg into its individual components and allow for a late font shape load.

```

472 \begingroup
473 \expandafter\split@name\mandatory@arg/\@nil
474 \try@load@fontshape
475 \endgroup

```

Then we record the current `\f@size` since it may get clobbered.

```

476 \let\f@user@size\f@size

```

Then we check whether this new combination is defined and give an error message if not. In this case we also switch to `\error@fontshape`.

```

477 \expandafter
478 \ifx\csname\mandatory@arg\endcsname\relax
479 \errmessage{No\space declaration\space for\space
480 shape\space \mandatory@arg}%
481 \error@fontshape
482 \else

```

Otherwise we warn the user about the substitution taking place.

```

483 #1{Font\space shape\space '\curr@fontshape'\space in\space
484 size\space <\f@size>\space not\space available\MessageBreak
485 Font\space shape\space '\mandatory@arg'\space tried\space
486 instead}%
487 \expandafter\split@name\mandatory@arg/\@nil
488 \fi

```

Then we restart the font specification scan by calling `\get@external@font`.

```

489 \edef\f@size{\f@user@size}%
490 \get@external@font

```

Finally `\do@subst@correction` is called to get the font name right.

```

491 \do@subst@correction
492 }

```

*(End definition for \s@fct@sub. This function is documented on page ??.)*

`\font@aliasinfo` Sometimes a substitution is only done to map a long font name to a standard shape or series, e.g.,

```

DeclareFontShape{T1}{Roboto-LF}{b}{it}{<-> alias * Roboto-LF/bold/it}{}

```

Using the `ssub` function in that case will give a strange (and incorrect) warning. As an alternative we therefore offer the size function `alias`. It will still add some info into the `.log` file, but no longer complains that the font shape is not available. It is implemented by grabbing the default warning text and replacing it with a new one.

```

493 </2ekernel>
494 <*2ekernel | latexrelease>
495 <latexrelease>\IncludeInRelease{2020/02/02}%
496 <latexrelease>{\font@aliasinfo}{alias size function}%
497 \DeclareSizeFunction{alias}{\sub@sfcnt\font@aliasinfo}
498 \def\font@aliasinfo#1{%
499 \font@info{Font\space shape\space '\curr@fontshape'\space
500 aliased\space to\MessageBreak '\mandatory@arg'}%
501 }
502 </2ekernel | latexrelease>

```

```

503 <latexrelease>\EndIncludeInRelease
504 <latexrelease>\IncludeInRelease{0000/00/00}%
505 <latexrelease>{\font@aliasinfo}{alias size function}%
506 <latexrelease>\let\s@fct@alias\@undefined
507 <latexrelease>\let\font@aliasinfo\@undefined
508 <latexrelease>
509 <latexrelease>\EndIncludeInRelease
510 <*2ekernel>

```

(End definition for \font@aliasinfo. This function is documented on page ??.)

**\s@fct@subf** The **subf** size function allows substitution of another font. The mandatory argument is the external name of the font to be substituted, the optional argument a size scaling factor like in the default size function. The main difference to the default size function is the warning message.

```

511 \DeclareSizeFunction{subf}{\subf@sfcnt\font@warning}
512 \DeclareSizeFunction{ssubf}{\subf@sfcnt\font@info}

513 \def\subf@sfcnt#1{%
514     #1{Font\space shape\space '\curr@fontshape'\space in\space
515         size\space \f@size\space not\space available\MessageBreak
516         external\space font\space '\mandatory@arg'\space used}%
517     \empty@sfcnt#1%
518 }

```

(End definition for \s@fct@subf. This function is documented on page ??.)

**\s@fct@fixed** The **fixed** size function is for using a font at a different size than requested. A warning message is printed, and the external font to be used is taken from the mandatory argument. If an optional argument is present it is used as the ‘at’ size for the font. Otherwise the font is loaded at its design size.

```

519 \DeclareSizeFunction{fixed}{\fixed@sfcnt\font@warning}
520 \DeclareSizeFunction{sfixed}{\fixed@sfcnt\font@info}

521 \def\fixed@sfcnt#1{%
522     \ifx\optional@arg\@empty
523         \let\external@font\mandatory@arg
524     \else
525         \edef\external@font{\mandatory@arg\space at\optional@arg pt}%
526     \fi
527     #1{External\space font\space '\external@font'\space loaded\space
528         for\space size\MessageBreak
529         <\f@size>}%
530 }
531 </2ekernel>

```

(End definition for \s@fct@fixed. This function is documented on page ??.)

# File u

## ltfsscmp.dtx

This file contains the implementation of commands giving compatibility with the original ‘NFSS1’ release of the Font Selection Scheme.

**Warning:** The macro documentation is still basically the documentation from the first NFSS release and therefore in some cases probably not completely accurate.

Version 1 of NFSS is obsolete now for about 20 years (and was “current” only for a short intermediate time) so with the 2015 release these internal interface commands are removed from the kernel and made available via `latexrelease` package so that backward compatibility remains ensured for very old documents.

```

1 (*latexrelease)
2 \IncludeInRelease{2015/01/01}{\new@fontshape}%
3                                     {NFSS version1 commands}%
4 \let\new@fontshape\@undefined
5 \let\warn@rel@i\@undefined
6 \let\scan@fontshape\@undefined
7 \let\scan@@fontshape\@undefined
8 \let\subst@fontshape\@undefined
9 \let\extra@def\@undefined
10 \let\default@mextra\@undefined
11 \let\preload@sizes\@undefined
12 \let\err@rel@i\@undefined
13 \let\newmathalphabet\@undefined
14 \let\newmathalphabet@\@undefined
15 \let\newmathalphabet@@@\@undefined
16 \let@if@no@font@opt\@undefined
17 \let@no@font@optfalse\@undefined
18 \let\define@mathalphabet\@undefined
19 \let\define@mathgroup\@undefined
20 \let\addtoversion\@undefined
21 \EndIncludeInRelease

```

In older releases we provide the original definitions.

```

22 \IncludeInRelease{0000/00/00}{\new@fontshape}%
23                                     {NFSS version1 commands}%

```

`\new@fontshape` The interface is now `\DeclareFontShape`.

```

24 \gdef\new@fontshape#1#2#3#4{%
25     \warn@rel@i\new@fontshape\DeclareFontShape
26     \expandafter\scan@fontshape\@gobble#4<\@nil><<%
27     \DeclareFontShape U{#1}{#2}{#3}\reserved@f}%
28 \@onlypreamble\new@fontshape

```

*(End definition for \new@fontshape. This function is documented on page ??.)*

`\warn@rel@i` The warning message used above.

```

29 \gdef\warn@rel@i#1#2{%
30     \@font@warning{*** NFSS release 1 command

```

```

31          \noexpand#1found\MessageBreak
32      *** Update by using release 2 command
33          \string#2.\MessageBreak
34      *** Recovery is probably possible}%
35 }%
36  \@onlypreamble\warn@rel@i

```

(End definition for \warn@rel@i. This function is documented on page ??.)

\scan@fontshape This will scan the old font shape definition syntax.

```

37  \gdef\scan@fontshape{%
38      \let\reserved@f\@empty
39      \let\reserved@e\@empty %           holds last info
40      \scan@@fontshape
41  }%
42  \@onlypreamble\scan@fontshape

```

(End definition for \scan@fontshape. This function is documented on page ??.)

\scan@@fontshape

```

43  \gdef\scan@@fontshape#1>#2#3<{%
44      \ifx\@nil#1%
45          \edef\reserved@f{\reserved@f\reserved@e}%
46      \else
47          \def\reserved@b{#1}%           nick names
48          \def\reserved@c{#3}%
49          \in@{ at}{#3}%
50          \ifin@
51              \in@{pt}{#3}% not a proof but a good chance
52          \ifin@

```

We grap also everything after pt and discard it if people have forgotten to place a percent sign there.

```

53      \def\reserved@a##1 at##2pt##3\@nil{%
54          \def\reserved@b{##2}%
55          \def\reserved@c{##1}%
56      }%
57      \reserved@a#3\@nil
58      \fi
59      \fi
60      \ifnum 0<0#2
61          \edef\reserved@d{subf*\reserved@c}%
62          \ifcase #2\or
63              \or
64              \else
65                  \errmessage{*** What's this? NFSS release 0? ***}%
66              \fi
67          \else
68              \edef\reserved@d{#2\reserved@c}%
69          \fi
70          \ifx\reserved@d\reserved@e
71              \edef\reserved@f{\reserved@f<\reserved@b>}%
72          \else
73              \edef\reserved@f{\reserved@f\reserved@e<\reserved@b>}%add old info
74              \let\reserved@e\reserved@d

```

```

75     \fi
76     \expandafter\scan@@fontshape
77     \fi
78 }%
79 \@onlypreamble\scan@@fontshape

```

(End definition for \scan@@fontshape. This function is documented on page ??.)

**\subst@fontshape** This is now also handled by the extend syntax of \DeclareFontShape.

```

80 \gdef\subst@fontshape#1#2#3#4#5#6{%
81     \warn@rel@i\subst@fontshape\DeclareFontShape
82     \DeclareFontShape{U}{#1}{#2}{#3}{<->sub*#4/#5/#6}{}}%
83 \@onlypreamble\subst@fontshape

```

(End definition for \subst@fontshape. This function is documented on page ??.)

**\extra@def** This was replaced by \DeclareFontFamily.

```

84 \gdef\extra@def#1#2#3{%
85     \warn@rel@i\extra@def\DeclareFontFamily
86     \DeclareFontFamily{U}{#1}{}%
87 }%
88 \@onlypreamble\extra@def

```

(End definition for \extra@def. This function is documented on page ??.)

**\default@mextra** The new name is \DeclareFontEncodingDefaults but in this case we don't feel comfortable with this either.

```

89 \gdef\default@mextra{%
90     \warn@rel@i\default@mextra\DeclareFontEncodingDefaults

```

We pick up the argument to \default@mextra implicitly as the second argument of \DeclareFontEncodingDefaults.

```

91     \DeclareFontEncodingDefaults\relax
92 }%
93 \@onlypreamble\default@mextra

```

(End definition for \default@mextra. This function is documented on page ??.)

**\preload@sizes** The new interface is \DeclarePreloadSizes.

```

94 \gdef\preload@sizes{%
95     \warn@rel@i\preload@sizes\DeclarePreloadSizes
96     \DeclarePreloadSizes U%
97 }%
98 \@onlypreamble\preload@sizes

```

(End definition for \preload@sizes. This function is documented on page ??.)

**\err@rel@i** This macro is used in cases where emulation with NFSS2 features is not really possible.

```

99 \gdef\err@rel@i#1#2{%
100     \@latex@error{*** NFSS release 1 command \noexpand#1found%
101         ^^J*** Recovery not possible. Use \string#2}%
102     {The new release of NFSS doesn't support the
103     \noexpand#1command^^Jany longer.
104     Please upgrade your file to the syntax of NFSS
105     release 2^^Jusing the \noexpand#2command.}%

```

Let's die.

```
106 \batchmode\input.\relax
107 }%
108 \@onlypreamble\err@rel@i
```

(End definition for \err@rel@i. This function is documented on page ??.)

```
\newmathalphabet \newmathalphabet is the old form.
\newmathalphabet@@ 109 \gdef\newmathalphabet{%
\newmathalphabet@@@ 110 \if@no@font@opt
111 \latex@error{*** NFSS release 1 command
112 \noexpand\newmathalphabet found%
113 ^^J \space*** Automatic recovery not possible.%
114 ^^J \space*** TYPE H for Help%
115 }%
116 {Please look at the file usrguide.tex for hints on
117 how to resolve this problem.}%
118 \else
119 \warn@rel@i\newmathalphabet\DeclareMathAlphabet
120 \fi
121 \@ifstar\newmathalphabet@@@
122 \newmathalphabet@@@}%
123 \gdef\newmathalphabet@@#1{\DeclareMathAlphabet#1{U}{-}{-}}%
124 \gdef\newmathalphabet@@@#1#2#3#4{%
125 \DeclareMathAlphabet{#1}{U}{#2}{#3}{#4}}%
126 \@onlypreamble\newmathalphabet
127 \@onlypreamble\newmathalphabet@@
128 \@onlypreamble\newmathalphabet@@@
```

(End definition for \newmathalphabet, \newmathalphabet@@, and \newmathalphabet@@@. These functions are documented on page ??.)

```
\if@no@font@opt
\@no@font@optfalse 129 \global\let\if@no@font@opt\iftrue
130 \gdef\@no@font@optfalse{\let\if@no@font@opt\iffalse}%
```

(End definition for \if@no@font@opt and \@no@font@optfalse. These functions are documented on page ??.)

```
\define@mathalphabet This is a case where dying is best.
131 \gdef\define@mathalphabet{%
132 \err@rel@i\define@mathalphabet\DeclareMathAlphabet
133 }%
134 \@onlypreamble\define@mathalphabet
```

(End definition for \define@mathalphabet. This function is documented on page ??.)

```
\define@mathgroup And here is another one
135 \gdef\define@mathgroup{%
136 \err@rel@i\define@mathgroup\DeclareSymbolFont
137 }%
138 \@onlypreamble\define@mathgroup
```

(End definition for \define@mathgroup. This function is documented on page ??.)

```

\addtoversion \addtoversion is the old form.
139 \def\addtoversion#1#2{%
140   \warn@rel@i\addtoversion\SetMathAlphabet
141   \SetMathAlphabet#2{#1}{U}}%
142 \@onlypreamble\addtoversion

(End definition for \addtoversion. This function is documented on page ??.)
    Finishing off this huge \IncludeInRelease argument:
143 \EndIncludeInRelease
144 </latexrelease>

```

## File v

# ltfssdcl.dtx

This file contains the main implementation of the font selection scheme commands. See other parts of the L<sup>A</sup>T<sub>E</sub>X distribution, or *The L<sup>A</sup>T<sub>E</sub>X Companion* for higher level documentation of these commands.

**Warning:** The macro documentation is still basically the documentation from the first NFSS release and therefore in some cases probably not completely accurate.

## 1 Interface Commands

`\in@` `\@in` is a utility macro with two arguments. It determines whether its first argument occurs in its second and sets the switch `\ifin@` accordingly. The first argument may not contain braces nor # (more precisely, tokens of category code 1, 2, or 6).

```
1 <*2kernel>
2 \def\in@#1#2%
3 {%
4   \begingroup
5     \def\in@@##1#1{%
6       \toks@\expandafter{\in@@#2{}}#1}%
7     \edef\in@@{\the\toks@}%
8     \expandafter\endgroup
9     \ifx\in@@\@empty
10      \in@false
11    \else
12      \in@true
13    \fi
14  }
15 \newif\ifin@
```

(End definition for `\in@` and `\ifin@`. These functions are documented on page ??.)

Before the `\begin{document}` command several *math versions* and *math alphabet identifiers* may be declared. In principle, there should be exactly one family/series/shape combination be declared for each version/alphabet pair. But we want to allow for defaults as well for automagical filling of holes.

While building the tables for math alphabet identifiers and math versions we keep several lists:

- the list of all math versions, `\version@list`, each entry prefixed by the control sequence `\version@elt`, i.e. this list has the following form

```
\version@elt<version1>\version@elt<version2>...
\version@elt<versionn>
```

- the list of all math alphabet identifiers. Here every entry has the form:

```
\group@elt<math group number>
{\{<default family>\}{<default series>\}{<default shape>\}}.
```



- Each defined math alphabet identifier holds a list containing Information about the *versions* for which it is defined. This list has a more complicated structure: it looks as follows:

```

\set@alpha<the alphabet identifier itself>
\reserved@c<math version><font info>
...
\@nil

```

where *<font info>* is either `\reserved@e` (if the combination is not defined yet) or

```
{\family}{\series}{\shape}}
```

`\version@list` We initialize the version list to be empty.

```

16 \let\version@list=\@empty
17 \@onlypreamble\version@list

```

(End definition for `\version@list`. This function is documented on page ??.)

`\version@elt`

```

18 \let\version@elt\relax
19 \@onlypreamble\version@elt

```

(End definition for `\version@elt`. This function is documented on page ??.)

`\new@mathversion` The macro `\new@mathversion` is called with the version control sequence as its argument.

```

20 %\def\new@mathversion#1{%

```

The first thing this macro does is to check if the version identifier is already present in `\version@list`. We enclose `\version@list` in braces since it might be empty (if no *version* is defined yet). But this means that we need a suitable number of `\expandafter` primitives.

```

21 % \expandafter\in@\expandafter#1\expandafter{\version@list}%
22 % \ifin@

```

If so it prints an error message. The `\next` macro is used to get rid of the four characters `\mv@` that would otherwise appear at the begin of the version name in the error message.

```

23 % \latex@error{Math version
24 % '\expandafter\@gobblefour\string#1'
25 % already defined}\@eha

```

Otherwise we have a new version, and we can proceed with entering it into the tables. We add it to `\version@list`. This is very easy: we define `\version@elt` (which is the delimiter in `\version@list`) to protect itself and the following token from being expanded and simply redefine `\version@list`.

```

26 % \else
27 % \global\expandafter\newcount\csname c@\expandafter
28 % \gobble\string#1\endcsname
29 % \global\csname c@\expandafter
30 % \gobble\string#1\endcsname\@ne
31 % \def\version@elt{\noexpand\version@elt\noexpand}%
32 % \edef\version@list{\version@list\version@elt#1}%

```

Then we prepare to enter the new version into all math alphabet identifier lists. Remember that these lists use `\reserved@c` as delimiter, and that there appears the control sequence `\reserved@e` that must not be expanded. Therefore we take suitable precautions.

```
33 %      \def\reserved@c{\noexpand\reserved@c\noexpand}%
34 %      \let\reserved@e\relax
```

We will now go through the `\alpha@list` to process every *math alphabet identifier* in turn. Since this list has `\group@elt` as a delimiter we define this control sequence. It has three arguments as every entry consists of three items (as explained above).

```
35 %      \def\group@elt##1##2##3{%
```

The first of these arguments is the *math alphabet identifier*. We redefine it by appending the information about the new version at the end of the list contained in it. However, there is one subtlety: the definitions for `\reserved@c` and `\reserved@e` made above prevent the main part of the list from being expanded. But we still have to take care of the header and the trailer. To do this we remove the trailer by means of the macro `\remove@nil` which also protect the header from being expanded. Its definition is given below. Now we can prepare to add the new version.

```
36 %          \edef##1{\expandafter\remove@nil##1%
37 %              \reserved@c
38 %              #1%
39 %              \reserved@e
40 %              \noexpand\@nil}}%
```

Finally we call `\alpha@list` which will now execute the macro `\group@elt` once for every defined *math alphabet identifier*. And that's all for now.

```
41 %      \alpha@list
42 %  \fi}
```

(End definition for `\new@mathversion`. This function is documented on page ??.)

`\alpha@list` As we explained above every entry in `\alpha@list` has the form  
`\alpha@elt`  
*alphabet identifier**internal group number**default font assignments*...  
 We initialize it to `\@empty`.

```
43 \let\alpha@list\@empty
44 \@onlypreamble\alpha@list
```

(End definition for `\alpha@list`. This function is documented on page ??.)

`\alpha@elt`

```
45 \let\alpha@elt\relax
46 \@onlypreamble\alpha@elt
```

(End definition for `\alpha@elt`. This function is documented on page ??.)

`\newgroup` Start the group (fam) allocation at 0. (Doesn't belong here.)

```
47 \count18=-1
```

(End definition for `\newgroup`. This function is documented on page ??.)

`\stepcounter`

(End definition for `\stepcounter`. This function is documented on page ??.)

`\select@group` We surround `\select@group` with braces so that functions using it can be used directly after `_` or `^`. However, if we use oldstyle syntax where the math alphabet doesn't have arguments (ie if `\math@bgroup` is not `\bgroup`) we need to get rid of the extra group.

```

48 </2ekernel>
49 <latexrelease>\IncludeInRelease{2015/01/01}
50 <latexrelease>          {\select@group}{\select@group}%
51 <*2ekernel | latexrelease>
52 \def\select@group#1#2#3#4{%
53   \ifx\math@bgroup\bgroup\else\relax\expandafter\@firstofone\fi
54   {%
55     \ifmmode
56       \ifnum\csname c@mv@\math@version\endcsname<\e@mathgroup@top
57         \begingroup
58           \escapechar\m@ne
59           \getanddefine@fonts{\csname c@mv@\math@version\endcsname}#3%
60           \globaldefs\@ne \math@fonts
61         \endgroup
62         \init@restore@version
63         \xdef#1{\noexpand\use@mathgroup\noexpand#2%
64           {\number\csname c@mv@\math@version\endcsname}}}%
65         \global\advance\csname c@mv@\math@version\endcsname\@ne
66       \else
67         \let#1\relax
68         \@latex@error{Too many math alphabets used in
69           version \math@version}%
70         \@eha
71       \fi
72     \else \expandafter\non@alpherr\fi
73     #1{#4}%
74   }%
75 }
76 </2ekernel | latexrelease>
77 <latexrelease>\EndIncludeInRelease
78 <latexrelease>\IncludeInRelease{0000/00/00}
79 <latexrelease>          {\select@group}{\select@group}%
80 <latexrelease>\def\select@group#1#2#3#4{%
81 <latexrelease> \ifx\math@bgroup\bgroup\else\relax\expandafter\@firstofone\fi
82 <latexrelease> {%
83 <latexrelease> \ifmmode
84 <latexrelease>   \ifnum\csname c@mv@\math@version\endcsname<\sixt@@n
85 <latexrelease>     \begingroup
86 <latexrelease>       \escapechar\m@ne
87 <latexrelease>       \getanddefine@fonts
88 <latexrelease>         {\csname c@mv@\math@version\endcsname}#3%
89 <latexrelease>       \globaldefs\@ne \math@fonts
90 <latexrelease>     \endgroup
91 <latexrelease>     \init@restore@version
92 <latexrelease>     \xdef#1{\noexpand\use@mathgroup\noexpand#2%
93 <latexrelease>       {\number\csname c@mv@\math@version\endcsname}}}%
94 <latexrelease>     \global\advance\csname c@mv@\math@version\endcsname\@ne
95 <latexrelease>   \else
96 <latexrelease>     \let#1\relax
97 <latexrelease>     \@latex@error{Too many math alphabets used in
98 <latexrelease>       version \math@version}%

```

```

99 <latexrelease>      \@eha
100 <latexrelease>      \fi
101 <latexrelease> \else \expandafter\non@alpherr\fi
102 <latexrelease> #1{#4}%
103 <latexrelease> }%
104 <latexrelease>}
105 <latexrelease>\EndIncludeInRelease
106 <*2ekernel>

107 \@onlypreamble\restore@mathversion

```

*(End definition for \select@group. This function is documented on page ??.)*

**\init@restore@version**

```

108 \def\init@restore@version{%
109     \global\let\init@restore@version\relax
110     \xdef\restore@mathversion
111         {\expandafter\noexpand\csname mv@\math@version\endcsname
112          \global\csname c@mv@\math@version\endcsname
113          \number\csname c@mv@\math@version\endcsname\relax}%
114     \aftergroup\dorestore@version
115 }
116 \@onlypreamble\init@restore@version

```

*(End definition for \init@restore@version. This function is documented on page ??.)*

**\non@alpherr**

```

117 \gdef\non@alpherr#1{\@latex@error{%

```

The command here will have a space at the end of its name, so we make sure not to insert an extra one.

```

118     \string#1allowed only in math mode}\@ehd}

```

*(End definition for \non@alpherr. This function is documented on page ??.)*

**\dorestore@version**

```

119 \def\dorestore@version
120 {\ifmmode
121     \aftergroup\dorestore@version
122 \else
123     \gdef\init@restore@version{%
124         \global\let\init@restore@version\relax
125         \xdef\restore@mathversion
126             {\expandafter\noexpand\csname mv@\math@version\endcsname
127              \global\csname c@mv@\math@version\endcsname
128              \number\csname c@mv@\math@version\endcsname\relax}%
129         \aftergroup\dorestore@version
130     }%
131     \begingroup
132         \let\getanddefine@fonts@gobbletwo
133         \restore@mathversion
134     \endgroup
135     \fi}%
136 \@onlypreamble\dorestore@version

```

*(End definition for \dorestore@version. This function is documented on page ??.)*

`\document@select@group` We surround `\select@group` with braces so that functions using it can be used directly after `_` or `^`.

```

137 </2ekernel>
138 <latexrelease>\IncludeInRelease{2020/10/01}
139 <latexrelease> {\document@select@group}{\document@select@group}%
140 <*2ekernel | latexrelease>
141 \def\document@select@group#1#2#3#4{%
142   \ifx\math@bgroup\bgroup\else\relax\expandafter\@firstofone\fi
143   {%
144     \ifmmode
145       \ifnum\csname c@mv@\math@version\endcsname<\e@mathgroup@top
146         \begingroup
147           \escapechar\m@ne
148           \getanddefine@fonts{\csname c@mv@\math@version\endcsname}#3%
149           \globaldefs\@ne \math@fonts
150         \endgroup
151         \expandafter\extract@alph@from@version
152           \csname mv@\math@version\expandafter\endcsname
153           \expandafter{\number\csname
154             c@mv@\math@version\endcsname}%
155           #1%
156         \global\advance\csname c@mv@\math@version\endcsname\@ne
157       \else
158         \let#1\relax
159         \@latex@error{Too many math alphabets used
160           in version \math@version}%
161         \@eha
162       \fi
163     \else \expandafter\non@alpherr\fi
164   \expandafter#1\ifx\math@bgroup\bgroup{#4}\else#4\fi
165   }%
166 }
167 </2ekernel | latexrelease>
168 <latexrelease>\EndIncludeInRelease
169 <latexrelease>\IncludeInRelease{2015/01/01}
170 <latexrelease> {\document@select@group}{\document@select@group}%
171 <latexrelease>
172 <latexrelease>\def\document@select@group#1#2#3#4{%
173 <latexrelease> \ifx\math@bgroup\bgroup\else\relax\expandafter\@firstofone\fi
174 <latexrelease> {%
175 <latexrelease> \ifmmode
176 <latexrelease>   \ifnum\csname c@mv@\math@version\endcsname<\e@mathgroup@top
177 <latexrelease>     \begingroup
178 <latexrelease>       \escapechar\m@ne
179 <latexrelease>       \getanddefine@fonts{\csname c@mv@\math@version\endcsname}#3%
180 <latexrelease>       \globaldefs\@ne \math@fonts
181 <latexrelease>     \endgroup
182 <latexrelease>     \expandafter\extract@alph@from@version
183 <latexrelease>       \csname mv@\math@version\expandafter\endcsname

```

```

184 <latexrelease> \expandafter{\number\csname
185 <latexrelease> c@mv@\math@version\endcsname}%
186 <latexrelease> #1%
187 <latexrelease> \global\advance\csname c@mv@\math@version\endcsname\@ne
188 <latexrelease> \else
189 <latexrelease> \let#1\relax
190 <latexrelease> \@latex@error{Too many math alphabets used
191 <latexrelease> in version \math@version}%
192 <latexrelease> \@eha
193 <latexrelease> \fi
194 <latexrelease> \else \expandafter\non@alpherr\fi
195 <latexrelease> #1{#4}%
196 <latexrelease> }%
197 <latexrelease> }
198 <latexrelease> \EndIncludeInRelease
199 <latexrelease>
200 <latexrelease> \IncludeInRelease{0000/00/00}
201 <latexrelease> {\document@select@group}{\document@select@group}%
202 <latexrelease>
203 <latexrelease> \def\document@select@group#1#2#3#4{%
204 <latexrelease> \ifx\math@bgroup\bgroup\else\relax\expandafter\@firstofone\fi
205 <latexrelease> {%
206 <latexrelease> \ifmmode
207 <latexrelease> \ifnum\csname c@mv@\math@version\endcsname<\sist@\n
208 <latexrelease> \begingroup
209 <latexrelease> \escapechar\m@ne
210 <latexrelease> \getanddefine@fonts
211 <latexrelease> {\csname c@mv@\math@version\endcsname}#3%
212 <latexrelease> \globaldefs\@ne \math@fonts
213 <latexrelease> \endgroup
214 <latexrelease> \expandafter\extract@alph@from@version
215 <latexrelease> \csname mv@\math@version\expandafter\endcsname
216 <latexrelease> \expandafter{\number\csname
217 <latexrelease> c@mv@\math@version\endcsname}%
218 <latexrelease> #1%
219 <latexrelease> \global\advance\csname c@mv@\math@version\endcsname\@ne
220 <latexrelease> \else
221 <latexrelease> \let#1\relax
222 <latexrelease> \@latex@error{Too many math alphabets used
223 <latexrelease> in version \math@version}%
224 <latexrelease> \@eha
225 <latexrelease> \fi
226 <latexrelease> \else \expandafter\non@alpherr\fi
227 <latexrelease> #1{#4}%
228 <latexrelease> }%
229 <latexrelease> }
230 <latexrelease> \EndIncludeInRelease
231 <*2ekernel>

```

(End definition for \document@select@group. This function is documented on page ??.)

\process@table

```

232 \def\process@table{%
233 \def\cdp@elt##1##2##3##4{%

```

```

234     \@font@info{Checking defaults for
235         ##1/##2/##3/##4}%
236     \expandafter
237     \ifx\csname##1/##2/##3/##4\endcsname\relax

```

Grouping is important for two reasons, first `\cdp@elt` will get redefined if `\Declare...` functions are executed within the external `.fd` file and secondly `\try@load@fontshape` changes a lot of catcodes without surrounding itself with a group.

```

238     \begingroup
239     \def\f@encoding{##1}\def\f@family{##2}%
240     \try@load@fontshape
241     \endgroup
242 \fi
243 \expandafter
244 \ifx\csname##1/##2/##3/##4\endcsname\relax
245     \@latex@error{This NFSS system isn't set up properly}%
246     {For encoding scheme ##1 the defaults
247       ##2/##3/##4 do not form a valid font shape}%
248 \else
249     \@font@info{... okay}%
250 \fi}%
251 \cdp@list

```

Now we make sure that `\error@fontshape` is okay.

```

252 \begingroup
253 \escapechar\m@ne
254 \error@fontshape
255 \expandafter\ifx\csname \curr@fontshape\endcsname\relax
256     \begingroup
257     \try@load@fontshape
258     \endgroup
259 \fi
260 \expandafter\ifx\csname \curr@fontshape\endcsname\relax
261     \@latex@error{This NFSS system isn't set up properly}%
262     {The system maintainer forgot to specify a suitable
263       substitution
264       font shape using the \noexpand\DeclareErrorFont
265       command}%
266 \fi
267 \endgroup

```

Set `\select@group` to its meaning used within the document body.

```

268 \let\select@group\document@select@group

```

Install the default font attributes as they are currently pointing to error font face. We can speed up the process by just using `\edef`, thereby avoiding all kind of extra processing. Don't use `\reset@font` since that would trigger `\selectfont`.

```

269 \fontencoding\encodingdefault
270 \edef\f@family{\familydefault}%
271 \edef\f@series{\seriesdefault}%
272 \edef\f@shape{\shapedefault}%

```

Drop stuff not longer needed. We need to add many more!!!!

```

273 \everyjob{}%
274 }
275 \@onlypreamble\process@table

```

(End definition for `\process@table`. This function is documented on page ??.)

276 `%\@onlypreamble\set@mathradical`

`\DeclareMathVersion`

```
277 \def\DeclareMathVersion#1{%
278   \expandafter\new@mathversion\csname mv@#1\endcsname}
279 \@onlypreamble\DeclareMathVersion
```

(End definition for `\DeclareMathVersion`. This function is documented on page ??.)

`\new@mathversion`

```
280 \def\new@mathversion#1{%
281   \expandafter\in@\expandafter#1\expandafter{\version@list}%
282   \ifin@
283     \@font@info{Redeclaring math version
284                 '\expandafter\@gobblefour\string#1'}%
285   \else
286     \expandafter\newcount\csname c@\expandafter
287                 \@gobble\string#1\endcsname
288     \def\version@elt{\noexpand\version@elt\noexpand}%
289     \edef\version@list{\version@list\version@elt#1}%
290   \fi
```

`\toks@` is used to gather all tokens for the math version. `\count@` will be used to count the math groups we add to this version.

```
291   \toks@{}%
292   \count@\z@
```

Now we loop over `\group@list` to add all math groups defined so far to the version and at the same time to count them.

```
293   \def\group@elt##1##2{%
294     \advance\count@\@ne
295     \addto@hook\toks@{\getanddefine@fonts##1##2}%
296   }%
297   \group@list
```

We set the counter for this math version to the number of math groups found in `\group@list`.

```
298   \global\csname c@\expandafter\@gobble\string#1\endcsname\count@
```

Now we loop over `\alpha@list` to add all math alphabets known so far. We have to distinguish the case that an alphabet by default should produce an error in new versions.

```
299   \def\alpha@elt##1##2##3{%
300     \ifx##2\no@alphabet@error
301       \toks@\expandafter{\the\toks@\install@mathalphabet##1%
302         {no@alphabet@error##1}}%
303     \else
304       \toks@\expandafter{\the\toks@\install@mathalphabet##1%
305         {\select@group##1##2##3}}%
306     \fi
307   }%
308   \alpha@list
```



Finally we define the math version to expand to the contents of \toks@.

```

309 \xdef#1{\the\toks@}%
310 }
311 \@onlypreamble\new@mathversion

```

(End definition for \new@mathversion. This function is documented on page ??.)

\DeclareSymbolFont

```

312 \def\DeclareSymbolFont#1#2#3#4#5{%
313   \@tempswafalse
314   \edef\reserved@b{#2}%
315   \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%
316     \ifx\reserved@b\reserved@c \@tempswatrue\fi}%
317   \cdp@list
318   \if@tempswa
319     \@ifundefined{sym#1}{%
320       \ifnum\count18<15 %
321         \expandafter\new@mathgroup\csname sym#1\endcsname
322         \expandafter\new@symbolfont\csname sym#1\endcsname
323           {#2}{#3}{#4}{#5}%
324       \else
325         \@latex@error{Too many symbol fonts declared}\@eha
326       \fi
327     }%
328   {%
329     \@font@info{Redeclaring symbol font ‘#1’}%

```

Update the group list.

```

330   \def\group@elt##1##2{%
331     \noexpand\group@elt\noexpand##1%
332     \expandafter\ifx\csname sym#1\endcsname##1%
333       \expandafter\noexpand\csname#2/#3/#4/#5\endcsname
334     \else
335       \noexpand##2%
336     \fi}%
337   \xdef\group@list{\group@list}%

```

Update the version list.

```

338   \def\version@elt##1{%
339     \expandafter
340     \SetSymbolFont@\expandafter##1\csname#2/#3/#4/#5\endcsname
341     \endcsname \csname sym#1\endcsname
342   }%
343   \version@list
344 }%
345 \else
346   \@latex@error{Encoding scheme ‘#2’ unknown}\@eha
347 \fi
348 }
349 \@onlypreamble\DeclareSymbolFont

```

(End definition for \DeclareSymbolFont. This function is documented on page ??.)

`\group@list`

```
350 \let\group@list\@empty
351 \@onlypreamble\group@list
```

*(End definition for \group@list. This function is documented on page ??.)*

`\group@elt`

```
352 \let\group@elt\relax
353 \@onlypreamble\group@elt
```

*(End definition for \group@elt. This function is documented on page ??.)*

`\new@symbolfont`

```
354 \def\new@symbolfont#1#2#3#4#5{%
355   \toks@\expandafter{\group@list}%
356   \edef\group@list{\the\toks@\noexpand\group@elt\noexpand#1%
357     \expandafter\noexpand\csname#2/#3/#4/#5\endcsname}%
358   \def\version@elt##1{\toks@\expandafter{##1}%
359     \edef##1{\the\toks@\noexpand\getanddefine@fonts
360       #1\expandafter\noexpand\csname#2/#3/#4/#5\endcsname}%
361     \global\advance\csname c@\expandafter
362       \gobble\string##1\endcsname\@ne
363     }%
364   \version@list
365 }
366 \@onlypreamble\new@symbolfont
```

*(End definition for \new@symbolfont. This function is documented on page ??.)*

`\SetSymbolFont`

```
367 \def\SetSymbolFont#1#2#3#4#5#6{%
368   \@tempswafalse
369   \edef\reserved@b{#3}%
370   \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%
371     \ifx\reserved@b\reserved@c \@tempswatrue\fi}%
372   \cdp@list
373   \if@tempswa
374     \expandafter\SetSymbolFont@
375     \csname mv@#2\expandafter\endcsname\csname#3/#4/#5/#6\expandafter
376     \endcsname \csname sym#1\endcsname
377   \else
378     \@latex@error{Encoding scheme ‘#3’ unknown}\@eha
379   \fi
380 }
381 \@onlypreamble\SetSymbolFont
```

*(End definition for \SetSymbolFont. This function is documented on page ??.)*

`\SetSymbolFont@`

```
382 \def\SetSymbolFont@#1#2#3{%
383   \expandafter\in@\expandafter#1\expandafter{\version@list}%
384   \ifin@
385     \expandafter\in@\expandafter#3\expandafter{\group@list}%
386     \ifin@
387       \begingroup
```

```

388 \expandafter\get@cdp\string#2\@nil\reserved@a
389 \toks@{}%
390 \def\install@mathalphabet##1##2{%
391 \addto@hook\toks@{\install@mathalphabet##1{##2}}%
392 }%
393 \def\getanddefine@fonts##1##2{%
394 \ifnum##1=#3%
395 \addto@hook\toks@{\getanddefine@fonts#3#2}%
396 \expandafter\get@cdp\string##2\@nil\reserved@b
397 \ifx\reserved@a\reserved@b\else
398 \@font@info{Encoding ‘\reserved@b’ has changed
399 to ‘\reserved@a’ for symbol font\MessageBreak
400 ‘\expandafter\@gobblefour\string#3’ in the
401 math version ‘\expandafter
402 \@gobblefour\string#1’}%
403 \fi
404 \@font@info{%
405 Overwriting symbol font
406 ‘\expandafter\@gobblefour\string#3’ in
407 version ‘\expandafter
408 \@gobblefour\string#1’\MessageBreak
409 \spaces \expandafter\@gobble\string##2 -->
410 \expandafter\@gobble\string#2}%
411 \else
412 \addto@hook\toks@{\getanddefine@fonts##1##2}%
413 \fi}%
414 #1%
415 \xdef#1{\the\toks@}%
416 \endgroup
417 \else
418 \@latex@error{Symbol font ‘\expandafter\@gobblefour\string#3’
419 not defined}\@eha
420 \fi
421 \else
422 \@latex@error{Math version ‘\expandafter\@gobblefour\string#1’
423 is not
424 defined}{You probably misspelled the name of the math
425 version.^^JOr you have to specify an additional package.}%
426 \fi
427 }
428 \@onlypreamble\SetSymbolFont@

```

(End definition for \SetSymbolFont@. This function is documented on page ??.)

\get@cdp

```

429 \def\get@cdp#1#2/#3\@nil#4{\def#4{#2}}
430 \@onlypreamble\get@cdp

```

(End definition for \get@cdp. This function is documented on page ??.)

\DeclareMathAlphabet

```

431 \def\DeclareMathAlphabet#1#2#3#4#5{%
432 \@tempswafalse
433 \edef\reserved@b{#2}%
434 \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%

```

```

435     \ifx\reserved@b\reserved@c \@tempswatrue\fi}%
436   \cdp@list
437   \if@tempswa
438     \expandafter\ifx
439     \csname\expandafter\@gobble\string#1\endcsname
440   \relax
441     \new@mathalphabet#1{#2}{#3}{#4}{#5}%
442   \else

```

Check if it is already a math alphabet.

```

443     \edef\reserved@a{\noexpand\in@{\string\select@group}%
444       {\expandafter\meaning\csname \expandafter
445         \@gobble\string#1\space\endcsname}}%
446   \reserved@a
447   \ifin@
448     \@font@info{Redeclaring math alphabet \string#1}%
449     \def\version@elt##1{%
450       \expandafter\SetMathAlphabet@\expandafter
451         ##1\csname#2/#3/#4/#5\expandafter\endcsname

452       \csname M@#2\expandafter\endcsname
453       \csname \expandafter\@gobble\string#1\space\endcsname#1}%
454     \version@list
455   \else

```

Check if it is a math alphabet defined via \DeclareSymbolFontAlphabet.

```

456     \edef\reserved@a{\noexpand\in@{\string\use@mathgroup}%
457       {\expandafter\meaning\csname \expandafter
458         \@gobble\string#1\space\endcsname}}%
459   \reserved@a
460   \ifin@

```

In that case overwriting is simple since there is nothing inserted in the math version macros.

```

461     \@font@info{Redeclaring math alphabet \string#1}%
462     \new@mathalphabet#1{#2}{#3}{#4}{#5}%

```

Otherwise panic.

```

463     \else
464       \@latex@error{Command ‘\string#1’ already defined}\@eha
465     \fi
466   \fi
467   \fi
468   \else
469     \@latex@error{Encoding scheme ‘#2’ unknown}\@eha
470   \fi
471   }
472   \@onlypreamble\DeclareMathAlphabet

```

(End definition for \DeclareMathAlphabet. This function is documented on page ??.)

\new@mathalphabet

```

473   \def\new@mathalphabet#1#2#3#4#5{%
474     \toks@\expandafter{\alpha@list}%
475     \edef#1{\expandafter\noexpand\csname \expandafter
476       \@gobble\string#1\space\endcsname

```

```

477         \if/#5/%
478             \noexpand\no@alphabet@error
479             \noexpand\no@alphabet@error
480         \else
481             \expandafter\noexpand\csname M@#2\endcsname
482             \expandafter\noexpand\csname#2/#3/#4/#5\endcsname
483         \fi
484     }%
485     \toks2\expandafter{#1}%
486     \edef\alpha@list{\the\toks@\noexpand\alpha@elt\the\toks2}%
487     \def\version@elt##1{\toks@\expandafter{##1}%
488         \edef##1{\the\toks@\install@mathalphabet
489             \expandafter\noexpand
490             \csname \expandafter@gobble
491                 \string#1\space\endcsname
492             {\if/#5/%
493                 \noexpand\no@alphabet@error
494                 \noexpand#1%
495             \else
496                 \noexpand\select@group\the\toks2
497                 \fi}}%
498         }%
499     \version@list
500     \expandafter\edef\csname \expandafter@gobble
501         \string#1\space\endcsname{\if/#5/%
502         \noexpand\no@alphabet@error
503         \noexpand#1%
504     \else
505         \noexpand\select@group\the\toks2
506     \fi}%
507     \edef#1{\noexpand\protect
508         \expandafter\noexpand\csname \expandafter
509             \@gobble\string#1\space\endcsname}%
510 }
511 \@onlypreamble\new@mathalphabet

```

(End definition for \new@mathalphabet. This function is documented on page ??.)

## \SetMathAlphabet

```

512 \def\SetMathAlphabet#1#2#3#4#5#6{%
513     \@tempswafalse
514     \edef\reserved@b{#3}%
515     \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%
516         \ifx\reserved@b\reserved@c \@tempwattrue\fi}%
517     \cdp@list
518     \if@tempswa
519         \expandafter\SetMathAlphabet@
520             \csname mv@#2\expandafter\endcsname\csname#3/#4/#5/#6\expandafter
521             \endcsname \csname M@#3\expandafter\endcsname
522             \csname \expandafter@gobble\string#1\space\endcsname#1%
523     \else
524         \@latex@error{Encoding scheme ‘#3’ unknown}\@eha
525     \fi
526 }
527 \@onlypreamble\SetMathAlphabet

```

(End definition for \SetMathAlphabet. This function is documented on page ??.)

\SetMathAlphabet@

```

528 \def\SetMathAlphabet@#1#2#3#4#5{%
529   \expandafter\in@\expandafter#1\expandafter{\version@list}%
530   \ifin@
531     \expandafter\in@\expandafter#4\expandafter{\alpha@list}%
532     \ifin@
533       \begingroup
534       \toks@{%
535         \def\getanddefine@fonts##1##2{%
536           \addto@hook\toks@{\getanddefine@fonts##1##2}%
537         }%
538         \def\reserved@c##1##2##3##4{%           % for message below
539           \expandafter\@gobble\string##4}%
540         \def\install@mathalphabet##1##2{%
541           \ifx##1#4%
542             \addto@hook\toks@
543               {\install@mathalphabet#4{\select@group#4#3#2}}%
544             \@font@info{Overwriting math alphabet
545               '\string#5' in version '\expandafter
546               \@gobblefour\string#1'\MessageBreak
547               \@spaces \reserved@c##2 -->
548               \expandafter\@gobble\string#2}%
549           \else
550             \addto@hook\toks@{\install@mathalphabet##1{##2}}%
551           \fi
552           }%
553           #1%
554           \xdef#1{\the\toks@}%
555         \endgroup
556       \else

```

If the math alphabet was defined via \DeclareSymbolFontAlphabet we have remove its external definition and add it as a normal math alphabet to every version before trying to change it in one version.

```

557   \edef\reserved@a{%
558     \noexpand\in@{\string\use@mathgroup}{\meaning#4}}%
559   \reserved@a
560   \ifin@
561     \def\reserved@b##1\use@mathgroup##2##3{%
562       \def\reserved@b{##3}\def\reserved@c{##2}}%
563     \expandafter\reserved@b#4%
564     \begingroup
565     \def\install@mathalphabet##1##2{%
566       \addto@hook\toks@{\install@mathalphabet##1{##2}}%
567     }%
568     \def\getanddefine@fonts##1##2{%
569       \addto@hook\toks@{\getanddefine@fonts##1##2}%
570       \ifnum##1=\reserved@b
571         \expandafter
572         \addto@hook\expandafter\toks@
573         \expandafter{\expandafter\install@mathalphabet
574         \expandafter#4\expandafter

```

```

575         {\expandafter\select@group\expandafter
576          #4\reserved@c##2}}}%
577     \fi
578   }%
579   \def\version@elt##1{%
580     \toks@{}%
581     ##1%
582     \xdef##1{\the\toks@}%
583   }%
584   \version@list
585 \endgroup

```

Put it into the `\alpha@list` with default ‘error’

```

586   \expandafter\gdef\expandafter\alpha@list\expandafter
587   {\alpha@list
588     \alpha@elt #4\no@alphabet@error \no@alphabet@error}%
589   \gdef#4{\no@alphabet@error #5}% fake things :-)

```

Then call the internal setting routine again:

```

590   \SetMathAlphabet@{#1}{#2}{#3}#4#5%
591 \else
592   \@latex@error{Command ‘\string#5’ not defined as a
593     math alphabet}%
594   {Use \noexpand\DeclareMathAlphabet to define it.}%
595 \fi
596 \fi
597 \else
598   \@latex@error{Math version ‘\expandafter\@gobblefour\string#1’
599     is not
600     defined}{You probably misspelled the name of the math
601     version.^^JOr you have to specify an additional package.}%
602 \fi
603 }
604 \onlypreamble\SetMathAlphabet@

```

(End definition for `\SetMathAlphabet@`. This function is documented on page ??.)

`\DeclareMathAccent` Could do with more checks like allowing single number in #4 lowercase in #4 etc

```

605 </2ekernel>
606 <*2ekernel | latexrelease>
607 <latexrelease>\IncludeInRelease{2019/10/01}%
608 <latexrelease> {DeclareMathAccent}{Make math accents robust}%
609 \def\DeclareMathAccent#1#2#3#4{%
610   \expandafter\in@\csname sym#3\expandafter\endcsname
611   \expandafter{\group@list}%
612   \ifin@
613     \begingroup
614     \count\z@=#4\relax
615     \count\tw@\count\z@
616     \divide\count\z@\sist@@n
617     \count@\count\z@
618     \multiply\count@\sist@@n
619     \advance\count\tw@-\count@
620     \if\relax\noexpand#1% is command?
621     \edef\reserved@a{\noexpand\in@

```

```

622         {\expandafter\@gobble\string\mathaccent}
623         {\expandafter\meaning
624         \csname\expandafter\@gobble\string#1\space\endcsname}}%
625     \reserved@a
626     \ifin@
627         \expandafter\let
628         \csname\expandafter\@gobble\string#1\space\endcsname
629         \@undefined
630         \expandafter\set@mathaccent
631         \csname sym#3\endcsname#1#2%
632         {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
633         \@font@info{Redefining math accent \string#1}%
634     \else
635         \expandafter\ifx
636         \csname\expandafter\@gobble\string#1\endcsname
637         \relax
638         \expandafter\set@mathaccent
639         \csname sym#3\endcsname#1#2%
640         {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
641     \else
642         \@latex@error{Command '\string#1' already defined}\@eha
643     \fi
644 \fi
645 \else
646 \@latex@error{Not a command name: '\noexpand#1'}\@eha
647 \fi
648 \endgroup
649 \else
650 \@latex@error{Symbol font '#3' is not defined}\@eha
651 \fi
652 }
653 </2ekernel | latexrelease>
654 <latexrelease>\EndIncludeInRelease
655 <latexrelease>\IncludeInRelease{0000/00/00}%
656 <latexrelease>          {DeclareMathAccent}{Make math accents robust}%
657 <latexrelease>\def\DeclareMathAccent#1#2#3#4{%
658 <latexrelease>  \expandafter\in@\csname sym#3\expandafter\endcsname
659 <latexrelease>  \expandafter{\group@list}%
660 <latexrelease>  \ifin@
661 <latexrelease>    \begingroup
662 <latexrelease>    \count\z@=#4\relax
663 <latexrelease>    \count\tw@\count\z@
664 <latexrelease>    \divide\count\z@\sixt@@n
665 <latexrelease>    \count@\count\z@
666 <latexrelease>    \multiply\count@\sixt@@n
667 <latexrelease>    \advance\count\tw@-\count@
668 <latexrelease>    \if\relax\noexpand#1% is command?
669 <latexrelease>      \edef\reserved@a{\noexpand\in@
670 <latexrelease>        {\expandafter\@gobble\string\mathaccent}\{\meaning#1}}%
671 <latexrelease>      \reserved@a
672 <latexrelease>    \ifin@
673 <latexrelease>      \expandafter\set@mathaccent
674 <latexrelease>      \csname sym#3\endcsname#1#2%
675 <latexrelease>      {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%

```



```

676 <latexrelease> \font@info{Redefining math accent \string#1}%
677 <latexrelease> \else
678 <latexrelease> \expandafter\ifx
679 <latexrelease> \csname\expandafter\@gobble\string#1\endcsname
680 <latexrelease> \relax
681 <latexrelease> \expandafter\set@mathaccent
682 <latexrelease> \csname sym#3\endcsname#1#2%
683 <latexrelease> {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
684 <latexrelease> \else
685 <latexrelease> \latex@error{Command ‘\string#1’ already defined}\@eha
686 <latexrelease> \fi
687 <latexrelease> \fi
688 <latexrelease> \else
689 <latexrelease> \latex@error{Not a command name: ‘\noexpand#1’}\@eha
690 <latexrelease> \fi
691 <latexrelease> \endgroup
692 <latexrelease> \else
693 <latexrelease> \latex@error{Symbol font ‘#3’ is not defined}\@eha
694 <latexrelease> \fi
695 <latexrelease>}
696 <latexrelease>\EndIncludeInRelease
697 <*2ekernel>

698 \onlypreamble\DeclareMathAccent

```

(End definition for \DeclareMathAccent. This function is documented on page ??.)

\set@mathaccent

```

699 </2ekernel>
700 <*2ekernel | latexrelease>
701 <latexrelease>\IncludeInRelease{2019/10/01}%
702 <latexrelease> {\set@mathaccent}{makemath accents robust}%
703 \def\set@mathaccent#1#2#3#4{%
704 \xdef#2{\mathaccent"\mathchar@type#3\hexnumber@#1#4\relax}%
705 \MakeRobust#2%
706 }
707 \onlypreamble\set@mathaccent
708 </2ekernel | latexrelease>
709 <latexrelease>\EndIncludeInRelease
710 <latexrelease>\IncludeInRelease{0000/00/00}%
711 <latexrelease> {\set@mathaccent}{makemath accents robust}%
712 <latexrelease>
713 <latexrelease>\def\set@mathaccent#1#2#3#4{%
714 <latexrelease> \xdef#2{\mathaccent"\mathchar@type#3\hexnumber@#1#4\relax}}
715 <latexrelease>
716 <latexrelease>\EndIncludeInRelease
717 <*2ekernel>

```

(End definition for \set@mathaccent. This function is documented on page ??.)

\DeclareMathSymbol

```

718 \def\DeclareMathSymbol#1#2#3#4{%
719 \expandafter\in@\csname sym#3\endcsname
720 \expandafter{\group@list}%
721 \ifin@

```

```

722 \begingroup
723 \count\z@=#4\relax
724 \count\tw@\count\z@
725 \divide\count\z@\sist@@n
726 \count@\count\z@
727 \multiply\count@\sist@@n
728 \advance\count\tw@-\count@
729 \if\relax\noexpand#1% is command?

```

Store the command name with a space attached inside `\reserved@@b` in case we look at a robust definition.

```

730 \edef\reserved@b{\expandafter\noexpand
731 \csname\expandafter@gobble\string#1\space\endcsname}%

```

Test both `#1` and `#1_` for containing `mathchar`.

```

732 \edef\reserved@a
733 {\noexpand\in@{\expandafter@gobble\string\mathchar}%
734 {\meaning#1\expandafter\meaning\reserved@b}}%
735 \reserved@a

```

Drop `#1_` in case it was defined before.

```

736 \global\expandafter\let\reserved@b\@undefined
737 \ifin@
738 \expandafter\set@mathsymbol
739 \csname sym#3\endcsname#1#2%
740 {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
741 \@font@info{Redeclaring math symbol \string#1}%
742 \else
743 \expandafter\ifx
744 \csname\expandafter@gobble\string#1\endcsname
745 \relax
746 \expandafter\set@mathsymbol
747 \csname sym#3\endcsname#1#2%
748 {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
749 \else
750 \@latex@error{Command '\string#1' already defined}\@eha
751 \fi
752 \fi
753 \else
754 \expandafter\set@mathchar
755 \csname sym#3\endcsname#1#2
756 {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
757 \fi
758 \endgroup
759 \else
760 \@latex@error{Symbol font '#3' is not defined}\@eha
761 \fi
762 }
763 \@onlypreamble\DeclareMathSymbol

```

(End definition for `\DeclareMathSymbol`. This function is documented on page ??.)

`\set@mathchar`

```

764 \def\set@mathchar#1#2#3#4{%
765 \global\mathcode'#2="\mathchar@type#3\hexnumber@#1#4\relax}
766 \@onlypreamble\set@mathchar

```

(End definition for `\set@mathchar`. This function is documented on page ??.)

`\set@mathsymbol`

```
767 \def\set@mathsymbol#1#2#3#4{%
768   \global\mathchardef#2"\mathchar@type#3\hexnumber@#1#4\relax}
769 \@onlypreamble\set@mathsymbol
```

(End definition for `\set@mathsymbol`. This function is documented on page ??.)

```
770 %\def\mathsymbol#1#2#3{%
771 %   \@tempcnta=#3\relax
772 %   \@tempcntb\@tempcnta
773 %   \divide\@tempcnta\sixt@@n
774 %   \count@\@tempcnta
775 %   \multiply\count@\sixt@@n
776 %   \advance\@tempcntb-\count@
777 %   \mathchar"\mathchar@type#1\hexnumber@#2%
778 %       \hexnumber@\@tempcnta\hexnumber@\@tempcntb\relax}
779 %
780 %\def\DeclareMathAlphabetCharacter#1#2#3{%
781 %   \DeclareMathSymbol{#1}7{#2}{#3}
```

`\DeclareMathDelimiter`

```
782 \def\DeclareMathDelimiter#1{%
783   \if\relax\noexpand#1%
784     \expandafter\@DeclareMathDelimiter
785   \else
786     \expandafter\@xxDeclareMathDelimiter
787   \fi
788   #1}
789 \@onlypreamble\DeclareMathDelimiter
```

(End definition for `\DeclareMathDelimiter`. This function is documented on page ??.)

`\@xxDeclareMathDelimiter`

This macro checks if the second arg is a “math type” such as `\mathopen`. The undocumented original code didn’t use math types when the delimiter was a single letter. For this reason the coding is a bit strange as it tries to support the undocumented syntax for compatibility reasons.

```
790 \def\@xxDeclareMathDelimiter#1#2#3#4{%
```

7 is the default value returned in the case that `\mathchar@type` is passed something unexpected, like a math symbol font name. We locally move `\mathalpha` out of the way so if you use that the right branch is taken. This will still fail if an explicit number 7 is used!

```
791 \begingroup
792   \let\mathalpha\mathord
793   \ifnum7=\mathchar@type{#2}%
794     \endgroup
```

If this branch is taken we have old syntax (5 arguments).

```
795     \expandafter\@firstofone
796   \else
```

If this branch is taken `\mathchar@type` is different from 7 so we assume new syntax. In this case we also use the arguments to set up the letter as a math symbol for the case where it is not used as a delimiter.

```
797 \endgroup
798 \DeclareMathSymbol#1{#2}{#3}{#4}%
```

Then we arrange that `\@xDeclareMathDelimiter` only gets #1, #3, #4 ... as it does not expect a math type as argument.

```
799 \expandafter\@firstoftwo
800 \fi
801 {\@xDeclareMathDelimiter#1}{#2}{#3}{#4}}
802 \@onlypreamble\@xxDeclareMathDelimiter
```

(End definition for `\@xxDeclareMathDelimiter`. This function is documented on page ??.)

`\@DeclareMathDelimiter`

```
803 \def\@DeclareMathDelimiter#1#2#3#4#5#6{%
804   \expandafter\in@\csname sym#3\expandafter\endcsname
805   \expandafter{\group@list}%
806   \ifin@
807     \expandafter\in@\csname sym#5\expandafter\endcsname
808     \expandafter{\group@list}%
809   \ifin@
810     \begingroup
811       \count\z@=#4\relax
812       \count\tw@\count\z@
813       \divide\count\z@\sist@@n
814       \count@\count\z@
815       \multiply\count@\sist@@n
816       \advance\count\tw@-\count@
817       \edef\reserved@c{\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
818     %
819     \count\z@=#6\relax
820     \count\tw@\count\z@
821     \divide\count\z@\sist@@n
822     \count@\count\z@
823     \multiply\count@\sist@@n
824     \advance\count\tw@-\count@
825     \edef\reserved@d{\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
826   %
827   \edef\reserved@a{\noexpand\in@
828     {\expandafter\@gobble\string\delimiter}{\meaning#1}}%
829   \reserved@a
830   \ifin@
831     \expandafter\set@mathdelimiter
832     \csname sym#3\expandafter\endcsname
833     \csname sym#5\endcsname#1#2%
834     \reserved@c\reserved@d
835     \@font@info{Redeclaring math delimiter \string#1}%
836   \else
837     \expandafter\ifx
838     \csname\expandafter\@gobble\string#1\endcsname
839     \relax
840     \expandafter\set@mathdelimiter
```

```

841         \csname sym#3\expandafter\endcsname
842         \csname sym#5\endcsname#1#2%
843         \reserved@c\reserved@d
844     \else
845         \@latex@error{Command ‘\string#1’ already defined}\@eha
846     \fi
847 \fi
848 \endgroup
849 \else
850     \@latex@error{Symbol font ‘#5’ is not defined}\@eha
851 \fi
852 \else
853     \@latex@error{Symbol font ‘#3’ is not defined}\@eha
854 \fi
855 }
856 \@onlypreamble\@DeclareMathDelimiter

```

(End definition for \@DeclareMathDelimiter. This function is documented on page ??.)

\@xDeclareMathDelimiter

```

857 \def\@xDeclareMathDelimiter#1#2#3#4#5{%
858     \expandafter\in@\csname sym#2\expandafter\endcsname
859     \expandafter{\group@list}%
860     \ifin@
861         \expandafter\in@\csname sym#4\expandafter\endcsname
862         \expandafter{\group@list}%
863     \ifin@
864         \begingroup
865             \count\z@=#3\relax
866             \count\tw@\count\z@
867             \divide\count\z@\sixt@@n
868             \count@\count\z@
869             \multiply\count@\sixt@@n
870             \advance\count\tw@-\count@
871             \edef\reserved@c{\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
872             %
873             \count\z@=#5\relax
874             \count\tw@\count\z@
875             \divide\count\z@\sixt@@n
876             \count@\count\z@
877             \multiply\count@\sixt@@n
878             \advance\count\tw@-\count@
879             \edef\reserved@d{\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
880             \expandafter\set@@mathdelimiter
881             \csname sym#2\expandafter\endcsname\csname sym#4\endcsname#1%
882             \reserved@c\reserved@d
883         \endgroup
884     \else
885         \@latex@error{Symbol font ‘#4’ is not defined}\@eha
886     \fi
887 \else
888     \@latex@error{Symbol font ‘#2’ is not defined}\@eha
889 \fi
890 }

```

```
891 \@onlypreamble\@xDeclareMathDelimiter
```

(End definition for \@xDeclareMathDelimiter. This function is documented on page ??.)

`\set@mathdelimiter` We have to end the definition of a math delimiter like `\lfloor` with a space and not with `\relax` as we did before, because otherwise constructs involving `\abovewithdelims` will prematurely end (pr/1329)

```
892 \</2ekernel>
893 \<*2ekernel | latexrelease>
894 \<latexrelease>\IncludeInRelease{2019/10/01}%
895 \<latexrelease>          {\set@mathdelimiter}{make delimiters robust}%
896 \def\set@mathdelimiter#1#2#3#4#5#6{%
```

We use `\protected` not `\MakeRobust` so that `\bigl\lfloor` etc. works inside `\protected@edef`.

```
897   \protected
898   \xdef#3{\delimiter"\mathchar@type#4\hexnumber@#1#5%
899     \hexnumber@#2#6 }%
900 %   \MakeRobust#3%
901 }
902 \@onlypreamble\set@mathdelimiter
903 \</2ekernel | latexrelease>
904 \<latexrelease>\EndIncludeInRelease
905 \<latexrelease>\IncludeInRelease{0000/00/00}%
906 \<latexrelease>          {\set@mathdelimiter}{make delimiters robust}%
907 \<latexrelease>
908 \<latexrelease>\def\set@mathdelimiter#1#2#3#4#5#6{%
909 \<latexrelease>   \xdef#3{\delimiter"\mathchar@type#4\hexnumber@#1#5%
910 \<latexrelease>     \hexnumber@#2#6 }}
911 \<latexrelease>
912 \<latexrelease>\EndIncludeInRelease
913 \<*2ekernel>
```

(End definition for `\set@mathdelimiter`. This function is documented on page ??.)

`\set@@mathdelimiter`

```
914 \def\set@@mathdelimiter#1#2#3#4#5{%
915   \global\delcode'#3="\hexnumber@#1#4\hexnumber@#2#5\relax}
916 \@onlypreamble\set@@mathdelimiter
```

(End definition for `\set@@mathdelimiter`. This function is documented on page ??.)

`\DeclareMathRadical`

```
917 \def\DeclareMathRadical#1#2#3#4#5{%
```

Below is a crude fix to make this macro work if #1 is undefined or `\relax`. Should be improved!

```
918   \expandafter\ifx
919     \csname\expandafter\@gobble\string#1\endcsname
920     \relax
921     \let#1\radical
922   \fi
923   \edef\reserved@a{\noexpand\in@
924     {\expandafter\@gobble\string\radical}{\meaning#1}}%
925   \reserved@a
```

```

926 \ifin@
927 \expandafter\in@\csname sym#2\expandafter\endcsname
928 \expandafter{\group@list}%
929 \ifin@
930 \expandafter\in@\csname sym#4\expandafter\endcsname
931 \expandafter{\group@list}%
932 \ifin@
933 \begingroup
934 \count\z@=#3\relax
935 \count\tw@\count\z@
936 \divide\count\z@\sist@@n
937 \count@\count\z@
938 \multiply\count@\sist@@n
939 \advance\count\tw@-\count@
940 \edef\reserved@c{%
941 \hexnumber@\count\z@}\hexnumber@\count\tw@}%
942 \count\z@=#5\relax
943 \count\tw@\count\z@
944 \divide\count\z@\sist@@n
945 \count@\count\z@
946 \multiply\count@\sist@@n
947 \advance\count\tw@-\count@
948 \edef\reserved@d{%
949 \hexnumber@\count\z@}\hexnumber@\count\tw@}%
Coded inline instead of using \set@mathradical
950 % \expandafter\set@mathradical
951 % \csname sym#2\expandafter\endcsname
952 % \csname sym#4\endcsname#1%
953 % \reserved@c\reserved@d
954 \xdef#1{\radical"\expandafter\hexnumber@
955 \csname sym#2\endcsname\reserved@c
956 \expandafter\hexnumber@
957 \csname sym#4\endcsname\reserved@d
958 \relax}%
959 \endgroup
960 \else
961 \@latex@error{Symbol font ‘#4’ is not defined}\@eha
962 \fi
963 \else
964 \@latex@error{Symbol font ‘#2’ is not defined}\@eha
965 \fi
966 \else
967 \@latex@error{Command ‘\string#1’ already defined}\@eha
968 \fi
969 }
970 \@onlypreamble\DeclareMathRadical

```

(End definition for \DeclareMathRadical. This function is documented on page ??.)

Definition below was wrong it contained \delimiter !

```

def\set@mathradical#1#2#3#4#5{%
\xdef#3{\radical"\hexnumber@#1#4\hexnumber@#2#5\relax}}

```

\mathalpha just a dummy currently

```
971 \let\mathalpha\relax
```

(End definition for \mathalpha. This function is documented on page ??.)

\mathchar@type

```
972 \def\mathchar@type#1{%
973   \ifodd 2#1#1 #1\else           % is this non-negative number?
974   \ifx#1\mathord 0\else
975   \ifx#1\mathop 1\else
976   \ifx#1\mathbin 2\else
977   \ifx#1\mathrel 3\else
978   \ifx#1\mathopen 4\else
979   \ifx#1\mathclose 5\else
980   \ifx#1\mathpunct 6\else
981   7%                             % anything else is variable ord
982   \fi
983   \fi
984   \fi
985   \fi
986   \fi
987   \fi
988   \fi
989 \fi}
990 \@onlypreamble\mathchar@type
```

(End definition for \mathchar@type. This function is documented on page ??.)

\DeclareSymbolFontAlphabet

```
991 \def\DeclareSymbolFontAlphabet#1#2{%
992   \expandafter\DeclareSymbolFontAlphabet@
993   \csname \expandafter\@gobble\string#1\space\endcsname{#2}#1}
994 \@onlypreamble\DeclareSymbolFontAlphabet
```

(End definition for \DeclareSymbolFontAlphabet. This function is documented on page ??.)

\DeclareSymbolFontAlphabet@

```
995 \def\DeclareSymbolFontAlphabet@#1#2#3{%
We use the switch \if@tempswa to decide if we can declare this symbol font alphabet.
996   \@tempswatrue
First check if #2 is known to be a symbol font
997   \expandafter\in@\csname sym#2\expandafter\endcsname
998   \expandafter{\group@list}%
999   \ifin@
Check if #1 is defined as a math alphabet defined via \DeclareMathAlphabet:
1000   \expandafter\in@\expandafter#1\expandafter{\alpha@list}%
1001   \ifin@
If so remove it from the \alpha@list and from all math version macros.
1002   \@font@info{Redeclaring math alphabet \string#3}%
1003   \toks@{}%
1004   \def\alpha@elt##1##2##3{%
1005     \ifx##1#1\else\addto@hook\toks@{\alpha@elt##1##2##3}\fi}%
1006   \alpha@list
1007   \xdef\alpha@list{\the\toks@}%

```



Now we loop over all versions and remove the math alphabet:

```

1008     \def\version@elt##1{%
1009         \begingroup
1010         \toks@{}%
1011         \def\getanddefine@fonts####1####2{%
1012             \addto@hook\toks@{\getanddefine@fonts####1####2}}%
1013         \def\install@mathalphabet####1####2{%
1014             \ifx####1#1\else
1015                 \addto@hook\toks@{\install@mathalphabet
1016                                     ####1{####2}}\fi}%
1017         ##1%
1018         \xdef##1{\the\toks@}%
1019     \endgroup
1020 }%
1021 \version@list
1022 \else

```

If #3 is not defined as a math alphabet check if it is defined at all:

```

1023     \expandafter\ifx
1024     \csname\expandafter\@gobble\string#1\space\endcsname
1025     \relax

```

If it is undefined, fine otherwise check if it is a math alphabet defined via `\DeclareSymbolFontAlphabet`:

```

1026     \else
1027     \edef\reserved@a{%
1028         \noexpand\in@{\string\use@mathgroup}{\meaning#1}}%
1029     \reserved@a
1030     \ifin@
1031     \@font@info{Redeclaring math alphabet \string#3}%
1032     \else

```

Since the command #3 is defined to be something which is not a math alphabet we have to skip redefining it.

```

1033     \@tempswafalse
1034     \@latex@error{Command ‘\string#3’ already defined}\@eha
1035     \fi
1036     \fi
1037     \fi
1038     \else

```

Since the symbol font is not known we better skip defining this alphabet.

```

1039     \@tempswafalse
1040     \@latex@error{Unknown symbol font ‘#2’}\@eha
1041     \fi
1042     \if@tempswa

```

When we reach this point we are allowed to define #1 to be a symbol font math alphabet. This means that we have to set it to

`\use@mathgroup <math-settings> \sym<name>`

The `<math-settings>` are the one for the encoding that is used in the font shape where `\sym<name>` is pointing to. This means that we have to get it from the information stored in `\group@list`. Thus we loop through that list after defining `\group@elt` in a suitable way.

```

1043     \def\group@elt##1##2{%

```

```

1044     \expandafter\ifx\csname sym#2\endcsname##1%
1045     \expandafter\reserved@a\string##2\@nil
1046     \fi}%
1047     \def\reserved@a##1##2/##3\@nil{%
1048     \def\reserved@a{##2}}%
1049     \group@list
1050     \toks@{\relax\ifmmode \else \non@alpherr#1\fi}%
1051     \edef#1{\the\toks@
1052             \noexpand\use@mathgroup
1053             \expandafter\noexpand\csname M@\reserved@a\endcsname
1054             \csname sym#2\endcsname}%
1055     \def#3{\protect#1}%
1056     \fi
1057 }
1058 \@onlypreamble\DeclareSymbolFontAlphabet@
1059 </2ekernel>

```

*(End definition for \DeclareSymbolFontAlphabet@. This function is documented on page ??.)*

# File w

## ltfssini.dtx

This file contains the top level L<sup>A</sup>T<sub>E</sub>X interface to the font selection scheme commands. See other parts of the L<sup>A</sup>T<sub>E</sub>X distribution, or *The L<sup>A</sup>T<sub>E</sub>X Companion* for higher level documentation of these commands.

## 1 NFSS Initialisation

Finally, there are six commands that are to be used in L<sup>A</sup>T<sub>E</sub>X and that we will therefore protect against expansion at the wrong point: `\fontfamily`, `\fontseries`, `\fontshape`, `\fontsize`, `\selectfont`, and `\mathversion`.

```
1 \langle*2ekernel\rangle
```

### 1.1 Providing math *versions*

L<sup>A</sup>T<sub>E</sub>X provides two *versions*. We call them *normal* and *bold*, respectively.

```
2 \DeclareMathVersion{normal}
3 \DeclareMathVersion{bold}
```

Now we define the standard font change commands. We don't allow the use of `\rmfamily` etc. in math mode.

(Actually most are now defined further down in the file.)

First the changes to another *family*:

```
4 %\DeclareRobustCommand\rmfamily
5 %      {\not@math@alphabet\rmfamily\mathrm
6 %      \fontfamily\rmdefault\selectfont}
7 %\DeclareRobustCommand\sffamily
8 %      {\not@math@alphabet\sffamily\mathsf
9 %      \fontfamily\sfddefault\selectfont}
10 %\DeclareRobustCommand\ttfamily
11 %      {\not@math@alphabet\ttfamily\mathtt
12 %      \fontfamily\ttdefault\selectfont}
```

Then the commands changing the *series*:

```
13 %\DeclareRobustCommand\bfseries
14 %      {\not@math@alphabet\bfseries\mathbf
15 %      \fontseries\bfdefault\selectfont}
16 %\DeclareRobustCommand\mdseries
17 %      {\not@math@alphabet\mdseries\relax
18 %      \fontseries\mddefault\selectfont}
19 \DeclareRobustCommand\upshape
20      {\not@math@alphabet\upshape\relax
21      \fontshape\updefault\selectfont}
```

Then the commands changing the *shape*:

```
22 \DeclareRobustCommand\slshape
23      {\not@math@alphabet\slshape\relax
24      \fontshape\sldefault\selectfont}
25 \DeclareRobustCommand\scshape
26      {\not@math@alphabet\scshape\relax
```

```

27         \fontshape\scdefault\selectfont}
28 \DeclareRobustCommand\itshape
29     {\not@math@alphabet\itshape\mathit
30     \fontshape\itdefault\selectfont}

```

## 2 Custom series settings for main document families

This section was introduced 2020/02/02 and for now we support a full rollback (may need splitting later).

```

31 </2ekernel>
32 <*2ekernel | latexrelease>
33 <latexrelease>\IncludeInRelease{2020/02/02}%
34 <latexrelease>          {\DeclareFontSeriesDefault}{Custom series}%

```

One problem with the NFSS approach of handling the series axis turned out to be that (especially with respect to “boldness”) different font families implemented different strategies. For example, with Computer Modern fonts you normally only have **bx** whereas most PostScript fonts offered only **b** but not **bx**. As a result L<sup>A</sup>T<sub>E</sub>X’s standard setting for `\bfdefault` didn’t work with such fonts, but if it got changed to produce **b**, then that didn’t work with Computer Modern if the fonts got combined (e.g., using Computer Modern Typewriter with such fonts).

The solution back then was to provide substitution rules in the font `.fd` such that if a **bx** series got requested the **b** series got used. While this works in that particular case, it isn’t a very general solution. For example, if you happen to have a font family that has several weights you may want to typeset the whole document in a somewhat lighter or darker font but if you then modify `\mddefault` to allow for this, then of course your change only works with that particular family but not with the typewriter or sans serif family you also want to use.

A better solution was provided by the `mweights` package by Bob Tennent that offers defaults on the level of the three main font families in the document: for “rm”, “sf” and “tt” so that font packages could define defaults for the sans serif document font by providing `\bfseries@sf` which then was used when `\bfseries` got executed and the current family was the `\sffamily`.

`\DeclareFontSeriesDefault`

We now support this concept directly from within L<sup>A</sup>T<sub>E</sub>X and for use in font packages (or the document preamble) we offer `\DeclareFontSeriesDefault`. This declaration takes three arguments:

**document family interface:** Can either be `rm`, `sf` or `tt`. This is optional and if not given the overall default.

**document series interface:** Can be `md` or `bf`.

**series value:** This is the value that is going to be used with the combination is requested.

For example, `\DeclareFontSeriesDefault[rm]{bf}{sb}` would use **sb** (semi-bold) when `\rmfamily \bfseries` is asked for.

If used without the optional argument, e.g., `\DeclareFontSeriesDefault{bf}{b}` then this is like redefining `\bfdefault` or `\mddefault`.

If some family specific defaults aren't given, e.g. if there are no declarations for, say, `tt` then the format defaults of `\mddefault` and `\bfdefault` are assumed. If those are later changed this is *not* reflected!<sup>14</sup>

`\DeclareFontSeriesDefault` The command to declare font series defaults for the “rm”, “sf” or “tt” family.

```
35 \let\DeclareFontSeriesDefault\@undefined      % for rollback
36 \newcommand\DeclareFontSeriesDefault[3][]{%
37   \def\reserved@a{#1}%
```

No optional argument: set up general default.

```
38   \ifx\reserved@a\@empty
39     \ifcsname #2series\endcsname              % supported are
40                                           % \[md/bf]default
```

Adding `\@empty` allows us to detect if the default gets redefined with `\renewcommand` or `\def` by the user.

```
41     \expandafter\def
42       \csname #2default\endcsname{#3\@empty}%
43     \expandafter\def
44       \csname #2default@previous\endcsname{#3\@empty}%
45   \else
46
47     \@latex@error{Wrong syntax for \string\DeclareFontSeriesDefault}%
48     {Mandatory first argument must be 'md' or 'bf'.}
```

Optional argument given, set up specific default.

```
49   \else
50     \ifcsname #2series@#1\endcsname          % supported are
51                                           % \[md/bf]series@[rm/sf/tt]
52     \expandafter\edef
53       \csname #2series@#1\endcsname{#3}%
```

If the interface is used we remove the frozen kernel default. This way, we know that something was explicitly set up (even if the setup has the same value as the default).

```
54     \expandafter\let
55       \csname #2series@#1@kernel\endcsname\@undefined
56   \else
57     \@latex@error{Wrong syntax for \string\DeclareFontSeriesDefault}%
58     {Optional argument must be 'rm', 'sf', or 'tt'. \MessageBreak
59       Mandatory first argument must be 'md' or 'bf'.}
60   \fi
61 \fi
62 }
```

*(End definition for `\DeclareFontSeriesDefault`. This function is documented on page ??.)*

`\mdseries@rm` We initialize the family specific default at the end of the format generation. Later on they may get overwritten in the preamble or a package via `\DeclareFontSeriesDefault` (or possibly directly).

`\mdseries@sf` Conceptual change: The `\bfdefault` will be `b` not `bx` because that is what it should be really for nearly every font except Computer/Latin Modern.

`\mdseries@tt`

<sup>14</sup>I see no easy way to achieve this without compromising compatibility with existing packages that currently use `mweights` and directly define (some) of the `\mdseries@...` commands but not others.

To account for the fact that by default we typeset in CM or LM we set up the `\bfseries@..` defaults to use `bx` instead.

This means that it behaves like before because if the default fonts are used then `\bfseries@rm` etc kick in and make `\textbf` use `bx`. However, if the font gets changed then `\bfdefault` will get used.

```
63 \def\bfseries@rm{bx}
64 \def\bfseries@sf{bx}
65 \def\bfseries@tt{bx}
```

Frozen version of the kernel defaults so we can see if they have changed.

```
66 \let\bfseries@rm@kernel\bfseries@rm
67 \let\bfseries@sf@kernel\bfseries@sf
68 \let\bfseries@tt@kernel\bfseries@tt
```

The default for the medium series is `m` and this will be interpreted as resetting both weight and width. To reset only one of them the virtual value `?m` and `m?` are available.

```
69 \def\mdseries@rm{m}
70 \def\mdseries@sf{m}
71 \def\mdseries@tt{m}
```

*(End definition for `\mdseries@rm` and others. These functions are documented on page ??.)*

`\series@change@debug` For debugging, but right now none of this code is extracted. The idea is to have a separate package with debugging code one day.

```
72 <*debug>
73 \let\series@change@debug\typeout
74 \let\series@change@debug\@gobble
75 </debug>
```

*(End definition for `\series@change@debug`. This function is documented on page ??.)*

`\prepare@family@series@update` This is core command that prepares for the family update. The big difference to the documented code above is that the nested `\ifx` statements seem to be missing. Instead we loop through an internal list that holds the names of the three meta families. This approach allows us to extend the mechanism at a later stage to allow for additional named meta families.

Here is the current definition of that list:

```
\@meta@family@list
76 \def\@meta@family@list{\@elt{rm}\@elt{sf}\@elt{tt}}

77 \def\prepare@family@series@update#1#2{%

78   \if@forced@series
79   <+debug> \series@change@debug{No series preparation (forced \f@series)\on@line}%
80     \fontfamily#2%
81   \else
82   <+debug> \series@change@debug{Preparing for switching to #1 (#2)\on@line}%
83     \expand@font@defaults
```

We prepare for changing the current series. We have to find it before changing the family as discussed above.

```
84   \let\target@series@value\@empty
85   \def\target@meta@family@value{#1}%
```

As the very last item in the meta family list we add `\@elt{??}` and define this pseudo meta family to be the current font family. So if none of the real meta families matched then this will match. This will cover the following case:

- `\bfseries` is called for a family using `bx` (e.g., CMR)
- Switch to a font family that is none of the meta families, e.g., via `\fontfamily{ptm}\selectfont`
- Then none of the real meta families, match but the final `\@elt{??}` will.
- Therefore if the current series is `\mddefault` or `\bfdefault` it will be detected and the corresponding target series selected.

```
86 \expandafter\edef\csname ??def@ult\endcsname{\f@family}%
```

To find it we loop over the meta family list with a suitable definition of `\@elt`.

```
87 \let\@elt\update@series@target@value
88 \@meta@family@list
```

Last resort pseudo meta family. Will only be looked at if none of the real ones have matched.

```
89 \@elt{??}%
90 \let\@elt\relax
```

That will figure out the correct series value to use without updating it. Now we can change the family.

```
91 \fontfamily#2%
```

After that we update the series. That code is again like the one above.

```
92 \ifx\target@series@value\@empty
93 <+debug> \series@change@debug{Target series still empty ...}%
94 \else
95 \ifx \f@series\target@series@value
96 <+debug> \series@change@debug{Target series unchanged:
97 <+debug> \f@series \space = \target@series@value}%
98 \else
99 \maybe@load@fontshape
100 <+debug> \series@change@debug{Target series:
101 <+debug> \f@series \space -> \target@series@value}%
```

The `\target@series@value` may contain something like `cm` (coming from a default) and so we can't directly assign it to `\f@series` we have to drop any surplus `m` first.

```
102 % \let\f@series\target@series@value
103 \series@maybe@drop@one@m\target@series@value\f@series
104 \fi
105 \fi
106 \fi
107 }
```

*(End definition for `\prepare@family@series@update` and `\@meta@family@list`. These functions are documented on page ??.)*

`\update@series@target@value` In this macro used in the look you basically find the nested `\ifx`s from the outline above. The only difference is that it is parameterized instead of being written out and only for one block of tests because the code is called repeatedly when looping over the meta family list. From the list we get each meta family name in turn.

```
108 \def\update@series@target@value#1{%
```

There is one additional test at the beginning, because the list contains all meta families and we need to ignore the case where current one from the list and target one are identical.

```

109 \def\reserved@a{#1}%
110 \ifx\target@meta@family@value\reserved@a % rm -> rm do nothing
111 \else
112 <+debug> \series@change@debug{Trying to match #1: \csname#1def@ult\endcsname
113 <+debug> \space = \f@family\space ?}%

```

We only “do” something if the current font family matches the current meta family.

```

114 \expandafter\ifx\csname#1def@ult\endcsname\f@family

```

If that’s the case we know that this is the block that applies (only one meta family can match). So to speed things up we change \@elt so that the rest of the loop gets gobbled.

```

115 \let\@elt\@gobble

```

Then we try to find the right new value for the series (as explained above). The two macros defined first are only there because we now need to use \csname and this way the code will be a little faster.

```

116 \expandafter\let\expandafter\reserved@b
117 \csname mdseries@\target@meta@family@value\endcsname
118 \expandafter\let\expandafter\reserved@c
119 \csname bfseries@\target@meta@family@value\endcsname
120 <+debug>\series@change@debug{Targets for mdseries and bfseries:
121 <+debug> \reserved@b\space and \reserved@c}%

```

This here is now identical to the nested \ifx block from the outline, except that it there appeared twice in \rmfamily. This is now covered by looping and stopping the loop when a match was found.

We have to sanitize the default value first because it may contain something like mc and that would never match \f@series because there it would be called c with the m dropped. It would be probably better to do that differently these days, but it is hard to adjust without causing a lot of issues, so we do the dropping in various places instead.

```

122 \expandafter\series@maybe@drop@one@m
123 \csname mdseries@#1\endcsname\reserved@d
124 \ifx\reserved@d\f@series
125 <+debug> \series@change@debug{mdseries@#1 matched -> \reserved@b}%
126 \let\target@series@value\reserved@b
127 \else

```

Again do some sanitizing.

```

128 \expandafter\series@maybe@drop@one@m
129 \csname bfseries@#1\endcsname\reserved@d
130 \ifx\reserved@d\f@series
131 <+debug> \series@change@debug{bfseries@#1 matched -> \reserved@c}%
132 \let\target@series@value\reserved@c
133 \else\ifx\f@series\mdddef@ult \let\target@series@value\reserved@b
134 <+debug> \series@change@debug{mdddef@ult matched -> \reserved@b}%
135 \else\ifx\f@series\bfdef@ult \let\target@series@value\reserved@c
136 <+debug> \series@change@debug{bfdef@ult matched -> \reserved@c}%
137 \fi\fi\fi\fi
138 \fi
139 \fi
140 }

```

(End definition for \update@series@target@value. This function is documented on page ??.)



`\init@series@setup` This is code to be run at begin document ...

```
141 \def\init@series@setup{%
```

We only want `bx` in `\bfseries@rm` if the roman font is Computer Modern or Latin Modern, otherwise it should be `b`. It was set to `bx` in the kernel so that any font use with the default families in the preamble get this value. Now at the real document start we check if the fonts have been changed. If there was a `\DeclareFontSeriesDefault` declaration or `\bfseries@rm` was directly altered then it differs from `\bfseries@rm@kernel` and we do nothing. Otherwise we check if `\rmdefault` is one of the CM/LM font families and if so we keep `bx` otherwise we change it to `b`.

This approach doesn't cover one case: CM/LM got changed to a different family that supports `bx`, but the support package for that family used `\def\bfseries@rm{bx}` instead of using `\DeclareFontSeriesDefault`. In that case the code here changes it to `b`. Solution: use the `\DeclareFontSeriesDefault` interface.

```
142 \ifx\bfseries@rm@kernel\bfseries@rm
143   \expandafter\in@\expandafter{\rmdefault}%
144   {cmr,cmss,cmtt,lcms,lcmtt,lmr,lmss,lmtt}%
145 \ifin@ \else \def\bfseries@rm{b}\fi\fi
```

Same approach for `\bfseries@sf` and `\bfseries@tt`:

```
146 \ifx\bfseries@sf@kernel\bfseries@sf
147   \expandafter\in@\expandafter{\sfdefault}%
148   {cmr,cmss,cmtt,lcms,lcmtt,lmr,lmss,lmtt}%
149 \ifin@ \else \def\bfseries@sf{b}\fi\fi
150 \ifx\bfseries@tt@kernel\bfseries@tt
151   \expandafter\in@\expandafter{\ttdefault}%
152   {cmr,cmss,cmtt,lcms,lcmtt,lmr,lmss,lmtt}%
153 \ifin@ \else \def\bfseries@tt{b}\fi\fi
```

If the document preamble has changed the `\familydefault` or if the if the `\rmdefault` contains a new font family, we may have to adjust the series defaults accordingly, before starting typesetting.

Similarly, if the user has changed the `\mddefault` or the medium series for the family selected as document font we may also have to adjust the `\seriesdefault`.

On the other hand if the document font is still CM or LM then `\bfdefault` is wrong, because it is now saying `b` and not `bx` as it should for such fonts.

To fix all this we first run `\reset@font` (the internal kernel name for `\normalfont`). This will set up the document encoding, family, series and shape based on the current values of `\encodingdefault`, `\familydefault`, `\seriesdefault` and `\shapedefault`. However, if the family (from `\familydefault`) has special medium default we should switch to that (and not use what is current value from `\seriesdefault`). This can be achieved by afterwards calling `\mediumseries` and then changing `\seriesdefault` to the now current series value (in `\f@series`).

But what should happen if `\seriesdefault` got explicitly changed? In that case the explicit change should survive and we should not alter `\seriesdefault`. This is solved by comparing the current value of `\seriesdefault` with a kernel version saved in the format and if they differ we do not call `\mdseries` or change `\seriesdefault`.

```
154 \reset@font
155 \ifx\seriesdefault\seriesdefault@kernel
156   \mdseries
157   \let\seriesdefault\f@series
158 \fi
159 }%
```

(End definition for `\init@series@setup`. This function is documented on page ??.)

As the kernel code now implements the same functionality as `mweights`, albeit internally coded slightly differently, that package shouldn't be loaded any more. We therefore pretend that it already got loaded. Thus, a font package that tries to load it and then sets `\mdseries@.`, etc. will continue to work but will now use the kernel code.

Of course, mid-term such package should probably use `\DeclareFontSeriesDefault` instead of making using low-level definitions.

```

160 \expandafter\let\csname ver@mweights.sty\endcsname\fmtversion
161 </2ekernel | latexrelease>
162 <latexrelease>\EndIncludeInRelease
163 <latexrelease>\IncludeInRelease{0000/00/00}%
164 <latexrelease>          {\DeclareFontSeriesDefault}{Custom series}%
165 <latexrelease>
166 <latexrelease>\let\DeclareFontSeriesDefault\@undefined
167 <latexrelease>\let\bfseries@rm\@undefined
168 <latexrelease>\let\bfseries@sf\@undefined
169 <latexrelease>\let\bfseries@tt\@undefined
170 <latexrelease>\let\bfseries@rm@kernel\@undefined
171 <latexrelease>\let\bfseries@sf@kernel\@undefined
172 <latexrelease>\let\bfseries@tt@kernel\@undefined
173 <latexrelease>\let\mdseries@rm\@undefined
174 <latexrelease>\let\mdseries@sf\@undefined
175 <latexrelease>\let\mdseries@tt\@undefined
176 <latexrelease>\expandafter\let\csname ver@mweights.sty\endcsname\@undefined
177 <latexrelease>
178 <latexrelease>\let\@meta@family@list\@undefined
179 <latexrelease>\let\prepare@family@series@update\@undefined
180 <latexrelease>\let@update@series@target@value\@undefined
181 <latexrelease>

```

This is always called in `\document` so don't make it undefined.

```

182 <latexrelease>\let\init@series@setup\relax
183 <latexrelease>
184 <latexrelease>\EndIncludeInRelease
185 <*2ekernel>
186 </2ekernel>
187 <*2ekernel | latexrelease>
188 <latexrelease>\IncludeInRelease{2020/10/01}%
189 <latexrelease>          {\bfseries}{Custom series with hooks}%

```

`\expand@font@defaults` The family specific defaults are fully expanded, i.e., they are defined via `\edef` inside `\DeclareFontSeriesDefault`. However, the overall defaults, e.g., `\bfdefault` may have been redefined by the user and thus may not be fully expanded. So to enable reliable comparison we make expanded versions of them. That we rerun each time. The alternative would be to only allow for changes before begin document.

```

\rm@def@ult
\sfb@def@ult
\tt@def@ult
\md@def@ult
\bf@def@ult
190 \def\expand@font@defaults{%
191   \edef\rmdef@ult{\rmdefault}%
192   \edef\sfbdef@ult{\sfdefault}%
193   \edef\ttdef@ult{\ttdefault}%

```

The series defaults may contain some surplus m that we need to drop here.

```

194   \series@maybe@drop@one@m\bfdefault\bfdef@ult
195   \series@maybe@drop@one@m\mddefault\mddef@ult

```

Formats that set up parallel fonts, e.g., for Japanese, can use this hook to add additional code here.

```
196 \UseHook{expand@font@defaults}%
197 }
```

(End definition for `\expand@font@defaults` and others. These functions are documented on page ??.)

**\bfseries** This document command switches to the bold series.

```
198 \DeclareRobustCommand\bfseries{%
199 \not@math@alphabet\bfseries\mathbf
```

In the original NFSS definition it then called `\fontseries` with the value `\bfdefault`. In the new scheme we have more alternatives and therefore check if the current family (`\f@family`) is the current `\rmdef@ult`, `\sfdef@ult` or `\ttdef@ult` and then select the correct family default in that case.

```
200 \expand@font@defaults
```

If `\bfdefault` and `\bfdefault@previous` are different then the default got changed directly through the legacy interface (i.e., via `\def` or `\renewcommand`. In that case we reset all meta family defaults so that the document behaves like it was the case before the new mechanism was introduced.

```
201 \ifx\bfdefault\bfdefault@previous\else
```

We add `\@empty` and then let `\bfdefault@previous` to `\bfdefault` so that we can detect any further change.

```
202 \expandafter\def\expandafter\bfdefault
203 \expandafter{\bfdefault\@empty}%
204 \let\bfdefault@previous\bfdefault
```

And we reset the meta family defaults (`\bfdef@ult` is an expanded version of `\bfdefault`).

```
205 \let\bfseries@rm\bfdef@ult
206 \let\bfseries@sf\bfdef@ult
207 \let\bfseries@tt\bfdef@ult
```

Formats that set up parallel fonts, e.g., for Japanese, can use this hook to add resets here. Not that this hook is only run when resets are necessary.

```
208 \UseHook{bfseries/defaults}%
209 \fi
210 \ifx\f@family\rmdef@ult \fontseries\bfseries@rm
211 \else\ifx\f@family\sfdef@ult \fontseries\bfseries@sf
212 \else\ifx\f@family\ttdef@ult \fontseries\bfseries@tt
```

If not `\bfdefault` is used.

```
213 \else \fontseries\bfdefault
214 \fi\fi\fi
```

This hook in contrast is always executed.

```
215 \UseHook{bfseries}%
216 \selectfont
217 }
```

(End definition for `\bfseries`. This function is documented on page ??.)

`\mdseries` This document command switches to the medium series.

```
218 \DeclareRobustCommand\mdseries{%
219   \not@math@alphabet\mdseries\relax
220   \expand@font@defaults
221   \ifx\mddefault\mddefault@previous\else
222     \expandafter\def\expandafter\mddefault\expandafter{\mddefault\@empty}%
223     \let\mddefault@previous\mddefault
224     \let\mdseries@rm\mddef@ult
225     \let\mdseries@sf\mddef@ult
226     \let\mdseries@tt\mddef@ult
```

Formats that set up parallel fonts, e.g., for Japanese, can use this hook to add resets here.

```
227   \UseHook{mdseries/defaults}%
228   \fi
229   \ifx\f@family\rmdef@ult      \fontseries\mdseries@rm
230   \else\ifx\f@family\sfdef@ult \fontseries\mdseries@sf
231   \else\ifx\f@family\ttdef@ult \fontseries\mdseries@tt
232   \else                        \fontseries\mddefault
233   \fi\fi\fi
234   \UseHook{mdseries}%
235   \selectfont
236 }
```

*(End definition for \mdseries. This function is documented on page ??.)*

`\rmfamily` Here are the document level commands for changing the main font families, or rather, here is a documented outline of the code, the actual code is then streamlined and somewhat generalized.

```
DeclareRobustCommand\rmfamily{%
  \not@math@alphabet\rmfamily\mathrm
```

If families are changed then we have to do a bit more work. In the original NFSS implementation a family change kept encoding, series shape and size unchanged but now we can't any longer simply reuse the current series value. Instead we may have to change it from one family default to the next.

```
\expand@font@defaults
```

We have to do the testing while the current family is still unchanged but we have to do the adjustment of the series after it got changed (because the new family might has different sets of shapes available and we certainly don't want to see substitution going on. So we use `\target@series@value` to hold the target series (if any).

```
\let\target@series@value\@empty
```

Thus, if the current family is the sans family

```
\ifx\f@family\sfdef@ult
```

and if we using the medium series of the sans family

```
\ifx\f@series\mdseries@sf
```

then lets switch to the medium series for the serif family

```
\let\target@series@value\mdseries@rm
```

and if we use the bold series of the sans family switch to the bold default of the serif family:

```
\else\ifx\f@series\bfseries@sf \let\target@series@value\bfseries@rm
```

However, the sans family may not have any specific defaults set, so we also compare with the overall defaults.

```
\else\ifx\f@series\mddef@ult \let\target@series@value\mdseries@rm
\else\ifx\f@series\bfdef@ult \let\target@series@value\bfseries@rm
```

If neither test was true we leave the series alone. This way a special manual setting such as `\fontseries{lc}` is not undone if the family changes (of course there may not be any support for it in the new family but then the NFSS substitution kicks in and sorts it out).

```
\fi\fi\fi\fi
```

We need to do the same if the current family is the typewriter family:

```
\else\ifx\f@family\ttdef@ult
\ifx\f@series\mdseries@tt \let\target@series@value\mdseries@rm
\else\ifx\f@series\bfseries@tt \let\target@series@value\bfseries@rm
\else\ifx\f@series\mddef@ult \let\target@series@value\mdseries@rm
\else\ifx\f@series\bfdef@ult \let\target@series@value\bfseries@rm
\fi\fi\fi\fi
\fi\fi
```

With these preparations for series out of the way we can now change the font family to `\rmdefault`.

```
\fontfamily\rmdefault
```

If `\target@series@value` is still empty there is nothing more to do other than selecting the new family. However, if not then we should update the font series now as well. But there is one further subtle issue. We may not have loaded an `.fd` file for our target font family yet. In the past that was done in `\selectfont` if necessary but since we are now doing all the comparisons in `\fontseries` we need to make sure that the font family specifications are already loaded prior to calling `\fontseries`.

```
\ifx\target@series@value\@empty \else
\maybe@load@fontshape
```

Updating the series in this case means directly changing `\f@series` to the target value. We don't want to go through `\fontseries` because that would apply the mappings and then `bx + b` would keep `bx` instead of changing to `b` as desired. as

```
\let\f@series\target@series@value
\fi
\selectfont}
```

So now for the real definition: most of the code above gets delegated to a helper command `\prepare@family@series@update` so that the definition becomes again fairly short. In addition we add a hook, mainly for our Japanese friends so that the code can be extended prior to the call to `\selectfont`.

```
237 \DeclareRobustCommand\rmfamily{%
238   \not@math@alphabet\rmfamily\mathrm
```

This holds all the code discussed above, first argument is the meta family, i.e., `rm` in this case, and second argument is the default family name, e.g., `cmr` indirectly accessed via `\rmdefault`. This is calling `\fontfamily` and if necessary `\fontseries` as outline above.

```
239   \prepare@family@series@update{rm}\rmdefault
```

Then comes the hook code (by default a no-op) and finally the call to `\selectfont`.

```
240   \UseHook{rmfamily}%
241   \selectfont}
```

The definitions for `\sffamily` and `\ttfamily` are similar, the differences are only in what font families get checked.

```
\sffamily
\ttfamily
242 \DeclareRobustCommand\sffamily{%
243   \not@math@alphabet\sffamily\mathsf
244   \prepare@family@series@update{sf}\sfdefault
245   \UseHook{sffamily}%
246   \selectfont}

247 \DeclareRobustCommand\ttfamily{%
248   \not@math@alphabet\ttfamily\mathtt
249   \prepare@family@series@update{tt}\ttdefault
250   \UseHook{ttfamily}%
251   \selectfont}
```

*(End definition for \rmfamily, \sffamily, and \ttfamily. These functions are documented on page ??.)*

```
rmfamily  Declare the hooks used above.
sffamily  252 \NewHook{rmfamily}
ttfamily  253 \NewHook{sffamily}
normalfont 254 \NewHook{ttfamily}
expand@font@defaults 255 \NewHook{normalfont}
bfseries  256 \NewHook{expand@font@defaults}
bfseries/defaults 257 \NewHook{bfseries}
mdseries  258 \NewHook{bfseries/defaults}
mdseries/defaults 259 \NewHook{mdseries}
260 \NewHook{mdseries/defaults}
```

*(End definition for rmfamily and others. These functions are documented on page ??.)*

```
\@rmfamilyhook
\@sffamilyhook
\@ttfamilyhook
\@defaultfamilyhook
261 \let\@rmfamilyhook\@empty
262 \let\@sffamilyhook\@empty
263 \let\@ttfamilyhook\@empty
264 \let\@defaultfamilyhook\@empty %FMI sort out
```

These four hooks have legacy versions used in 2020/02/02 so we should support them until they aren't any longer used.

By default the hooks do nothing.

(End definition for \rmfamilyhook and others. These functions are documented on page ??.)

```
265 </2ekernel | latexrelease>
266 <latexrelease>\EndIncludeInRelease
267 <latexrelease>\IncludeInRelease{2020/02/02}%
268 <latexrelease>          {\bfseries}{Custom series with hooks}%
269 <latexrelease>
270 <latexrelease>\def\expand@font@defaults{%
271 <latexrelease>  \edef\rmdef@ult{\rmdefault}%
272 <latexrelease>  \edef\sdef@ult{\sfdefault}%
273 <latexrelease>  \edef\ttdef@ult{\ttdefault}%
274 <latexrelease>  \edef\bfdef@ult{\bfdefault}%
275 <latexrelease>  \edef\mddef@ult{\mddefault}%
276 <latexrelease>  \edef\famdef@ult{\familydefault}%
277 <latexrelease>}
278 <latexrelease>
279 <latexrelease>\DeclareRobustCommand\bfseries{%
280 <latexrelease>  \not@math@alphabet\bfseries\mathbf
281 <latexrelease>  \expand@font@defaults
282 <latexrelease>    \ifx\f@family\rmdef@ult      \fontseries\bfseries@rm
283 <latexrelease>    \else\ifx\f@family\sdef@ult    \fontseries\bfseries@sf
284 <latexrelease>    \else\ifx\f@family\ttdef@ult    \fontseries\bfseries@tt
285 <latexrelease>    \else                                \fontseries\bfdefault
286 <latexrelease>    \fi\fi\fi
287 <latexrelease>  \selectfont
288 <latexrelease>}
289 <latexrelease>
290 <latexrelease>\DeclareRobustCommand\mdseries{%
291 <latexrelease>  \not@math@alphabet\mdseries\relax
292 <latexrelease>  \expand@font@defaults
293 <latexrelease>    \ifx\f@family\rmdef@ult      \fontseries\mdseries@rm
294 <latexrelease>    \else\ifx\f@family\sdef@ult    \fontseries\mdseries@sf
295 <latexrelease>    \else\ifx\f@family\ttdef@ult    \fontseries\mdseries@tt
296 <latexrelease>    \else                                \fontseries\mddefault
297 <latexrelease>    \fi\fi\fi
298 <latexrelease>  \selectfont
299 <latexrelease>}
300 <latexrelease>
301 <latexrelease>\DeclareRobustCommand\rmfamily{%
302 <latexrelease>  \not@math@alphabet\rmfamily\mathrm
303 <latexrelease>  \prepare@family@series@update{rm}\rmdefault
304 <latexrelease>  \@rmfamilyhook
305 <latexrelease>  \selectfont}
306 <latexrelease>\DeclareRobustCommand\sffamily{%
307 <latexrelease>  \not@math@alphabet\sffamily\mathsf
308 <latexrelease>  \prepare@family@series@update{sf}\sfdefault
309 <latexrelease>  \@sffamilyhook
310 <latexrelease>  \selectfont}
311 <latexrelease>\DeclareRobustCommand\ttfamily{%
312 <latexrelease>  \not@math@alphabet\ttfamily\mathtt
313 <latexrelease>  \prepare@family@series@update{tt}\ttdefault
314 <latexrelease>  \@ttfamilyhook
315 <latexrelease>  \selectfont}
316 <latexrelease>
```

```

317 <latexrelease>
318 <latexrelease>\EndIncludeInRelease
319 <latexrelease>\IncludeInRelease{0000/00/00}%
320 <latexrelease>          {\bfseries}{Custom series with hooks}%
321 <latexrelease>
322 <latexrelease>\let\expand@font@defaults\@undefined
323 <latexrelease>
324 <latexrelease>\DeclareRobustCommand\bfseries
325 <latexrelease>          {\not@math@alphabet\bfseries\mathbf
326 <latexrelease>          \fontseries\bfdefault\selectfont}
327 <latexrelease>\DeclareRobustCommand\mdseries
328 <latexrelease>          {\not@math@alphabet\mdseries\relax
329 <latexrelease>          \fontseries\mddefault\selectfont}
330 <latexrelease>\DeclareRobustCommand\rmfamily
331 <latexrelease>          {\not@math@alphabet\rmfamily\mathrm
332 <latexrelease>          \fontfamily\rmdefault\selectfont}
333 <latexrelease>\DeclareRobustCommand\sffamily
334 <latexrelease>          {\not@math@alphabet\sffamily\mathsf
335 <latexrelease>          \fontfamily\sfdefault\selectfont}
336 <latexrelease>\DeclareRobustCommand\ttfamily
337 <latexrelease>          {\not@math@alphabet\ttfamily\mathtt
338 <latexrelease>          \fontfamily\ttdefault\selectfont}
339 <latexrelease>
340 <latexrelease>\let\@rmfamilyhook\@undefined
341 <latexrelease>\let\@sffamilyhook\@undefined
342 <latexrelease>\let\@ttfamilyhook\@undefined
343 <latexrelease>
344 <latexrelease>\EndIncludeInRelease
345 <*2ekernel>

```

`\IfFontSeriesContextTF` With the ability for `\bfseries` or `\mdseries` to be mapped to different NFSS axis values it becomes important to have the ability to determine the current context as we can no longer look at `\f@series` to answer a question such as “am I currently typesetting in a bold typeface?”

This is provided by the test `\IfFontSeriesContextTF`. It takes three arguments:

- The context we try to check (either `bf` for bold or `md` for medium, i.e., the same that can go into the first mandatory argument of `\DeclareFontSeriesDefault`),
- what to do if we are in this context (true case) and
- what to do if we are not (false case).

This allows you to define commands like `\IfBold`, e.g.,

```
\newcommand\IfBold[2]{\IfSeriesContextTF{bf}{#1}{#2}}
```

and then do

```
This is \IfBold{bold}{non-bold} text.
```

and get the appropriate result.

```

346 </2ekernel>
347 <*2ekernel | latexrelease>
348 <latexrelease>\IncludeInRelease{2020/10/01}%
349 <latexrelease>          {\IfFontSeriesContextTF}{Font series context}%

```



```

350 \DeclareRobustCommand\IfFontSeriesContextTF[1]{%
351   \expand@font@defaults

```

In the beginning we haven't found the context we are looking for.

```

352   \@font@series@contextfalse

```

We store the requested context away for use in the tests.

```

353   \def\requested@test@context{#1}%

```

The next definition is there to ensure that get a final match during testing even if the current family is non of the meta families (`rm`, `sf` or `tt`). This will then basically tests if the current font family matches the overall default.

```

354   \expandafter\edef\csname ??def@ult\endcsname{\f@family}%

```

Then we run through the meta family list (currently containing just the three values) followed by the artificial meta family `??` and test each of them in turn using `\test@font@series@context` as the testing command.

```

355   \let\@elt\test@font@series@context
356   \@meta@family@list
357   \@elt{??}%
358   \let\@elt\relax

```

Following that we evaluate the status of `\if@font@series@context` to determine which of the remaining arguments (true/false case) we have to execute.

```

359   \if@font@series@context
360   \expandafter\@firstoftwo
361   \else
362   \expandafter\@secondoftwo
363   \fi
364 }

```

*(End definition for \IfFontSeriesContextTF. This function is documented on page ??.)*

`\test@font@series@context` This tests the context (stored in `\requested@test@context`) and updates the boolean if the right context is found.

```

365 \def\test@font@series@context#1{%

```

First task is to figure out whether the current family matches `\rmfamily`, `\sffamily`, etc. so in `\reserved@a` we store the value of `\rmdef@ult` (or whatever the given meta family is) and compare that to `\f@family`.

```

366   \edef\reserved@a{\csname #1def@ult\endcsname}%
367   \ifx\f@family\reserved@a

```

If they match we have found the right meta family so we don't need to test any of the remaining meta family and therefore change `\@elt` to `\@gobble`.

```

368   \let\@elt\@gobble

```

Now we have to test if `\f@series` matches the requested context (e.g., whether `\bfseries@rm` has that value if the current meta family is `rm` and we are looking for the `bf` context).

```

369   \expandafter\ifx
370   \csname\requested@test@context series@#1\endcsname\f@series

```

If yes we change the boolean and are done.

```

371   \@font@series@contexttrue

```

If not then maybe the reason is that nothing special was set up for that meta family so we also check now check if `\f@series` matches the overall default (e.g., `\bfdef@ult` if we are looking for the bold context). If that matches we change the boolean.

```

372     \else
373         \expandafter\ifx
374             \csname\requested@test@context def@ult\endcsname\f@series
375             \@font@series@contexttrue
376     \fi\fi\fi
377 }

```

(End definition for `\test@font@series@context`. This function is documented on page ??.)

`\if@font@series@context` The boolean to signal if we found the requested font series context.

```

378 \newif\if@font@series@context

```

(End definition for `\if@font@series@context`. This function is documented on page ??.)

```

379 </2ekernel | latexrelease>
380 <latexrelease>\EndIncludeInRelease
381 <latexrelease>\IncludeInRelease{0000/00/00}%
382 <latexrelease>                {\IfFontSeriesContextTF}{Font series context}%
383 <latexrelease>
384 <latexrelease>\let\IfFontSeriesContextTF\@undefined
385 <latexrelease>\let\test@font@series@context\@undefined
386 <latexrelease>\let\if@font@series@context\@undefined
387 <latexrelease>\let\@font@series@contexttrue\@undefined
388 <latexrelease>\let\@font@series@contextfalse\@undefined
389 <latexrelease>\EndIncludeInRelease
390 <*2ekernel>

```

### 3 Supporting nested emphasis

By default  $\text{\LaTeX}_{2\epsilon}$  supports two levels of nested emphasis: if the current font has an upright shape then it switches to `\itshape` otherwise to `\emminnershape` (which defaults to `\upshape`). This means nested emphasis will oscillate between italic and upright shapes.

Sometimes it would be nice to allow for a more lengthy sequence, but instead of providing a fixed one  $\text{\LaTeX}$  now offers a general mechanism that allows to define arbitrary sequences.

`\DeclareEmphSequence`  
`\emforce`

This declaration expects a comma separated list of (font) change declarations corresponding to increasing levels of emphasis. The mechanism tries to be “smart” and verifies that the declarations actually alter the font. If not it will ignore this level and tries the next one—the assumption being that there was a manual font change in the document to the font that is now supposed to be used for emphasis. Of course, this only works if the declarations in the list actually change the font and not, say, just the color. In such a case one has to use `\emforce` to which directs the mechanism to use the level even if the font attributes haven’t changed.

`\emreset`

If the nesting is so deep, that the specified levels are exhausted then `\emreset` is used as a final set of declarations (which by default returns back to the upright shape). Any additional nesting levels will then reuse the list from its beginning.

`\DeclareEmphSequence` `\DeclareEmphSequence` expects a clist of declaration. Spaces in the argument are dropped to avoid surious spaces in the output. The declarations are additive. At the very end the shape is reset using `\emreset` and `\emforce` so that this case is never skipped.<sup>15</sup> Further nested calls restart at the beginning.

```

391 </2ekernel>
392 <*2ekernel | latexrelease>
393 <latexrelease> \IncludeInRelease{2020/02/02}%
394 <latexrelease> { \DeclareEmphSequence}{Nested emph}%
395 \def\DeclareEmphSequence#1{%
396   \protected@edef\emfontdeclare@clist{\zap@space#1, \@empty\emforce\emreset}%
397 }

```

By default the it is empty, in which case `\eminnershape` is used by L<sup>A</sup>T<sub>E</sub>X.

```

398 \let\emfontdeclare@clist\@empty

```

*(End definition for \DeclareEmphSequence. This function is documented on page ??.)*

`\emrest` Reset the font to upright and upper/lower case. With the default rules using `\shapedefault` does that for us but to be on the safe side we do it like this:

```

399 \DeclareRobustCommand\emreset{\upshape\ulcshape}

```

*(End definition for \emrest. This function is documented on page ??.)*

`\em` The new definition for `\em` (and implicitly `\emph` is like it was before if `\emfontdeclare@clist` is empty.

```

400 \DeclareRobustCommand\em{%
401   \@nomath\em
402   \ifx\emfontdeclare@clist\@empty
403     \ifdim \fontdimen\@ne\font >\z@
404       \eminnershape \else \itshape \fi
405   \else

```

But if not we use the list to decide how to do emphasis.

We use the current font to check if the declarations have any effect, so even a size change is allowed and identified as a modification (but a color change, for example, isn't). So first we save the current status.

```

406   \edef\em@currfont{\csname\curr@fontshape/\f@size\endcsname}%

```

Then we grab the next element from the list and check if it can be used.

```

407   \expandafter\do@emfont@update\emfontdeclare@clist\do@emfont@update
408   \fi
409 }
410 \def\eminnershape{\upshape}

```

*(End definition for \em. This function is documented on page ??.)*

`\do@emfont@update` We know that the list (if not empty) has at least 2 elements separated by a comma, so we pick up the first in #1 and the rest in #2.

```

411 \def\do@emfont@update#1,#2\do@emfont@update{%

```

First action is to alter the list and move the first entry to the end

```

412   \def\emfontdeclare@clist{#2,#1}%

```

<sup>15</sup>Maybe we should not add `\emforce` but allow that case to be skipped as well. Of course, that might result in an endless loop if somebody defines a sequence without any font change and without `\emforce` but ...

Then we execute current declaration. Appending `\selectfont` means one can write just `\fontshape{it}}` and that works then too.

```
413 % \typeout{Use: \detokenize{#1}}%
414 #1\selectfont
```

We then compare the current font with our saved version, but with a slight twist: we add `\em@force` at the end of the name. Normally this is empty so has no effect but if there was an `\emforce` as part of `#1` it will append a `/` to the font name (making it invalid) thus this will then always fail the test.

If the test fails we are done and the declarations will be used. Otherwise we will try the next declaration in the sequence.

```
415 \expandafter\ifx\csname \curr@fontshape/\f@size\em@force
```

For the comparison with `\ifx` we have to expand `\em@currfont` once as the relevant info is inside.

```
416 \expandafter\endcsname
417 \em@currfont
418 \expandafter\do@emfont@update\emfontdeclare@clist\do@emfont@update
```

If `\emforce` was used, we have to undo its effect:

```
419 \else
420 \let\em@force\@empty
421 \fi
422 }
```

*(End definition for `\do@emfont@update`. This function is documented on page ??.)*

`\emforce` The definition of `\emforce` is simple: change `\em@force` to make the above test always  
`\em@force` invalid.

```
423 \protected\def\emforce{\def\em@force{}}
424 \let\em@force\@empty
425 </2ekernel | latexrelease>
426 <latexrelease>\EndIncludeInRelease
```

*(End definition for `\emforce` and `\em@force`. These functions are documented on page ??.)*

`\em` These are the older definitions for `\em`, prior to 2020.

`\emminnershape` We also have to define the *emphasize* font change command (i.e. `\em`). This command will look is the current font is sloped (i.e. has a positive `\fontdimen1`) and will then select either `\upshape` or `\itshape`.

```
427 <latexrelease>\IncludeInRelease{2015/01/01}{\DeclareEmphSequence}{Nested emph}%
428 <latexrelease>\let\DeclareEmphSequence\@undefined
429 <latexrelease>\let\emfontdeclare@clist\@undefined
430 <latexrelease>\let\emreset\@undefined
431 <latexrelease>\let\do@emfont@update\@undefined
432 <latexrelease>\let\emforce\@undefined
433 <latexrelease>\let\em@force\@undefined
434 <latexrelease>
435 <latexrelease>\DeclareRobustCommand\em
436 <latexrelease>{\@nomath\em \ifdim \fontdimen\@ne\font >\z@
437 <latexrelease>\emminnershape \else \itshape \fi}%
438 <latexrelease>\EndIncludeInRelease
439 <latexrelease>
440 <latexrelease>\IncludeInRelease{0000/00/00}{\DeclareEmphSequence}{Nested emph}%
```

```

441 \<latexrelease>\DeclareRobustCommand\em
442 \<latexrelease>          {\@nomath\em \ifdim \fontdimen\@ne\font >\z@
443 \<latexrelease>          \upshape \else \itshape \fi}%
444 \<latexrelease>\let\eminnershape\@undefined
445 \<latexrelease>\EndIncludeInRelease
446 \<*2ekernel>

```

(End definition for \em and \eminnershape. These functions are documented on page ??.)

**\not@math@alphabet** This function generates an error message when it is called in math mode. The same function should be defined in `newfont.sty`.

```

447 \def\not@math@alphabet#1#2{%
448   \relax
449   \ifmmode
450     \@latex@error{Command \noexpand#1invalid in math mode}%
451     {%
452       Please
453       \ifx#2\relax
454         define a new math alphabet^^J%
455         if you want to use a special font in math mode%
456       \else

```

We have to a \noexpand below to prevent expansion of #2. In case of #1 we can omit this (due to the current definition of robust commands since they do come out right there :-).

```

457         use the math alphabet \noexpand#2instead of
458         the #1command%
459       \fi
460     .
461   }%
462 \fi}

```

(End definition for \not@math@alphabet. This function is documented on page ??.)

Finally we provide two abbreviations to switch to the L<sup>A</sup>T<sub>E</sub>X versions.

```

463 \DeclareRobustCommand\boldmath{\@nomath\boldmath
464   \mathversion{bold}}
465 \DeclareRobustCommand\unboldmath{\@nomath\unboldmath
466   \mathversion{normal}}

```

Here we switch to the default math version by defining the internal macro \math@version. We dare not to call \mathversion at this place because this would call \glb@settings.

```

467 \def\math@version{normal}

```

### 3.1 Legacy

We start by defining a few macros that are part of standard L<sup>A</sup>T<sub>E</sub>X's user interface. The use of these functions is not encouraged, but they will allow to process older documents without changes to the source.

**\newfont**

```

468 \def\newfont#1#2{\@ifdefinable#1{\font#1=#2\relax}}

```

(End definition for \newfont. This function is documented on page ??.)

`\symbol`

```
469 </2ekernel>
470 <*2ekernel | latexrelease>
471 <latexrelease>\IncludeInRelease{2020/10/01}%
472 <latexrelease>{\symbol}{XeTeX change for math}%
473 \ifdefined\XeTeXversion
474 \DeclareRobustCommand\symbol[1]{\Ucharcat#1 12\relax}
475 \else
476 \DeclareRobustCommand\symbol[1]{\char#1\relax}
477 \fi
478 </2ekernel | latexrelease>
479 <latexrelease>\EndIncludeInRelease
480 <latexrelease>\IncludeInRelease{0000/00/00}%
481 <latexrelease>{\symbol}{XeTeX change for math}%
482 <latexrelease>
483 <latexrelease>\DeclareRobustCommand\symbol[1]{\char#1\relax}
484 <latexrelease>
485 <latexrelease>\EndIncludeInRelease
486 <*2ekernel>
```

*(End definition for \symbol. This function is documented on page ??.)*

## 3.2 Miscellaneous

`\@setfontsize` This abbreviation is used by L<sup>A</sup>T<sub>E</sub>X's user level size changing commands, such as `\large`.  
`\@setsize`

```
487 \def\@setfontsize#1#2#3{\@nomath#1%
```

For the benefit of people relying on keeping the name of the current font command saved in `\@currsize` we define it. To ensure that `\@setfontsize` keeps being robust we omit this assignment during times where `\protect` differs from `\@typeset@protect`.

```
488 \ifx\protect\@typeset@protect
489 \let\@currsize#1%
490 \fi
491 \fontsize{#2}{#3}\selectfont}
```

For compatibility we also define `\@setsize` the 209 command

```
492 <*compat>
493 \def\@setsize#1#2#3#4{\@setfontsize#1{#4}{#2}}
494 </compat>
```

*(End definition for \@setfontsize and \@setsize. These functions are documented on page ??.)*

`\hexnumber@` To set up L<sup>A</sup>T<sub>E</sub>X's special math character definitions we first provide a macro to generate hexadecimal numbers. It is a rather simple `\ifcase`.

```
495 \def\hexnumber@#1{\ifcase\number#1
496 0\or 1\or 2\or 3\or 4\or 5\or 6\or 7\or 8\or
497 9\or A\or B\or C\or D\or E\or F\fi}
```

*(End definition for \hexnumber@. This function is documented on page ??.)*

`\nfss@text` In its simplest form `\nfss@text` is an `\mbox`. This will produce unbreakable text outside math and inside math you will get text with the same fonts as outside. The only drawback is that such item won't change sizes in subscripts. But this behavior can be easily changed.

With the `amstex` style option one will get a sub style called `amstext` which will redefine the `\nfss@text` macro to produce correct text in all sizes.

We have to use `\def` instead of the shorter `\let` since `\mbox` is undefined when we reach this point.

```
498 \def\nfss@text#1{\mbox{#1}}
```

(End definition for `\nfss@text`. This function is documented on page ??.)

**\copyright** The definition of `\copyright` was changed so that it works in other type styles, and to make it robust. We leave the family untouched so that the copyright notice will come out differently if a different font family is in use. This command is commented out, since it is now defined in `ltoutenc.dtx`.

```
499 %\DeclareRobustCommand\copyright
500 %    {\oalign{\hfil
501 %        \raise.07ex\hbox{\mdseries\upshape c}\hfil\crcr
502 %        \mathhexbox20D}}}
```

(End definition for `\copyright`. This function is documented on page ??.)

**\normalfont** The macro `\reset@font` is used in L<sup>A</sup>T<sub>E</sub>X to switch to a standard font, in order to initialize the current font in situations where typesetting is done in a new visual context (e.g. in a footnote). We define it here to allow the test for the new L<sup>A</sup>T<sub>E</sub>X version above but nevertheless are able to run all kind of mixtures.

The user interface name for `\reset@font` is `\normalfont`:

```
503 </2ekernel>
504 <*2ekernel | latexrelease>
505 <latexrelease>\IncludeInRelease{2020/02/02}%
506 <latexrelease>                {\normalfont}{Add hook to \normalfont}%
507 \DeclareRobustCommand\normalfont%
```

Instead of calling `\usefont`, as it was done in the past, we inline the code from `\usefont` as we want to add the hook before `\selectfont`, but after all the font attributes are set.

```
508 \fontencoding\encodingdefault
509 \edef\f@family{\familydefault}%
510 \edef\f@series{\seriesdefault}%
511 \edef\f@shape{\shapedefault}%

512 \UseHook{normalfont}%
```

This is the old name for the hook introduced in 2020/02/02. It will be removed in one of the future releases!

```
513 \@defaultfamilyhook          % hookname from 2020/02 will vanish
514 \selectfont}

515 \let\reset@font\normalfont
```

(End definition for `\normalfont` and `\reset@font`. These functions are documented on page ??.)

```
516 </2ekernel | latexrelease>
517 <latexrelease>\EndIncludeInRelease
518 <latexrelease>\IncludeInRelease{0000/00/00}%
519 <latexrelease>                {\normalfont}{Add hook to \normalfont}%
520 <latexrelease>
521 <latexrelease>\DeclareRobustCommand\normalfont
522 <latexrelease>                {\usefont\encodingdefault
523 <latexrelease>                \familydefault
```

```

524 <latexrelease>                \seriesdefault
525 <latexrelease>                \shapedefault
526 <latexrelease>                \relax}
527 <latexrelease>\let\reset@font\normalfont
528 <latexrelease>
529 <latexrelease>\let\@defaultfamilyhook\@undefined
530 <latexrelease>
531 <latexrelease>\EndIncludeInRelease
532 <*2ekernel>

```

We left out the special L<sup>A</sup>T<sub>E</sub>X fonts which are not automatically included in the base version of the font selection since these fonts contain only a few characters which are also included in the AMS fonts so anybody who is using these fonts doesn't need them. But for compatibility reasons we will define these symbols.

```

533 \def\not@base#1{\@latex@error
534   {Command \noexpand#1not provided in base LaTeX2e}%
535   {Load the latexsym or the amsfonts package to
536    define this symbol}}
537 \def\mho{\not@base\mho}
538 \def\Join{\not@base\Join}
539 \def\Box{\not@base\Box}
540 \def\Diamond{\not@base\Diamond}
541 \def\leadsto{\not@base\leadsto}
542 \def\squsubset{\not@base\squsubset}
543 \def\squsupset{\not@base\squsupset}
544 \def\lhd{\not@base\lhd}
545 \def\unlhd{\not@base\unlhd}
546 \def\rhd{\not@base\rhd}
547 \def\unrhd{\not@base\unrhd}

```

We now initialize all variables set by `\DeclareErrorFont`. These values are not really important since they will be overwritten later on by the definition in `fontdef.ltx`.

However, if `fontdef.cfg` is corrupted then at least a hopefully suitable error font is present.

```

548 \DeclareErrorFont{OT1}{cmr}{m}{n}{10}  %% don't modify this setting
549                                         %% overwrite it in fontdef.cfg
550                                         %% if necessary

```

We also set some default values for `\f@family` etc. Note that we don't yet have any encodings that comes later. In the past this was implicitly done by `\DeclareErrorFont`.

```

551 \fontfamily{cmr}
552 \fontseries{m}
553 \fontshape{n}
554 \fontsize{10}{10}

```

The initial `fontenc` package load list. This will get overwritten in `fonttext` and is only provided in case an old `fonttext.cfg` does not define the command:

```

555 \def\@fontenc@load@list{\@elt{T1,OT1}}

```

We now load the customizable parts of NFSS.

```

556 \InputIfFileExists{fonttext.cfg}
557     {\typeout{=====^^J%
558              ^^J%

```



```

559         Local config file fonttext.cfg used^^J%
560         ^^J%
561         =====}%
562         \def\@addtofilelist##1{\xdef\@filelist{\@filelist,##1}}%
563     }
564     {\input{fonttext.ltx}}
565 \let\@addtofilelist\@gobble

```

Ditto for math although I don't think that we will get a lot of customisation :-)

```

566 \InputIfFileExists{fontmath.cfg}
567     {\typeout{=====^^J%
568             ^^J%
569             Local config file fontmath.cfg used^^J%
570             ^^J%
571             =====}%
572     \def\@addtofilelist##1{\xdef\@filelist{\@filelist,##1}}%
573 }
574 {\input{fontmath.ltx}}
575 \let\@addtofilelist\@gobble

```

Then we preload several fonts. This file might be customized *without* changing the behavior of the format (i.e. necessary font definitions will be loaded at runtime if they are not preloaded). This is done in the file `preload.ltx`.

```

576 \InputIfFileExists{preload.cfg}
577     {\typeout{=====^^J%
578             ^^J%
579             Local config file preload.cfg used^^J%
580             ^^J%
581             =====}%
582     \def\@addtofilelist##1{\xdef\@filelist{\@filelist,##1}}%
583 }
584 {\input{preload.ltx}}
585 \let\@addtofilelist\@gobble

```

`\seriesdefault` After `\seriesdefault` got defined inside `fonttext.ltx` or a `.cfg` file overwriting it, we alter its value by appending `\@empty` to it. This will vanish if expanded but allows us to check if the default gets altered (even to the same value) in the document preamble. All we have to do is to save the current value somewhere and later compare the two. For this we use `\seriesdefault@kernel`.

```

586 \expandafter\def\expandafter\seriesdefault\expandafter{\seriesdefault\@empty}
587 \let\seriesdefault@kernel\seriesdefault

```

(End definition for `\seriesdefault` and `\seriesdefault@kernel`. These functions are documented on page ??.)

`\@accii` We also save the values of some accents in `\@accii`, `\@acciii` and `\@acciii` so they can be restored by a `minipage` inside a `tabbing` environment.

```

\@acciii 588 \let\@accii\ ' \let\@acciii\ ' \let\@acciii\ =

```

(End definition for `\@accii`, `\@acciii`, and `\@acciii`. These functions are documented on page ??.)

`\cal` Here were the two old *⟨alphabet identifiers⟩*.

`\mit` (End definition for `\cal` and `\mit`. These functions are documented on page ??.)

```

589 \</2ekernel>

```

# File x

## fontdef.dtx

<-latexrelease> [2020/08/01 v3.0i LaTeX Kernel (<-latexrelease> font setup)]

## 1 Introduction

This file is used to generate the files `fonttext.ltx` (text font declarations) and `fontmath.ltx` (math font declarations), which are used during the format generation. It contains the declaration of the standard text encodings used at the site as well as a minimal subset of font shape groups that NFSS will look at to ensure that the specified encodings are valid.

The math part contains the setup for math encodings as well as the default math symbol declarations that belong to the encoding.

It is possible to change this setup (by using other fonts, or defaults) without losing the ability to process documents written at other sites. Portability in this sense means that a document will compile without errors. It does not mean, however, that identical output will be produced. For this it is necessary that the distributed setup is used at both installations.

## 2 Customization

You are not allowed to change this source file! If you want to change the default encodings and/or the font shape groups preloaded you should create a copy of `fonttext.ltx` under the name `fonttext.cfg` and change this copy. If  $\text{\LaTeX} 2_{\epsilon}$  finds a file of this name it will use it, otherwise it uses the standard file which is `fontdef.ltx`.

If you don't plan to use Computer Modern much or at all, it might (!) be a good idea to make your own `fonttext.cfg`. Look at the comments below (docstrip module 'text') to see what should go into such a file.

To change the math font setup use a copy of `fontmath.ltx` under the name `fontmath.cfg` and change this copy. However, dealing with this interface is even more a job for an expert than changing the text font setup — in short, we don't encourage either.

**Warning:** please note that we don't support customised  $\text{\LaTeX}$  versions. Thus, before sending in a bug report please try your test file with a  $\text{\LaTeX}$  format which is not customised and send in the log from that version (unless the problem goes away).

Please note: the following standard encodings have to be defined in all local variants of `font....cfg` to guarantee that all  $\text{\LaTeX}$  installations behave in the same way.

T1	Cork $\text{\TeX}$ text encoding
OT1	old $\text{\TeX}$ text encoding
U	unknown encoding
OML	old $\text{\TeX}$ math letters encoding
OMS	old $\text{\TeX}$ math symbols encoding
OMX	old $\text{\TeX}$ math extension symbols encoding
TU	Unicode

Notice that some of these encodings are ‘old’ in the sense that we hope that they will be superseded soon by encoding standards defined by the T<sub>E</sub>X user community. Therefore this set of default encodings may change in the future.

The first candidate is OT1 which will soon be replaced by T1, the official T<sub>E</sub>X text encoding.

**Warning:** If you add additional encodings to this file there is no guarantee any longer that files processable at your installation will also be processable at other installations. Thus, if you make use of such an encoding in your document, e.g. if you intend to typeset in Cyrillic (OT2 encoding), you need to specify this encoding in the preamble of your document prior to sending it to another installation. Once the encoding is specified in that place in your document, the document is processable at all L<sup>A</sup>T<sub>E</sub>X installations (provided they have suitable fonts installed).

For this reason we suggest that you define a short package file that sets up an additional encoding used at your site (rather than putting the encoding into this file) since this package can easily be shipped with your document.

### 3 The docstrip modules

The following modules are used to direct **docstrip** in generating external files:

driver	produce a documentation driver file
text	produce the file <b>fonttext.ltx</b>
math	produce the file <b>fontmath.ltx</b>
cfgtext	produce a dummy <b>fonttext.cfg</b> file
cfgmath	produce a dummy <b>fontmath.cfg</b> file

A typical **docstrip** command file would then have entries like:

```
generateFile{fonttext.ltx}{t}{\from{fontdef.dtx}{text}}
```

### 4 A driver for this document

The next bit of code contains the documentation driver file for T<sub>E</sub>X, i.e. the file that will produce the documentation you are currently reading. It will be extracted from this file by the DOCSTRIP program.

```
1 <*driver>
2 \documentclass{ltxdoc}
3 \GetFileInfo{fontdef.dtx}
4 \begin{document}
5   \DocInput{fontdef.dtx}
6 \end{document}
7 </driver>
```

### 5 The fonttext.ltx file

The identification is done earlier on with a \ProvidesFile declaration.

```
8 <*text>
9 \typeout{=== Don't modify this file, use a .cfg file instead ===^~J}
```

## 5.1 Encodings

This file declares the standard encodings for text and math fonts. All others should be declared in packages or in the documents directly.

For every text encoding there are normally a number of encoding specific commands, e.g. accents, special characters, etc. (The definition for such a command might have to change when the encoding is changed, because the character is in a different position, or not available at all, or the accent is produced in a different way.) This is handled by a general mechanism which is described in `ltoutenc.dtx`.

By convention, text encoding specific declarations, including the declaration `\DeclareFontEncoding` are kept in separate file of the form `<enc>enc.def`, e.g. `ot1enc.def`. This allows other applications to make use of the declarations as well.

Similar to the default encoding, the loading of the encoding files for the two major text encodings shouldn't be changed. In particular, the `inputenc` package depends on this.

```
10 \input {omlenc.def}
11 \input {omsenc.def}
```

Documents containing a lot of accented characters should really be using T1 fonts. We therefore load this last so that T1 encoding specific commands are executed as fast as possible (encoding files are no longer reloaded in `fontenc`).

```
12 \input {ot1enc.def}
13 \input {t1enc.def}
14 \input{ts1enc.def}

15 \ifx\Umathcode\@undefined
```

We then set the default text font encoding. This will hopefully change some day to T1. This setting should *not* be changed to produce a portable format.

```
16 \fontencoding{OT1}

The initial fontenc package load list if an 8-bit TEX engine is used:
17 \def\@fontenc@load@list{\@elt{T1,OT1}}
18 \def\rmsubstdefault{cmr}
19 \def\sfsubstdefault{cmss}
20 \def\ttsubstdefault{cmtt}
21 \LoadFontDefinitionFile{TS1}{cmr}

22 \else
```

Unicode.

```
23 \input {tuenc.def}
24 \fontencoding{TU}

The initial fontenc package load list if a Unicode engine is used:
25 \def\@fontenc@load@list{\@elt{TU}}
26 \DeclareFontSubstitution{TU}{lmr}{m}{n}
27 \LoadFontDefinitionFile{TU}{lmr}
28 \LoadFontDefinitionFile{TU}{lmss}
29 \LoadFontDefinitionFile{TU}{lmtt}

30 \def\rmsubstdefault{lmr}
31 \def\sfsubstdefault{lmss}
32 \def\ttsubstdefault{lmtt}
33 \LoadFontDefinitionFile{TS1}{lmr}
```

```
34 \DeclareFontSubstitution{TU}{lmr}{m}{n}
```

End of Unicode branch.

```
35 \fi
```

If different encodings for text fonts are in use one could put the common setup into `\DeclareFontEncodingDefaults`. There is now a better mechanism so using this interface is discouraged!

```
36 \DeclareFontEncodingDefaults{}{}
```

Then we define the default substitution for every encoding. This release of  $\text{\LaTeX 2}_{\epsilon}$  assumes that the ec fonts are available. It is possible to change this to point to some other font family (e.g., Times with the appropriate encoding if it is available) without making documents non-portable. However, in such a case documents will produce different page breaks at other sites. The substitution defaults can all be changed without losing portability as long as there are font shape definitions for the selected substitutions.

```
37 \DeclareFontSubstitution{T1}{cmr}{m}{n}
```

```
38 \DeclareFontSubstitution{OT1}{cmr}{m}{n}
```

For every encoding declaration,  $\text{\LaTeX 2}_{\epsilon}$  will try to verify that the given substitution information makes sense, i.e. that it is impossible to go into an endless loop if font substitution happens. This is done at the moment the `\begin{document}` is encountered.  $\text{\LaTeX 2}_{\epsilon}$  will then check that for every encoding the substitution defaults form a valid font shape group, which means that it will check if there is a `\DeclareFontShape` declaration for this combination. We will therefore load the corresponding `.fd` files now. If we don't do this they would be loaded at verification time (i.e. at `\begin{document}`) which would delay processing unnecessarily.

**Warning:** Please note that this means that you have to regenerate the format whenever you change any of these `.fd` files since  $\text{\LaTeX 2}_{\epsilon}$  will not read `.fd` files if it already knows about the encoding/family combination.

The `\nfss@catcodes` ensures that white space is ignored in any definitions made in the `fd` files.

```
39 \begingroup
```

```
40 \nfss@catcodes
```

```
41 \input {t1cmr.fd}
```

```
42 \input {ot1cmr.fd}
```

```
43 \endgroup
```

We also load some other font definition files which are normally needed in a document. This is only done for processing speed and you can comment the next two lines out to save some memory. If necessary these files are then loaded when your document is processed. (Loading `.fd` files is a less drastic step compared to preloading fonts because the number of fonts is limited 255 at (nearly) every  $\text{\TeX}$  installation, while the amount of main memory is not a limiting factor at most installations.)

```
44 \begingroup
```

```
45 \nfss@catcodes
```

```
46 \input {ot1cmss.fd}
```

```
47 \input {ot1cmtt.fd}
```

```
48 \endgroup
```

Even with all the precautions it is still possible that NFSS will run into problems, for example, when a .fd file contains corrupted data. To guard against such cases NFSS has a very low-level fallback font that is installed with the following line.

```
49 \DeclareErrorFont{OT1}{cmr}{m}{n}{10}
```

This means, “if everything else fails use Computer Modern Roman normal shape at 10pt in the old text encoding”. You can change the font used but the encoding should be the same as the one specified with `\fontencoding` above.

## 5.2 Defaults

To allow the use of `\rmfamily`, `\sffamily`, etc. in documents even if non-standard families are used we provide nine macros which hold the name of the corresponding families, series, and so on. This makes it easy to use other font families (like Times Roman, etc.). One simply has to redefine these defaults.

All these hooks have to be defined in this file but you can change their meaning (except for `\encodingdefault`) without making documents non-portable.

```
\encodingdefault The following three definitions set up the meaning for \rmfamily, \sffamily, and
\rmdefault      \ttfamily.
\sfdefault
\ttdefault
50 \ifx\Umathcode\@undefined
51 \newcommand\encodingdefault{OT1}
52 \newcommand\rmdefault{cmr}
53 \newcommand\sfdefault{cmss}
54 \newcommand\ttdefault{cmtt}
55 \else
56 \newcommand\encodingdefault{TU}
57 \newcommand\rmdefault{lmr}
58 \fontfamily{\rmdefault}
59 \newcommand\sfdefault{lmss}
60 \newcommand\ttdefault{lmtt}
61 \fi
62 </text>
63 <latexrelease>\IncludeInRelease{2017/01/01}%
64 <latexrelease>          {\encodingdefault}{TU encoding default}%
65 <latexrelease>\ifx\Umathcode\@undefined
66 <latexrelease>\renewcommand\encodingdefault{OT1}
67 <latexrelease>\fontencoding{\encodingdefault}
68 <latexrelease>\renewcommand\rmdefault{cmr}
69 <latexrelease>\fontfamily{\rmdefault}
70 <latexrelease>\renewcommand\sfdefault{cmss}
71 <latexrelease>\renewcommand\ttdefault{cmtt}
72 <latexrelease>\else
73 <latexrelease>\renewcommand\encodingdefault{TU}
74 <latexrelease>%done in everyjob\fontencoding{\encodingdefault}
75 <latexrelease>\renewcommand\rmdefault{lmr}
76 <latexrelease>\fontfamily{\rmdefault}
77 <latexrelease>\renewcommand\sfdefault{lmss}
78 <latexrelease>\renewcommand\ttdefault{lmtt}
79 <latexrelease>\fi
80 <latexrelease>\EndIncludeInRelease
81 <latexrelease>\IncludeInRelease{0000/00/00}%
82 <latexrelease>          {\encodingdefault}{TU encoding default}%
```

```

83 <latexrelease>\fontencoding{OT1}
84 <latexrelease>\renewcommand\encodingdefault{OT1}
85 <latexrelease>\fontencoding{\encodingdefault}
86 <latexrelease>\renewcommand\rmdefault{cmr}
87 <latexrelease>\fontfamily{\rmdefault}
88 <latexrelease>\renewcommand\sfddefault{cmss}
89 <latexrelease>\renewcommand\ttdefault{cmtt}
90 <latexrelease>\EndIncludeInRelease
91 <*text>

```

(End definition for \encodingdefault and others. These functions are documented on page ??.)

```

\bfdefault Series changing commands are influenced by the following hooks.
\mddefault 92 \newcommand\bfdefault{b} % overwritten below (for rollback)
          93 \newcommand\mddefault{m} % overwritten below (for rollback)

```

(End definition for \bfdefault and \mddefault. These functions are documented on page ??.)

```

\itdefault Shape changing commands use the following hooks.
\sldefault 94 \newcommand\itdefault{it}
\scdefault 95 \newcommand\sldefault{sl}
\updefault 96 \newcommand\scdefault{sc}
          97 \newcommand\updefault{up} % overwritten below (for rollback)

```

(End definition for \itdefault and others. These functions are documented on page ??.)

```

98 </text>
99 <*text | latexrelease>
100 <latexrelease>\IncludeInRelease{2020/02/02}%
101 <latexrelease>          {\updefault}{font defaults change}%
102 % \begin{macrocode}
103 \renewcommand\updefault{up}

```

We append \@empty to the series value so that we can detect if it got changed via \def or \renewcommand later.

```

104 \renewcommand\bfdefault{b\@empty}
105 \renewcommand\mddefault{m\@empty}

106 \let\bfdefault@previous\bfdefault
107 \let\mddefault@previous\mddefault
108 </text | latexrelease>
109 <latexrelease>\EndIncludeInRelease
110 <latexrelease>\IncludeInRelease{0000/00/00}%
111 <latexrelease>          {\updefault}{font defaults change}%
112 <latexrelease>
113 <latexrelease>\renewcommand\updefault{n}
114 <latexrelease>\renewcommand\bfdefault{bx}
115 <latexrelease>
116 <latexrelease>\let\bfdefault@previous\undefined
117 <latexrelease>\let\mddefault@previous\undefined
118 <latexrelease>\EndIncludeInRelease
119 <*text>

```

`\familydefault` Finally we have the hooks that describe the behaviour of the `\normalfont` command.  
`\seriesdefault` To stay portable, the definition of `\encodingdefault` should *not* be changed and should  
`\shapedefault` match the setting above for `\fontencoding`. All other values can be set according to your taste.

```
120 \newcommand\familydefault{\rmdefault}
121 \newcommand\seriesdefault{\mddefault}
```

In previous releases `\shapedefault` pointed to `\updefault` which resolved to `n`, but these days that is no longer the case (and `up` is wrong when you want to do a reset. So we now use `n` explicitly.

```
122 \newcommand\shapedefault{n}
```

(End definition for `\familydefault`, `\seriesdefault`, and `\shapedefault`. These functions are documented on page ??.)

This finishes the low-level setup in `fonttext.ltx`.

```
123 </text>
```

## 6 The fontmath.ltx file

The identification is done earlier on with a `\ProvidesFile` declaration.

```
124 <*math>
125 \typeout{=== Don't modify this file, use a .cfg file instead ===^~J}
```

### 6.1 The font encodings used

```
126 \DeclareFontEncoding{OML}{-}{-}
127 \DeclareFontEncoding{OMS}{-}{-}
128 \DeclareFontEncoding{OMX}{-}{-}
```

Finally a declaration for U encoding which serves for all fonts that do not fit standard encodings. For math this sets up `\noaccents@` providing for AMS- $\text{\LaTeX}$ . This macro is used therein to handle accented characters if they are not supported by the font. In other words, if fonts with U encoding are used in math, all accents (like from `\breve`) are obtained from some other font that has them.

```
129 \DeclareFontEncoding{U}{-}{\noaccents@}
```

The encodings for math are next:

```
130 \DeclareFontSubstitution{OML}{cmm}{m}{it}
131 \DeclareFontSubstitution{OMS}{cmsy}{m}{n}
132 \DeclareFontSubstitution{OMX}{cmex}{m}{n}
133 \DeclareFontSubstitution{U}{cmr}{m}{n}

134 \begingroup
135 \nfss@catcodes
136 \input {omlcmm.fd}
137 \input {omscmsy.fd}
138 \input {omxcmex.fd}
139 \input {ucmr.fd}
140 \endgroup
```

#### 6.1.1 Symbolfont and Alphabet declarations

We now define the basic symbol fonts used by  $\text{\LaTeX}$ . These four symbol fonts must be defined by this file.



It is possible to make the symbol fonts point to other external fonts without losing the ability to process documents written at other sites, as long as one defines the same symbol font names with the same encodings, e.g. `operators` with OT1 etc. If other encodings are used documents become non-portable. Such a change should therefore be done in a package file.

```

141 \DeclareSymbolFont{operators}    {OT1}{cmr}{m}{n}
142 \DeclareSymbolFont{letters}     {OML}{cmm}{m}{it}
143 \DeclareSymbolFont{symbols}     {OMS}{cmsy}{m}{n}
144 \DeclareSymbolFont{largesymbols}{OMX}{cmex}{m}{n}

145 \SetSymbolFont{operators}{bold}{OT1}{cmr}{bx}{n}
146 \SetSymbolFont{letters}{bold}{OML}{cmm}{b}{it}
147 \SetSymbolFont{symbols}{bold}{OMS}{cmsy}{b}{n}

```

Below are the seven math alphabets which are defined by NFSS. Again they must be defined by this file. However, as before you can change the fonts used without losing portability, but you should be careful when changing the encoding since that may make documents come out wrong.

```

148 \DeclareSymbolFontAlphabet{\mathrm}    {operators}
149 \DeclareSymbolFontAlphabet{\mathnormal}{letters}
150 \DeclareSymbolFontAlphabet{\mathcal}    {symbols}
151 \DeclareMathAlphabet          {\mathbf}  {OT1}{cmr}{bx}{n}
152 \DeclareMathAlphabet          {\mathsf}  {OT1}{cmss}{m}{n}
153 \DeclareMathAlphabet          {\mathit}  {OT1}{cmr}{m}{it}
154 \DeclareMathAlphabet          {\mathtt}  {OT1}{cmtt}{m}{n}

```

Given the currently available fonts we cannot bold-en `\mathbf` and `\mathtt` but in principle one could use ‘ultra bold’ or something. The alphabets defined via `\DeclareSymbolFontAlphabet` will change automatically in a new math version if the corresponding symbol font changes.

```

155 \SetMathAlphabet\mathsf{bold}{OT1}{cmss}{bx}{n}
156 \SetMathAlphabet\mathit{bold}{OT1}{cmr}{bx}{it}

```

## 6.2 Math font sizes

The declarations below declare the text, script and scriptscript size to be used for each text font size.

All occurrences of sizes longer than a single character are replaced with the macro name that holds them, saving a number of tokens (but losing a bit of speed, so this may not stay this way).

```

157 \DeclareMathSizes{5}{5}{5}{5}
158 \DeclareMathSizes{6}{6}{5}{5}
159 \DeclareMathSizes{7}{7}{5}{5}
160 \DeclareMathSizes{8}{8}{6}{5}
161 \DeclareMathSizes{9}{9}{6}{5}
162 \DeclareMathSizes{\@xpt}{\@xpt}{7}{5}
163 \DeclareMathSizes{\@xipt}{\@xipt}{8}{6}
164 \DeclareMathSizes{\@xiipt}{\@xiipt}{8}{6}
165 \DeclareMathSizes{\@xivpt}{\@xivpt}{\@xpt}{7}
166 \DeclareMathSizes{\@xvipt}{\@xvipt}{\@xiipt}{\@xpt}
167 \DeclareMathSizes{\@xxpt}{\@xxpt}{\@xivpt}{\@xiipt}
168 \DeclareMathSizes{\@xxvpt}{\@xxvpt}{\@xxpt}{\@xvipt}

```

## 6.3 The math symbol assignments

We start by setting up math codes for most of the characters typed in directly from the keyboard. Most of them are normally already setup up in the same way by `IniTEX`. However, we repeat them here to have a complete setup which can be exchanged with another if desired.

### 6.3.1 The letters

```
169 \DeclareMathSymbol{a}{\mathalpha}{letters}{'a}
170 \DeclareMathSymbol{b}{\mathalpha}{letters}{'b}
171 \DeclareMathSymbol{c}{\mathalpha}{letters}{'c}
172 \DeclareMathSymbol{d}{\mathalpha}{letters}{'d}
173 \DeclareMathSymbol{e}{\mathalpha}{letters}{'e}
174 \DeclareMathSymbol{f}{\mathalpha}{letters}{'f}
175 \DeclareMathSymbol{g}{\mathalpha}{letters}{'g}
176 \DeclareMathSymbol{h}{\mathalpha}{letters}{'h}
177 \DeclareMathSymbol{i}{\mathalpha}{letters}{'i}
178 \DeclareMathSymbol{j}{\mathalpha}{letters}{'j}
179 \DeclareMathSymbol{k}{\mathalpha}{letters}{'k}
180 \DeclareMathSymbol{l}{\mathalpha}{letters}{'l}
181 \DeclareMathSymbol{m}{\mathalpha}{letters}{'m}
182 \DeclareMathSymbol{n}{\mathalpha}{letters}{'n}
183 \DeclareMathSymbol{o}{\mathalpha}{letters}{'o}
184 \DeclareMathSymbol{p}{\mathalpha}{letters}{'p}
185 \DeclareMathSymbol{q}{\mathalpha}{letters}{'q}
186 \DeclareMathSymbol{r}{\mathalpha}{letters}{'r}
187 \DeclareMathSymbol{s}{\mathalpha}{letters}{'s}
188 \DeclareMathSymbol{t}{\mathalpha}{letters}{'t}
189 \DeclareMathSymbol{u}{\mathalpha}{letters}{'u}
190 \DeclareMathSymbol{v}{\mathalpha}{letters}{'v}
191 \DeclareMathSymbol{w}{\mathalpha}{letters}{'w}
192 \DeclareMathSymbol{x}{\mathalpha}{letters}{'x}
193 \DeclareMathSymbol{y}{\mathalpha}{letters}{'y}
194 \DeclareMathSymbol{z}{\mathalpha}{letters}{'z}

195 \DeclareMathSymbol{A}{\mathalpha}{letters}{'A}
196 \DeclareMathSymbol{B}{\mathalpha}{letters}{'B}
197 \DeclareMathSymbol{C}{\mathalpha}{letters}{'C}
198 \DeclareMathSymbol{D}{\mathalpha}{letters}{'D}
199 \DeclareMathSymbol{E}{\mathalpha}{letters}{'E}
200 \DeclareMathSymbol{F}{\mathalpha}{letters}{'F}
201 \DeclareMathSymbol{G}{\mathalpha}{letters}{'G}
202 \DeclareMathSymbol{H}{\mathalpha}{letters}{'H}
203 \DeclareMathSymbol{I}{\mathalpha}{letters}{'I}
204 \DeclareMathSymbol{J}{\mathalpha}{letters}{'J}
205 \DeclareMathSymbol{K}{\mathalpha}{letters}{'K}
206 \DeclareMathSymbol{L}{\mathalpha}{letters}{'L}
207 \DeclareMathSymbol{M}{\mathalpha}{letters}{'M}
208 \DeclareMathSymbol{N}{\mathalpha}{letters}{'N}
209 \DeclareMathSymbol{O}{\mathalpha}{letters}{'O}
210 \DeclareMathSymbol{P}{\mathalpha}{letters}{'P}
211 \DeclareMathSymbol{Q}{\mathalpha}{letters}{'Q}
212 \DeclareMathSymbol{R}{\mathalpha}{letters}{'R}
213 \DeclareMathSymbol{S}{\mathalpha}{letters}{'S}
```

```

214 \DeclareMathSymbol{T}{\mathalpha}{letters}{‘T}
215 \DeclareMathSymbol{U}{\mathalpha}{letters}{‘U}
216 \DeclareMathSymbol{V}{\mathalpha}{letters}{‘V}
217 \DeclareMathSymbol{W}{\mathalpha}{letters}{‘W}
218 \DeclareMathSymbol{X}{\mathalpha}{letters}{‘X}
219 \DeclareMathSymbol{Y}{\mathalpha}{letters}{‘Y}
220 \DeclareMathSymbol{Z}{\mathalpha}{letters}{‘Z}

```

### 6.3.2 The digits

```

221 \DeclareMathSymbol{0}{\mathalpha}{operators}{‘0}
222 \DeclareMathSymbol{1}{\mathalpha}{operators}{‘1}
223 \DeclareMathSymbol{2}{\mathalpha}{operators}{‘2}
224 \DeclareMathSymbol{3}{\mathalpha}{operators}{‘3}
225 \DeclareMathSymbol{4}{\mathalpha}{operators}{‘4}
226 \DeclareMathSymbol{5}{\mathalpha}{operators}{‘5}
227 \DeclareMathSymbol{6}{\mathalpha}{operators}{‘6}
228 \DeclareMathSymbol{7}{\mathalpha}{operators}{‘7}
229 \DeclareMathSymbol{8}{\mathalpha}{operators}{‘8}
230 \DeclareMathSymbol{9}{\mathalpha}{operators}{‘9}

```

### 6.3.3 Punctuation, brace, etc. keys

```

231 \DeclareMathSymbol{!}{\mathclose}{operators}{"21}
232 \DeclareMathSymbol{*}{\mathbin}{symbols}{"03} % \ast
233 \DeclareMathSymbol{+}{\mathbin}{operators}{"2B}
234 \DeclareMathSymbol{,}{\mathpunct}{letters}{"3B}
235 \DeclareMathSymbol{-}{\mathbin}{symbols}{"00}
236 \DeclareMathSymbol{.}{\mathord}{letters}{"3A}
237 \DeclareMathSymbol{:}{\mathrel}{operators}{"3A}
238 \DeclareMathSymbol{;}{\mathpunct}{operators}{"3B}
239 \DeclareMathSymbol{=}{\mathrel}{operators}{"3D}
240 \DeclareMathSymbol{?}{\mathclose}{operators}{"3F}

```

The following symbols are defined as delimiters below which automatically defines them as math symbols.

```

241 %\DeclareMathSymbol{({\mathopen}{operators}{"28}
242 %\DeclareMathSymbol{)}{\mathclose}{operators}{"29}
243 %\DeclareMathSymbol{/}{\mathord}{letters}{"3D}
244 %\DeclareMathSymbol{[}{\mathopen}{operators}{"5B}
245 %\DeclareMathSymbol{]}{\mathclose}{operators}{"5D}
246 %\DeclareMathSymbol{|}{\mathord}{symbols}{"6A}
247 %\DeclareMathSymbol{<}{\mathrel}{letters}{"3C}
248 %\DeclareMathSymbol{>}{\mathrel}{letters}{"3E}

```

Should all of the following being activated by default? Probably not.

```

249 %\DeclareMathSymbol{\{}{\mathopen}{symbols}{"66}
250 %\DeclareMathSymbol{\}}{\mathclose}{symbols}{"67}
251 %\DeclareMathSymbol{\}\}{\mathord}{symbols}{"6E} % \backslash
252 \mathcode‘\ = "8000 % \space
253 \mathcode‘\prime = "8000 % ^\prime
254 \mathcode‘\_ = "8000 % \_

```

### 6.3.4 Delimitercodes for characters

[to be completed]

Finally, `InitEX` sets all `\delcode` values to -1, except `\delcode‘.=0`

```

255 \DeclareMathDelimiter{({\mathopen}{operators}{28}{largesymbols}{00}
256 \DeclareMathDelimiter{)}{\mathclose}{operators}{29}{largesymbols}{01}
257 \DeclareMathDelimiter{[{\mathopen}{operators}{5B}{largesymbols}{02}
258 \DeclareMathDelimiter{]}\mathclose}{operators}{5D}{largesymbols}{03}

```

The next two are considered to be relations when not used in the context of a delimiter! And worse, they do even represent different glyphs when being used as delimiter and not as delimiter. This is a user level syntax inherited from plain T<sub>E</sub>X. Therefore we explicitly redefine the math symbol definitions for these symbols afterwards.

```

259 \DeclareMathDelimiter{<{\mathopen}{symbols}{68}{largesymbols}{0A}
260 \DeclareMathDelimiter{>{\mathclose}{symbols}{69}{largesymbols}{0B}
261 \DeclareMathSymbol{<}{\mathrel}{letters}{3C}
262 \DeclareMathSymbol{>}{\mathrel}{letters}{3E}

```

And here is another case where the non-delimiter version produces a glyph different from the delimiter version.

```

263 \DeclareMathDelimiter{/}{\mathord}{operators}{2F}{largesymbols}{0E}
264 \DeclareMathSymbol{/}{\mathord}{letters}{3D}

265 \DeclareMathDelimiter{|}{\mathord}{symbols}{6A}{largesymbols}{0C}

266 \expandafter\DeclareMathDelimiter\@backslashchar
267 \mathord}{symbols}{6E}{largesymbols}{0F}

```

N.B. { and } should NOT get delcodes; otherwise parameter grouping fails!

## 6.4 Symbols accessed via control sequences

### 6.4.1 Greek letters

```

268 \DeclareMathSymbol{\alpha}{\mathord}{letters}{0B}
269 \DeclareMathSymbol{\beta}{\mathord}{letters}{0C}
270 \DeclareMathSymbol{\gamma}{\mathord}{letters}{0D}
271 \DeclareMathSymbol{\delta}{\mathord}{letters}{0E}
272 \DeclareMathSymbol{\epsilon}{\mathord}{letters}{0F}
273 \DeclareMathSymbol{\zeta}{\mathord}{letters}{10}
274 \DeclareMathSymbol{\eta}{\mathord}{letters}{11}
275 \DeclareMathSymbol{\theta}{\mathord}{letters}{12}
276 \DeclareMathSymbol{\iota}{\mathord}{letters}{13}
277 \DeclareMathSymbol{\kappa}{\mathord}{letters}{14}
278 \DeclareMathSymbol{\lambda}{\mathord}{letters}{15}
279 \DeclareMathSymbol{\mu}{\mathord}{letters}{16}
280 \DeclareMathSymbol{\nu}{\mathord}{letters}{17}
281 \DeclareMathSymbol{\xi}{\mathord}{letters}{18}
282 \DeclareMathSymbol{\pi}{\mathord}{letters}{19}
283 \DeclareMathSymbol{\rho}{\mathord}{letters}{1A}
284 \DeclareMathSymbol{\sigma}{\mathord}{letters}{1B}
285 \DeclareMathSymbol{\tau}{\mathord}{letters}{1C}
286 \DeclareMathSymbol{\upsilon}{\mathord}{letters}{1D}
287 \DeclareMathSymbol{\phi}{\mathord}{letters}{1E}
288 \DeclareMathSymbol{\chi}{\mathord}{letters}{1F}
289 \DeclareMathSymbol{\psi}{\mathord}{letters}{20}
290 \DeclareMathSymbol{\omega}{\mathord}{letters}{21}
291 \DeclareMathSymbol{\varepsilon}{\mathord}{letters}{22}
292 \DeclareMathSymbol{\vartheta}{\mathord}{letters}{23}
293 \DeclareMathSymbol{\varpi}{\mathord}{letters}{24}

```

```

294 \DeclareMathSymbol{\varrho}{\mathord}{letters}{25}
295 \DeclareMathSymbol{\varsigma}{\mathord}{letters}{26}
296 \DeclareMathSymbol{\varphi}{\mathord}{letters}{27}
297 \DeclareMathSymbol{\Gamma}{\mathalpha}{operators}{00}
298 \DeclareMathSymbol{\Delta}{\mathalpha}{operators}{01}
299 \DeclareMathSymbol{\Theta}{\mathalpha}{operators}{02}
300 \DeclareMathSymbol{\Lambda}{\mathalpha}{operators}{03}
301 \DeclareMathSymbol{\Xi}{\mathalpha}{operators}{04}
302 \DeclareMathSymbol{\Pi}{\mathalpha}{operators}{05}
303 \DeclareMathSymbol{\Sigma}{\mathalpha}{operators}{06}
304 \DeclareMathSymbol{\Upsilon}{\mathalpha}{operators}{07}
305 \DeclareMathSymbol{\Phi}{\mathalpha}{operators}{08}
306 \DeclareMathSymbol{\Psi}{\mathalpha}{operators}{09}
307 \DeclareMathSymbol{\Omega}{\mathalpha}{operators}{0A}

```

#### 6.4.2 Ordinary symbols

```

308 \DeclareMathSymbol{\aleph}{\mathord}{symbols}{40}
309 \DeclareMathSymbol{\imath}{\mathord}{letters}{7B}
310 \DeclareMathSymbol{\jmath}{\mathord}{letters}{7C}
311 \DeclareMathSymbol{\ell}{\mathord}{letters}{60}
312 \DeclareMathSymbol{\wp}{\mathord}{letters}{7D}
313 \DeclareMathSymbol{\Re}{\mathord}{symbols}{3C}
314 \DeclareMathSymbol{\Im}{\mathord}{symbols}{3D}
315 \DeclareMathSymbol{\partial}{\mathord}{letters}{40}
316 \DeclareMathSymbol{\infty}{\mathord}{symbols}{31}
317 \DeclareMathSymbol{\prime}{\mathord}{symbols}{30}
318 \DeclareMathSymbol{\emptyset}{\mathord}{symbols}{3B}
319 \DeclareMathSymbol{\nabla}{\mathord}{symbols}{72}
320 \DeclareMathSymbol{\top}{\mathord}{symbols}{3E}
321 \DeclareMathSymbol{\bot}{\mathord}{symbols}{3F}
322 \DeclareMathSymbol{\triangle}{\mathord}{symbols}{34}
323 \DeclareMathSymbol{\forall}{\mathord}{symbols}{38}
324 \DeclareMathSymbol{\exists}{\mathord}{symbols}{39}
325 \DeclareMathSymbol{\neg}{\mathord}{symbols}{3A}

```

Alias:

```

326 % \let\lnot=\neg
327 \DeclareMathSymbol{\lnot}{\mathord}{symbols}{3A}
328 \DeclareMathSymbol{\flat}{\mathord}{letters}{5B}
329 \DeclareMathSymbol{\natural}{\mathord}{letters}{5C}
330 \DeclareMathSymbol{\sharp}{\mathord}{letters}{5D}
331 \DeclareMathSymbol{\clubsuit}{\mathord}{symbols}{7C}
332 \DeclareMathSymbol{\diamondsuit}{\mathord}{symbols}{7D}
333 \DeclareMathSymbol{\heartsuit}{\mathord}{symbols}{7E}
334 \DeclareMathSymbol{\spadesuit}{\mathord}{symbols}{7F}

335 \DeclareRobustCommand\hbar{{\mathchar'26\mkern-9mu h}}
336 \DeclareRobustCommand\surd{{\mathchar"1270}}
337 \DeclareRobustCommand\angle{{\vbox{\ialign{$\m@th\scriptstyle##$\crrc
338 \not\mathrel{\mkern14mu}\crrc
339 \noalign{\nointerlineskip}
340 \mkern2.5mu\leaders\hrule \@height.34pt\hfill\mkern2.5mu\crrc}}}}

```

#### 6.4.3 Large Operators

```

341 \DeclareMathSymbol{\coprod}{\mathop}{largesymbols}{60}

```

```

342 \DeclareMathSymbol{\bigvee}{\mathop}{largesymbols}{57}
343 \DeclareMathSymbol{\bigwedge}{\mathop}{largesymbols}{56}
344 \DeclareMathSymbol{\biguplus}{\mathop}{largesymbols}{55}
345 \DeclareMathSymbol{\bigcap}{\mathop}{largesymbols}{54}
346 \DeclareMathSymbol{\bigcup}{\mathop}{largesymbols}{53}
347 \DeclareMathSymbol{\intop}{\mathop}{largesymbols}{52}
348 \DeclareRobustCommand\int{\intop\nolimits}
349 \DeclareMathSymbol{\prod}{\mathop}{largesymbols}{51}
350 \DeclareMathSymbol{\sum}{\mathop}{largesymbols}{50}
351 \DeclareMathSymbol{\bigotimes}{\mathop}{largesymbols}{4E}
352 \DeclareMathSymbol{\bigoplus}{\mathop}{largesymbols}{4C}
353 \DeclareMathSymbol{\bigodot}{\mathop}{largesymbols}{4A}
354 \DeclareMathSymbol{\ointop}{\mathop}{largesymbols}{48}
355 \DeclareRobustCommand\oint{\ointop\nolimits}
356 \DeclareMathSymbol{\bigsqcup}{\mathop}{largesymbols}{46}
357 \DeclareMathSymbol{\smallint}{\mathop}{symbols}{73}

```

#### 6.4.4 Binary symbols

```

358 \DeclareMathSymbol{\triangleleft}{\mathbin}{letters}{2F}
359 \DeclareMathSymbol{\triangleright}{\mathbin}{letters}{2E}
360 \DeclareMathSymbol{\bigtriangleup}{\mathbin}{symbols}{34}
361 \DeclareMathSymbol{\bigtriangledown}{\mathbin}{symbols}{35}

```

Alias:

```

362 % \let \varbigtriangledown \bigtriangledown
363 % \let \varbigtriangleup \bigtriangleup
364 \DeclareMathSymbol{\varbigtriangleup}{\mathbin}{symbols}{34}
365 \DeclareMathSymbol{\varbigtriangledown}{\mathbin}{symbols}{35}

```

These last two synonyms are needed because the `stmaryrd` package redefines them as Operators.

```

366 \DeclareMathSymbol{\wedge}{\mathbin}{symbols}{5E}
367 \DeclareMathSymbol{\vee}{\mathbin}{symbols}{5F}

```

Alias:

```

368 % \let \land = \wedge
369 % \let \lor = \vee
370 \DeclareMathSymbol{\land}{\mathbin}{symbols}{5E}
371 \DeclareMathSymbol{\lor}{\mathbin}{symbols}{5F}
372 \DeclareMathSymbol{\cap}{\mathbin}{symbols}{5C}
373 \DeclareMathSymbol{\cup}{\mathbin}{symbols}{5B}
374 \DeclareMathSymbol{\ddagger}{\mathbin}{symbols}{7A}
375 \DeclareMathSymbol{\dagger}{\mathbin}{symbols}{79}
376 \DeclareMathSymbol{\sqcap}{\mathbin}{symbols}{75}
377 \DeclareMathSymbol{\sqcup}{\mathbin}{symbols}{74}
378 \DeclareMathSymbol{\uplus}{\mathbin}{symbols}{5D}
379 \DeclareMathSymbol{\amalg}{\mathbin}{symbols}{71}
380 \DeclareMathSymbol{\diamond}{\mathbin}{symbols}{05}
381 \DeclareMathSymbol{\bullet}{\mathbin}{symbols}{0F}
382 \DeclareMathSymbol{\wr}{\mathbin}{symbols}{6F}
383 \DeclareMathSymbol{\div}{\mathbin}{symbols}{04}
384 \DeclareMathSymbol{\odot}{\mathbin}{symbols}{0C}
385 \DeclareMathSymbol{\oslash}{\mathbin}{symbols}{0B}
386 \DeclareMathSymbol{\otimes}{\mathbin}{symbols}{0A}
387 \DeclareMathSymbol{\ominus}{\mathbin}{symbols}{09}

```

```

388 \DeclareMathSymbol{\oplus}{\mathbin}{symbols}{"08}
389 \DeclareMathSymbol{\mp}{\mathbin}{symbols}{"07}
390 \DeclareMathSymbol{\pm}{\mathbin}{symbols}{"06}
391 \DeclareMathSymbol{\circ}{\mathbin}{symbols}{"0E}
392 \DeclareMathSymbol{\bigcirc}{\mathbin}{symbols}{"0D}
393 \DeclareMathSymbol{\setminus}{\mathbin}{symbols}{"6E}
394 \DeclareMathSymbol{\cdot}{\mathbin}{symbols}{"01}
395 \DeclareMathSymbol{\ast}{\mathbin}{symbols}{"03}
396 \DeclareMathSymbol{\times}{\mathbin}{symbols}{"02}
397 \DeclareMathSymbol{\star}{\mathbin}{letters}{"3F}

```

#### 6.4.5 Relations

```

398 \DeclareMathSymbol{\propto}{\mathrel}{symbols}{"2F}
399 \DeclareMathSymbol{\sqsubseteq}{\mathrel}{symbols}{"76}
400 \DeclareMathSymbol{\sqsupseteq}{\mathrel}{symbols}{"77}
401 \DeclareMathSymbol{\parallel}{\mathrel}{symbols}{"6B}
402 \DeclareMathSymbol{\mid}{\mathrel}{symbols}{"6A}
403 \DeclareMathSymbol{\dashv}{\mathrel}{symbols}{"61}
404 \DeclareMathSymbol{\vdash}{\mathrel}{symbols}{"60}
405 \DeclareMathSymbol{\nearrow}{\mathrel}{symbols}{"25}
406 \DeclareMathSymbol{\searrow}{\mathrel}{symbols}{"26}
407 \DeclareMathSymbol{\nwarrow}{\mathrel}{symbols}{"2D}
408 \DeclareMathSymbol{\swarrow}{\mathrel}{symbols}{"2E}
409 \DeclareMathSymbol{\Leftrightarrow}{\mathrel}{symbols}{"2C}
410 \DeclareMathSymbol{\Leftarrow}{\mathrel}{symbols}{"28}
411 \DeclareMathSymbol{\Rightarrow}{\mathrel}{symbols}{"29}
412 \DeclareRobustCommand\neq{\not=}

```

As `\neq` is robust we should not use `\let` to define `\ne` as then it would change if `\neq` changes.

```

413 \DeclareRobustCommand\ne{\not=}

```

It would ok to use `\let` for those declared by `\DeclareMathSymbol` but for a cleaner interface we avoid it always (just in case the internals change).

```

414 \DeclareMathSymbol{\leq}{\mathrel}{symbols}{"14}
415 \DeclareMathSymbol{\geq}{\mathrel}{symbols}{"15}

```

Alias:

```

416 % \let\le=\leq
417 % \let\ge=\geq
418 \DeclareMathSymbol{\le}{\mathrel}{symbols}{"14}
419 \DeclareMathSymbol{\ge}{\mathrel}{symbols}{"15}
420 \DeclareMathSymbol{\succ}{\mathrel}{symbols}{"1F}
421 \DeclareMathSymbol{\prec}{\mathrel}{symbols}{"1E}
422 \DeclareMathSymbol{\approx}{\mathrel}{symbols}{"19}
423 \DeclareMathSymbol{\succeq}{\mathrel}{symbols}{"17}
424 \DeclareMathSymbol{\preceq}{\mathrel}{symbols}{"16}
425 \DeclareMathSymbol{\supset}{\mathrel}{symbols}{"1B}
426 \DeclareMathSymbol{\subset}{\mathrel}{symbols}{"1A}
427 \DeclareMathSymbol{\supseteq}{\mathrel}{symbols}{"13}
428 \DeclareMathSymbol{\subseteq}{\mathrel}{symbols}{"12}
429 \DeclareMathSymbol{\in}{\mathrel}{symbols}{"32}
430 \DeclareMathSymbol{\ni}{\mathrel}{symbols}{"33}

```

Alias:

```

431 % \let\owns=\ni

```

```

432 \DeclareMathSymbol{\owns}{\mathrel}{symbols}{"33}
433 \DeclareMathSymbol{\gg}{\mathrel}{symbols}{"1D}
434 \DeclareMathSymbol{\ll}{\mathrel}{symbols}{"1C}
435 \DeclareMathSymbol{\not}{\mathrel}{symbols}{"36}
436 \DeclareMathSymbol{\leftrightharrow}{\mathrel}{symbols}{"24}
437 \DeclareMathSymbol{\leftarrow}{\mathrel}{symbols}{"20}
438 \DeclareMathSymbol{\rightarrow}{\mathrel}{symbols}{"21}

Alias:
439 % \let\gets=\leftarrow
440 % \let\to=\rightarrow
441 \DeclareMathSymbol{\gets}{\mathrel}{symbols}{"20}
442 \DeclareMathSymbol{\to}{\mathrel}{symbols}{"21}
443 \DeclareMathSymbol{\mapstochar}{\mathrel}{symbols}{"37}
444 \DeclareRobustCommand\mapsto{\mapstochar\rightarrow}
445 \DeclareMathSymbol{\sim}{\mathrel}{symbols}{"18}
446 \DeclareMathSymbol{\simeq}{\mathrel}{symbols}{"27}
447 \DeclareMathSymbol{\perp}{\mathrel}{symbols}{"3F}
448 \DeclareMathSymbol{\equiv}{\mathrel}{symbols}{"11}
449 \DeclareMathSymbol{\asymp}{\mathrel}{symbols}{"10}
450 \DeclareMathSymbol{\smile}{\mathrel}{letters}{"5E}
451 \DeclareMathSymbol{\frown}{\mathrel}{letters}{"5F}
452 \DeclareMathSymbol{\leftharpoonup}{\mathrel}{letters}{"28}
453 \DeclareMathSymbol{\leftharpoondown}{\mathrel}{letters}{"29}
454 \DeclareMathSymbol{\rightharpoonup}{\mathrel}{letters}{"2A}
455 \DeclareMathSymbol{\rightharpoondown}{\mathrel}{letters}{"2B}

```

Here cometh much profligate robustification of math constructs. Warning: some of these commands may become non-robust if an AMS package is loaded.

Further potential problems: some math font packages may make unfortunate assumptions about some of these definitions that are not true of the robust versions we need.

```

456 \DeclareRobustCommand
457   \cong{\mathrel{\mathpalette@vereq\sim}} % congruence sign
458 \def\@vereq#1#2{\lower.5p@\vbox{\lineskiplimit\maxdimen\lineskip-.5\p@
459   \ialign{$\m@th#1\hfil##\hfil$\crrc#2\crrc=\crrc}}
460 \DeclareRobustCommand
461   \notin{\mathrel{\m@th\mathpalette@cncel\in}}
462 \def\cncel#1#2{\m@th\oalign{$\hfil#1\mkern1mu/\hfil$\crrc#1#2$}}
463 \DeclareRobustCommand
464   \rightleftharpoons{\mathrel{\mathpalette\rlh@{}}}
465 \def\rlh@#1{\vcenter{\m@th\hbox{\oalign{\raise2pt
466   \hbox{$#1\rightharpoonup$}\crrc
467   $#1\leftharpoondown$}}}}
468 \DeclareRobustCommand
469   \doteq{\buildrel\textstyle.\over=}

```

#### 6.4.6 Arrows

```

470 \DeclareRobustCommand
471   \joinrel{\mathrel{\mkern-3mu}}
472 \DeclareRobustCommand
473   \relbar{\mathrel{\smash-}} % \smash, because -
474                               % has the same height as +

```



In contrast to `plain.tex` `\Relbar` got braces around the equal sign to guard against it being “math active” expanding to `\futurelet....` This might be the case when packages are implementing shorthands for math, e.g. `=>` meaning `\Rightarrow` etc. It would actually be better not to use `=` in such definitions but instead define something like `\mathequalsign` and use this. However we can’t do this now as it would break other math layouts where characters are in different places (since those wouldn’t know about the need for a new command name).

```

475 \DeclareRobustCommand
476   \Relbar{\mathrel{=}}
477 \DeclareMathSymbol{\lhook}{\mathrel}{letters}{"2C}
478   \DeclareRobustCommand\hookrightarrow{\lhook\joinrel\rightarrow}
479 \DeclareMathSymbol{\rhook}{\mathrel}{letters}{"2D}
480   \DeclareRobustCommand\hookleftarrow{\leftarrow\joinrel\rhook}
481 \DeclareRobustCommand
482   \bowtie{\mathrel{\triangleright\joinrel\mathrel{\triangleleft}}}
483 \DeclareRobustCommand
484   \models{\mathrel{|}\joinrel\Relbar}
485 \DeclareRobustCommand
486   \Longrightarrow{\Relbar\joinrel\Rightarrow}

```

LaTeX Change: `\longrightarrow` and `\longleftarrow` redefined to make them robust.

```

487 \DeclareRobustCommand\longrightarrow
488   {\relbar\joinrel\rightarrow}
489 \DeclareRobustCommand\longleftarrow
490   {\leftarrow\joinrel\relbar}
491 \DeclareRobustCommand
492   \Longleftarrow{\Leftarrow\joinrel\Relbar}
493 \DeclareRobustCommand
494   \longmapsto{\mapstochar\longrightarrow}
495 \DeclareRobustCommand
496   \longlefttrightarrow{\leftarrow\joinrel\rightarrow}
497 \DeclareRobustCommand
498   \Longlefttrightarrow{\Leftarrow\joinrel\Rightarrow}
499 \DeclareRobustCommand
500   \iff{\;\Longlefttrightarrow\;}

```

#### 6.4.7 Punctuation symbols

```

501 \DeclareMathSymbol{\ldotp}{\mathpunct}{letters}{"3A}
502 \DeclareMathSymbol{\cdotp}{\mathpunct}{symbols}{"01}
503 \DeclareMathSymbol{\colon}{\mathpunct}{operators}{"3A}

```

This is commented out, since `\ldots` is now defined in `loutenc.dtx`.

```

504 %\def\ldots{\mathinner{\ldotp\ldotp\ldotp}}
505 %\DeclareRobustCommand\ldots
506 %   {\relax\ifmmode\ldots\else\mbox{$\m@th\ldots$}\fi}
507 \DeclareRobustCommand
508   \cdots{\mathinner{\cdotp\cdotp\cdotp}}
509 \DeclareRobustCommand
510   \vdots{\vbox{\baselineskip4\p@ \lineskiplimit\z@
511     \kern6\p@\hbox{.}\hbox{.}\hbox{.}}}
512 \DeclareRobustCommand
513   \ddots{\mathinner{\mkern1mu\raise7\p@
514     \vbox{\kern7\p@\hbox{.}}\mkern2mu}

```

```
515 \raise4\p@\hbox{.}\mkern2mu\raise\p@\hbox{.}\mkern1mu}}
```

#### 6.4.8 Math accents

```
516 \DeclareMathAccent{\acute}{\mathalpha}{operators}{13}
517 \DeclareMathAccent{\grave}{\mathalpha}{operators}{12}
518 \DeclareMathAccent{\ddot}{\mathalpha}{operators}{7F}
519 \DeclareMathAccent{\tilde}{\mathalpha}{operators}{7E}
520 \DeclareMathAccent{\bar}{\mathalpha}{operators}{16}
521 \DeclareMathAccent{\breve}{\mathalpha}{operators}{15}
522 \DeclareMathAccent{\check}{\mathalpha}{operators}{14}
523 \DeclareMathAccent{\hat}{\mathalpha}{operators}{5E}
524 \DeclareMathAccent{\vec}{\mathord}{letters}{7E}
525 \DeclareMathAccent{\dot}{\mathalpha}{operators}{5F}
526 \DeclareMathAccent{\widetilde}{\mathord}{largesymbols}{65}
527 \DeclareMathAccent{\widehat}{\mathord}{largesymbols}{62}
```

For some reason plain T<sub>E</sub>X never bothered to provide a ring accent in math (although it is available in the fonts), but since we got a request for it here we go:

```
528 \DeclareMathAccent{\mathring}{\mathalpha}{operators}{17}
```

#### 6.4.9 Radicals

```
529 \DeclareMathRadical{\sqrtsign}{symbols}{70}{largesymbols}{70}
```

#### 6.4.10 Over and under something, etc

```
530 \DeclareRobustCommand\overrightarrow[1]{\vbox{\m@th\ialign{##\crrc
531 \rightarrowfill\crrc\noalign{\kern-\p@\nointerlineskip}
532 $\hfil\displaystyle{#1}\hfil$\crrc}}}
533 \DeclareRobustCommand\overleftarrow[1]{\vbox{\m@th\ialign{##\crrc
534 \leftarrowfill\crrc\noalign{\kern-\p@\nointerlineskip}%
535 $\hfil\displaystyle{#1}\hfil$\crrc}}}
536 \DeclareRobustCommand\overbrace[1]
537 {\mathop{\vbox{\m@th\ialign{##\crrc\noalign{\kern3\p@}%
538 \downbracefill\crrc\noalign{\kern3\p@\nointerlineskip}%
539 $\hfil\displaystyle{#1}\hfil$\crrc}}}\limits}
540 \DeclareRobustCommand\underbrace[1]{\mathop{\vtop{\m@th\ialign{##\crrc
541 $\hfil\displaystyle{#1}\hfil$\crrc
542 \noalign{\kern3\p@\nointerlineskip}%
543 \upbracefill\crrc\noalign{\kern3\p@}}}\limits}
```

(quite a waste of tokens, IMHO — Frank)

```
544 \DeclareRobustCommand\skew[3]
545 {\muskip\z@#1mu\divide\muskip\z@\tw@ \mkern\muskip\z@
546 #2{\mkern-\muskip\z@#3}\mkern\muskip\z@\mkern-\muskip\z@-{}
547 \DeclareRobustCommand\rightarrowfill{${\m@th\smash-\mkern-7mu%
548 \cleaders\hbox{${\mkern-2mu\smash-\mkern-2mu$}\hfill
549 \mkern-7mu\mathord\rightarrow$}
550 \DeclareRobustCommand\leftarrowfill{${\m@th\mathord\leftarrow\mkern-7mu%
551 \cleaders\hbox{${\mkern-2mu\smash-\mkern-2mu$}\hfill
552 \mkern-7mu\smash-$}
553 \DeclareMathSymbol{\braceld}{\mathord}{largesymbols}{7A}
554 \DeclareMathSymbol{\bracerd}{\mathord}{largesymbols}{7B}
555 \DeclareMathSymbol{\bracelu}{\mathord}{largesymbols}{7C}
556 \DeclareMathSymbol{\braceru}{\mathord}{largesymbols}{7D}
557 \DeclareRobustCommand\downbracefill{${\m@th \setbox\z@\hbox{${\braceld$}%
558 \braceld\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\braceru
```

```

559 \bracelu\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\bracerd$}
560 \DeclareRobustCommand\upbracefill{$\math \setbox\z@\hbox{$\braceld$}%
561 \bracelu\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\bracerd
562 \braceld\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\braceru$}

```

#### 6.4.11 Delimiters

```

563 \DeclareMathDelimiter{\lmoustache} % top from (, bottom from )
564 {\mathopen}{largesymbols}{7A}{largesymbols}{40}
565 \DeclareMathDelimiter{\rmoustache} % top from ), bottom from (
566 {\mathclose}{largesymbols}{7B}{largesymbols}{41}
567 \DeclareMathDelimiter{\arrowvert} % arrow without arrowheads
568 {\mathord}{symbols}{6A}{largesymbols}{3C}
569 \DeclareMathDelimiter{\Arrowvert} % double arrow without arrowheads
570 {\mathord}{symbols}{6B}{largesymbols}{3D}
571 \DeclareMathDelimiter{\Vert}
572 {\mathord}{symbols}{6B}{largesymbols}{0D}

```

`\DeclareMathDelimiter` produces a command that is robust (with an internal macro containing the payload) so we should not use `\let` for making an alias

```

573 %\let\l=\Vert
574 \DeclareMathDelimiter{\l}
575 {\mathord}{symbols}{6B}{largesymbols}{0D}
576 \DeclareMathDelimiter{\vert}
577 {\mathord}{symbols}{6A}{largesymbols}{0C}
578 \DeclareMathDelimiter{\uparrow}
579 {\mathrel}{symbols}{22}{largesymbols}{78}
580 \DeclareMathDelimiter{\downarrow}
581 {\mathrel}{symbols}{23}{largesymbols}{79}
582 \DeclareMathDelimiter{\updownarrow}
583 {\mathrel}{symbols}{6C}{largesymbols}{3F}
584 \DeclareMathDelimiter{\Uparrow}
585 {\mathrel}{symbols}{2A}{largesymbols}{7E}
586 \DeclareMathDelimiter{\Downarrow}
587 {\mathrel}{symbols}{2B}{largesymbols}{7F}
588 \DeclareMathDelimiter{\Updownarrow}
589 {\mathrel}{symbols}{6D}{largesymbols}{77}
590 \DeclareMathDelimiter{\backslash} % for double coset G\backslash H
591 {\mathord}{symbols}{6E}{largesymbols}{0F}
592 \DeclareMathDelimiter{\rangle}
593 {\mathclose}{symbols}{69}{largesymbols}{0B}
594 \DeclareMathDelimiter{\langle}
595 {\mathopen}{symbols}{68}{largesymbols}{0A}
596 \DeclareMathDelimiter{\rbrace}
597 {\mathclose}{symbols}{67}{largesymbols}{09}
598 \DeclareMathDelimiter{\lbrace}
599 {\mathopen}{symbols}{66}{largesymbols}{08}
600 \DeclareMathDelimiter{\rceil}
601 {\mathclose}{symbols}{65}{largesymbols}{07}
602 \DeclareMathDelimiter{\lceil}
603 {\mathopen}{symbols}{64}{largesymbols}{06}
604 \DeclareMathDelimiter{\rfloor}
605 {\mathclose}{symbols}{63}{largesymbols}{05}
606 \DeclareMathDelimiter{\lfloor}
607 {\mathopen}{symbols}{62}{largesymbols}{04}

```

`\lgroup` There are three plain TeX delimiters which are not fully supported by NFSS, since they  
`\rgroup` partly point into a bold cmr font. Allocating a full symbol font, just to have three  
`\bracevert` delimiters seems a bit too much given the limited space available. For this reason only  
the extensible sizes are supported. If this is not desired one can use, without losing  
portability, define `\mathbf` and `\mathtt` as font symbol alphabet (setting up `cmr/bx/n`  
and `cmtt/m/n` as symbol fonts first) and modify the delimiter declarations to point with  
their small variant to those symbol fonts. (This is done in `oldlfont.dtx` so look there  
for examples.)

```
608 \DeclareMathDelimiter{\lgroup} % extensible ( with sharper tips
609     {\mathopen}{largesymbols}{"3A}{largesymbols}{"3A}
610 \DeclareMathDelimiter{\rgroup} % extensible ) with sharper tips
611     {\mathclose}{largesymbols}{"3B}{largesymbols}{"3B}
612 \DeclareMathDelimiter{\bracevert} % the vertical bar that extends braces
613     {\mathord}{largesymbols}{"3E}{largesymbols}{"3E}
```

*(End definition for `\lgroup`, `\rgroup`, and `\bracevert`. These functions are documented on page ??.)*

## 6.5 Math versions of text commands

The `\mathunderscore` here is really a text definition, so it has been put back into  
`loutenc.dtx` (by Chris, 30/04/97) and should be removed from here.

These symbols are the math versions of text commands such as `\P`, `\$`, etc.

```
\mathparagraph These math symbols are not in plain TeX.
\mathsection 614 \DeclareMathSymbol{\mathparagraph}{\mathord}{symbols}{"7B}
\mathdollar 615 \DeclareMathSymbol{\mathsection}{\mathord}{symbols}{"78}
\mathsterling 616 \DeclareMathSymbol{\mathdollar}{\mathord}{operators}{"24}
\mathunderscore 617 \DeclareRobustCommand\mathsterling{\mathit{\mathchar"7024}}
618 \DeclareRobustCommand\mathunderscore{\kern.06em\vbox{\hrule\@width.3em}}
```

*(End definition for `\mathparagraph` and others. These functions are documented on page ??.)*

`\mathellipsis` This is plain TeX's `\ldots`.

```
619 \DeclareRobustCommand\mathellipsis{\mathinner{\ldotp\ldotp\ldotp}}%
```

*(End definition for `\mathellipsis`. This function is documented on page ??.)*

## 6.6 Other special functions and parameters

### 6.6.1 Biggggg

```
620 </math>
621 <*math | latexrelease>
622 <latexrelease> \IncludeInRelease{2018/12/01}%
623 <latexrelease>         {\Big}{Start LR-mode}%
624 \DeclareRobustCommand\big[1]{\leavevmode@ifvmode
625     {\hbox{$\left#1\vbox to8.5\p@{\right.\n@space$}}}}
626 \DeclareRobustCommand\Big[1]{\leavevmode@ifvmode
627     {\hbox{$\left#1\vbox to11.5\p@{\right.\n@space$}}}}
628 \DeclareRobustCommand\bigg[1]{\leavevmode@ifvmode
629     {\hbox{$\left#1\vbox to14.5\p@{\right.\n@space$}}}}
630 \DeclareRobustCommand\Bigg[1]{\leavevmode@ifvmode
631     {\hbox{$\left#1\vbox to17.5\p@{\right.\n@space$}}}}
632 </math | latexrelease>
```

```

633 \latexrelease\EndIncludeInRelease
634 \latexrelease\IncludeInRelease{0000/00/00}%
635 \latexrelease{\Big}{\Start LR-mode}%
636 \latexrelease\def\big#1{{\hbox{$\left#1\ vbox to8.5\p@{\right.\n@space$}}}}
637 \latexrelease\def\Big#1{{\hbox{$\left#1\ vbox to11.5\p@{\right.\n@space$}}}}
638 \latexrelease\def\bigg#1{{\hbox{$\left#1\ vbox to14.5\p@{\right.\n@space$}}}}
639 \latexrelease\def\Bigg#1{{\hbox{$\left#1\ vbox to17.5\p@{\right.\n@space$}}}}
640 \latexrelease\EndIncludeInRelease
641 \*math)

642 \def\n@space{\null\delimiterspace\z@ \m@th}

```

## 6.6.2 The log-like functions

`\operator@font` The `\operator@font` determines the symbol font used for log-like functions.

```

643 \def\operator@font{\mathgroup\symoperators}

```

(End definition for `\operator@font`. This function is documented on page ??.)

## 6.6.3 Parameters

```

644 \thinmuskip=3mu
645 \medmuskip=4mu plus 2mu minus 4mu
646 \thickmuskip=5mu plus 5mu

```

This finishes the low-level setup in `fontmath.ltx`.

```

647 \math)

```

# 7 Default cfg files

We provide default `cfg` files here to ensure that on installations that search large file trees we do not pick up some strange customisation files from somewhere.

```

648 \*cfgtext | cfgmath | cfgprel)
649 %%
650 %%
651 %%
652 %% Load the standard setup:
653 %%
654 \+cfgtext\input{fonttext.ltx}
655 \+cfgmath\input{fontmath.ltx}
656 \+cfgprel\input{preload.ltx}
657 %%
658 %% Small changes could go here; see documentation in cfgguide.tex for
659 %% allowed modifications.
660 %%
661 %% In particular it is not allowed to misuse this configuration file
662 %% to modify internal LaTeX commands!
663 %%
664 %% If you use this file as the basis for configuration please change
665 %% the \ProvidesFile lines to clearly identify your modification, e.g.,
666 %%
667 \+cfgtext%% \ProvidesFile{fonttext.cfg}[2001/06/01
668 \+cfgmath%% \ProvidesFile{fontmath.cfg}[2001/06/01
669 \+cfgprel%% \ProvidesFile{preload.cfg}[2001/06/01
670 %% Customised local font setup]
671 %%

```

```
672 %%  
673 </cfgtext | cfgmath | cfgprel>
```

# File y

## preload.dtx

### 1 Overview

This file contains an number of possible settings for preloading fonts during installation of NFSS2 (which is used by L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>). It will be used to generate the following files:

preload.min	minimal subset of fonts necessary to run NFSS2
preload.ori	preload of CM fonts similar to the old <code>lfonts.tex</code>
preload.ltx	The standard selection of preloads
cmpreload.xpt	preload of CM fonts for 10pt document size
cmpreload.xip	preload of CM fonts for 11pt document size
cmpreload.xii	preload of CM fonts for 12pt document size
dcpreload.xpt	preload of DC fonts for 10pt size
dcpreload.xip	preload of DC fonts for 11pt size
dcpreload.xii	preload of DC fonts for 12pt size

These files are for installations that make use of Computer Modern fonts either old encoding (OT1) or Cork encoding (T1). The Computer Modern fonts with Cork encoding are known as DC-fonts.

Most important is `preload.ltx` which is used during format generation. You are *not* allowed to change this file.

### 2 Customization

You can customize the preloaded fonts in your L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> system by installing a file with the name `preload.cfg`. If this file exists it will be used in place of the system file `preload.ltx`. You can, for example, copy one of the files mentioned above (that can be generated from this source) to `preload.cfg`.

Or you can define completely other preloads. In that case start from `preload.min` since that contains the fonts that have to be preloaded by *\*all\** L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> systems.

Avoid using `preload.ori`, it will load so many fonts that on most installations it is nearly impossible to load other font families afterwards. This file is only generated to show what fonts have been preloaded by L<sup>A</sup>T<sub>E</sub>X 2.09.

If you normally use other fonts than Computer Modern `preload.min` might be best.

**Warning:** If you preload fonts with encodings other than the normally supported encodings you have to declare that encoding in a `fontdef.cfg` configuration file (see the documentation in the file `fontdef.dtx`). Adding an extra encoding to the format might produce non-portable documents, thus this should be avoided if possible.

### 3 Module switches for the DOCSTRIP program

The DOCSTRIP will generate the above file from this source using the following module directives:

driver	produce a documentation driver file
preload	produce a preload... file
cm	for OT1 encoded Computer Modern
dc	for T1 encoded Computer Modern
min	produce minimal subset
xpt	produce 10pt preloads
xipt	produce 11pt preloads
xipt	produce 12pt preloads
ori	produce preloads similar to old <code>lfonts.tex</code>
tex	produce <code>preload.ltx</code>

A typical DOCSTRIP command file would then have entries like:

```
generateFile{preload.min}{t}{\from{preload.dtx}{preload,min}}
```

for generating preload files.

## 4 A driver for this document

The next bit of code contains the documentation driver file for T<sub>E</sub>X, i.e., the file that will produce the documentation you are currently reading. It will be extracted from this file by the DOCSTRIP program.

```

1 <*driver>
2 \documentclass{ltxdoc}
3 %\OnlyDescription % comment out for implementation details
4 \begin{document}
5   \DocInput{preload.dtx}
6 \end{document}
7 </driver>
```

## 5 The code

We begin by loading the math extension font (cmex10) and the L<sup>A</sup>T<sub>E</sub>X line and circle fonts. It is necessary to do this explicitly since these are used by `lplain.tex` and `latex.tex`. Since the internal font name contains / characters and digits we construct the name via `\csname`. These are the only fonts (!) that must be loaded in this file.

All `\DeclarePreloadSizes` can be removed or others can be added, they only influence the processing speed.

```

8 \expandafter\font\csname OMX/cmex/m/n/10\endcsname=cmex10\relax
9 \font\tenln =line10 \font\tenlnw =linew10\relax
10 \font\tencirc=lcircle10 \font\tencircw=lcirclew10\relax
```

The above fonts should not be touched but anything below this point here in the preload suggestions can be modified without any problems.

```

11 <-tex>%*****
12 <-tex>% Start any modification below this point **
13 <-tex>%*****
14 <-tex>
15 %%
16 %% Computer Modern Roman:
17 %%-----
```



```

18 <*ori>
19 \DeclarePreloadSizes{OT1}{cmr}{m}{n}
20     {5,6,7,8,9,10,10.95,12,14.4,17.28,20.74,24.88}
21 \DeclarePreloadSizes{OT1}{cmr}{bx}{n}{9,10,10.95,12,14.4,17.28}
22 \DeclarePreloadSizes{OT1}{cmr}{m}{sl}{10,10.95,12}
23 \DeclarePreloadSizes{OT1}{cmr}{m}{it}{7,8,9,10,10.95,12}
24 </ori>
25 <+xpt & cm> \DeclarePreloadSizes{OT1}{cmr}{m}{n}{5,7,10}
26 <+xpt & dc> \DeclarePreloadSizes{T1}{cmr}{m}{n}{5,7,10}
27 <+xipt & cm> \DeclarePreloadSizes{OT1}{cmr}{m}{n}{6,8,10.95}
28 <+xipt & dc> \DeclarePreloadSizes{T1}{cmr}{m}{n}{6,8,10.95}
29 <+xipt & cm> \DeclarePreloadSizes{OT1}{cmr}{m}{n}{6,8,12}
30 <+xipt & dc> \DeclarePreloadSizes{T1}{cmr}{m}{n}{6,8,12}
31 %%
32 %% Computer Modern Sans:
33 %%-----
34 <+ori> \DeclarePreloadSizes{OT1}{cmss}{m}{n}{10,10.95,12}
35 %%
36 %% Computer Modern Typewriter:
37 %%-----
38 <+ori> \DeclarePreloadSizes{OT1}{cmtt}{m}{n}{9,10,10.95,12}
39 %%
40 %% Computer Modern Math:
41 %%-----
42 <*ori>
43 \DeclarePreloadSizes{OML}{cmm}{m}{it}
44     {5,6,7,8,9,10,10.95,12,14.4,17.28,20.74}
45 \DeclarePreloadSizes{OMS}{cmsy}{m}{n}
46     {5,6,7,8,9,10,10.95,12,14.4,17.28,20.74}
47 </ori>

```

The math fonts are the same for both DC and CM fonts. So far there isn't an agreed on standard.

```

48 <*xpt>
49 \DeclarePreloadSizes{OML}{cmm}{m}{it}{5,7,10}
50 \DeclarePreloadSizes{OMS}{cmsy}{m}{n}{5,7,10}
51 </xpt>
52 <*xipt>
53 \DeclarePreloadSizes{OML}{cmm}{m}{it}{6,8,10.95}
54 \DeclarePreloadSizes{OMS}{cmsy}{m}{n}{6,8,10.95}
55 </xipt>
56 <*xipt>
57 \DeclarePreloadSizes{OML}{cmm}{m}{it}{6,8,12}
58 \DeclarePreloadSizes{OMS}{cmsy}{m}{n}{6,8,12}
59 </xipt>
60 %%
61 %% LaTeX symbol fonts:
62 %%-----
63 <*ori>
64 \DeclarePreloadSizes{U}{lasy}{m}{n}
65     {5,6,7,8,9,10,10.95,12,14.4,17.28,20.74}
66 </ori>
67 </preload>

```

# File z

## lftntcmd.dtx

### Abstract

The commands defined in this file `lftntcmd` are part of the kernel code for  $\text{\LaTeX} 2_{\epsilon}/\text{NFSS2}$ .

It is also meant to serve as documentation for package writers since it demonstrates how to define high-level font changing commands using a small number of creator functions.

## 1 Introduction

Font changes such as `\bfseries`, `\sffamily`, etc. are declarations; this means that their scope is delimited by the grouping structure, either by the next `\end` of some environment or by explicitly using a group, e.g., writing something like `{\bfseries...}` in the source. If you make the mistake of writing `\bfseries{...}` (thinking of `\bfseries` as a command with one argument) then the result is rather striking.

Font declarations are an artifact of the  $\text{\TeX}$  system and for several reasons it is better to avoid them on the user level whenever possible. In  $\text{\LaTeX}3$  they will probably all be replaced by environments and by font commands taking one argument.

This file defines a creator function for such declarative font switches. This function creates commands which can be used in both math and text.

This file also defines a number of high-level commands (all starting with `\text..`) that have one argument and typeset this argument in the requested way. Thus these commands are for typesetting short pieces of text in a specific family, series or shape. These are all produced as examples of the use of a creator function which is itself also defined in this file.

Table 1 shows all these high-level commands in action. A further advantage of using these commands is that they automatically take care of any necessary italic correction on either side of their argument.

Thus, when using such commands, one does not have to worry about forgetting the italic correction when changing fonts. Only in very few situations is this additional space wrong but, for example, most typographers recommend omitting the italic correction if a small punctuation character, like a comma, directly follows the font change. Since the amount of correction required is partly a matter of taste, you can define in what situations the italic correction should be suppressed. This is done by putting the characters that should cancel a preceding italic correction in the list `\nocorrlist`.<sup>16</sup> The default definition for this list is produced by the following.

```
\newcommand \nocorrlist {,.}
```

It is best to declare the most often used characters first, because this will make the processing slightly faster. For example,

```
\emph{When using the \NFSS{} high-level commands,  
the \emph{proper} use of italic corrections is  
automatically taken care of}. Only
```

---

<sup>16</sup>Any package that changes the `\catcode` of a character inside `\nocorrlist` must then explicitly reset the list. Otherwise the changed character will no longer be recognized by the suppression algorithm.

<i>Command</i>	<i>Corresponds to</i>	<i>Action</i>
<code>\textnormal{..}</code>	<code>\normalfont</code>	Typeset argument in normal family
<code>\textrm{..}</code>	<code>\rmfamily</code>	Typeset argument in roman family
<code>\textsf{..}</code>	<code>\sffamily</code>	Typeset argument in <b>sans serif</b> family
<code>\texttt{..}</code>	<code>\ttfamily</code>	Typeset argument in <b>typewriter</b> family
<code>\textmd{..}</code>	<code>\mdseries</code>	Typeset argument in medium series
<code>\textbf{..}</code>	<code>\bfseries</code>	Typeset argument in <b>bold</b> series
<code>\textup{..}</code>	<code>\upshape</code>	Typeset argument in normal shape
<code>\textit{..}</code>	<code>\itshape</code>	Typeset argument in <i>italic</i> shape
<code>\textsl{..}</code>	<code>\slshape</code>	Typeset argument in <i>slanted</i> shape
<code>\textsc{..}</code>	<code>\scshape</code>	Typeset argument in SMALL CAPS shape
<code>\emph{..}</code>	<code>\em</code>	Typeset argument <i>emphasized</i>

Table 1: Font-change commands with arguments

The font change commands provided here all start with `\text..` to emphasize that they are for use in normal text and to be easily memorable. They automatically take care of any necessary italic correction on either side of the argument.

`\emph{sometimes}` one has to help `\LaTeX{}` by adding a `\verb=\nocorr=` command.

which results in:

*When using the NFSS high-level commands, the proper use of italic corrections is automatically taken care of. Only sometimes one has to help L<sup>A</sup>T<sub>E</sub>X by adding a `\nocorr` command.*

In contrast, the use of the declaration forms is often more appropriate when you define your own commands or environments.

```
\newenvironment{bfitemize}{\begin{itemize}\normalfont\bfseries}
                          {\end{itemize}}
\begin{bfitemize}
\item This environment produces boldface items.
\item It is defined in terms of \LaTeX's
      \texttt{itemize} environment and NFSS
      declarations.
\end{bfitemize}
```

This gives:

- **This environment produces boldface items.**
- **It is defined in terms of L<sup>A</sup>T<sub>E</sub>X's `itemize` environment and NFSS declarations.**

In addition to global customization of when to insert the italic correction, it is of course sometimes necessary to explicitly insert one with `\/`.

It is also possible to suppress the italic correction in individual instances. For this, the command `\nocorr` is provided.

The `\nocorr` must appear as the first or last token inside the braces of the argument of the `\text...` commands, at that end of the text where you wish to suppress the italic correction.

It is worth pointing out here that inserting a `\/` in places where it can have no function (i.e. anywhere except immediately after a slanted letter) is not an error—it will just be silently ignored. Unfortunately this is not true if the redefinition of `\/` in `amstex.sty` is used as this version can cause space to be removed immediately before the `\/`.

## 2 The implementation

`\DeclareTextFontCommand` This is the creator function for `\text..` commands. It gives a warning if `\foo` or `\fragfoo` is already defined.

In math mode it simply puts the font declaration and text into a box (possibly an automagically sized one).

Otherwise it first scans the text to see where `\nocorr` occurs within it. This sets the `\check@ic` commands to do what is necessary concerning the italic correction at both ends.

The algorithm for deciding whether to put in an italic correction is not very subtle: one is added whenever the newly current font is not itself positively sloped, unless the next token is a character in the ‘nocorr’ list. At the end of the text this is done after closing the group so as to check the ‘outer font’. Note that this will often result in adding an italic correction token after a character in an unsloped font; we believe (in early 2003) that this is perhaps inefficient but not dangerous.

It also now checks for empty contents of the text command and optimises this case. Some care is also taken to check that doing dangerous things in vertical mode is avoided.

The italic correction token is added to the horizontal list before (in the list) an immediately preceding non-zero glob of glue (skip) and any non-zero penalty preceding that since, in the typical case, this puts it immediately after the last character in the preceding word.

Note that it is necessary to put in the `\aftergroup\maybe@ic` at the end of the group so that it comes after any other aftergroup tokens and immediately before the following tokens. It is also necessary to remove the `\fi` from the token list before the group ends; this is done by adding an `\expandafter` just before the closing brace.

```

1  \<2kernel>
2  \def \DeclareTextFontCommand #1#2{%
3    \DeclareRobustCommand#1[1]{%
4      \ifmmode
5        \nfss@text{#2##1}%
6      \else
7        \hmode\bgroup
8        \text@command{##1}%
9        #2\check@icl ##1\check@icr
10       \expandafter
11       \egroup
12       \fi
13           }%
14  }
```

(End definition for `\DeclareTextFontCommand`. This function is documented on page ??.)

`\textrm` Now we define the `\text{family}` commands in terms of the above; `\texttt` does not  
`\textsf` look very nice!  
`\texttt` 15 `\DeclareTextFontCommand{\textrm}{\rmfamily}`  
`\textnormal` 16 `\DeclareTextFontCommand{\textsf}{\sffamily}`  
 17 `\DeclareTextFontCommand{\texttt}{\ttfamily}`  
 18 `\DeclareTextFontCommand{\textnormal}{\normalfont}`

(End definition for `\textrm` and others. These functions are documented on page ??.)

`\textbf` For the series attribute:  
`\textmd` 19 `\DeclareTextFontCommand{\textbf}{\bfseries}`  
 20 `\DeclareTextFontCommand{\textmd}{\mdseries}`

(End definition for `\textbf` and `\textmd`. These functions are documented on page ??.)

`\textit` And for the shapes:  
`\textsl` 21 `\DeclareTextFontCommand{\textit}{\itshape}`  
`\textsc` 22 `\DeclareTextFontCommand{\textsl}{\slshape}`  
`\textup` 23 `\DeclareTextFontCommand{\textsc}{\scshape}`  
 24 `\DeclareTextFontCommand{\textup}{\upshape}`

(End definition for `\textit` and others. These functions are documented on page ??.)

`textulc`  
`textsw` 25 `\let\textulc\undefined`  
`textssc` 26 `\let\textsw\undefined`  
 27 `\let\textssc\undefined`  
 28 `\let\textulc\undefined`  
 29 `\let\textulc\undefined`  
 30 `\let\textulc\undefined`  
 31 `\let\textulc\undefined`  
 32 `\let\textulc\undefined`  
 33 `\let\textulc\undefined`  
 34 `\let\textulc\undefined`  
 35 `\let\textulc\undefined`  
 36 `\let\textulc\undefined`  
 37 `\let\textulc\undefined`  
 38 `\let\textulc\undefined`  
 39 `\let\textulc\undefined`  
 40 `\let\textulc\undefined`  
 41 `\let\textulc\undefined`

(End definition for `textulc`, `textsw`, and `textssc`. These functions are documented on page ??.)

`\emph` Finally we have the `\em` font change declaration of L<sup>A</sup>T<sub>E</sub>X. The corresponding definition  
 with argument is  
 42 `\DeclareTextFontCommand{\emph}{\em}`

(End definition for `\emph`. This function is documented on page ??.)

`\nocorr` This is just a label, so it does nothing; it should also be unexpandable.  
 43 `\let\nocorr\relax`

(End definition for `\nocorr`. This function is documented on page ??.)

`\check@icl` We define these defaults in case some error causes them to be expanded at the wrong  
`\check@icr` time.

```
44 \let \check@icl \@empty
45 \let \check@icr \@empty
```

(End definition for `\check@icl` and `\check@icr`. These functions are documented on page ??.)

`\text@command` This checks for a `\nocorr` as the first token in its argument and also for one in any other  
`\check@nocorr@` position not protected within braces (the latter is treated as if it were at the end of the argument).

Is this the correct action in the ‘empty’ case? It is efficient but typographically it is, strictly, incorrect!

```
46 \def \text@command #1{%
47   \def \reserved@a {#1}%
48   \ifx \reserved@a \@empty
49     \let \check@icl \@empty
50     \let \check@icr \@empty
51   \else
```

`\space` is a reserved word in L<sup>A</sup>T<sub>E</sub>X or actually already in plain T<sub>E</sub>X. If somebody really redefines it so many things will break that I don’t see any reason to make this routine here slower than necessary.

```
52 %   \def \reserved@b { }%
53 %   \ifx \reserved@a \reserved@b
54   \ifx \reserved@a \space
55     \let \check@icl \@empty
56     \let \check@icr \@empty
57   \else
58     \check@nocorr@ #1\nocorr\@nil
59   \fi
60 \fi
61 }
62 \def \check@nocorr@ #1#2\nocorr#3\@nil {%
```

The two checks are initialised here to their values in the normal case.

```
63 \let \check@icl \maybe@ic
64 \def \check@icr {\ifvmode \else \aftergroup \maybe@ic \fi}%
65 \def \reserved@a {\nocorr}%
66 \def \reserved@b {#1}%
67 \def \reserved@c {#3}%
68 \ifx \reserved@a \reserved@b
69   \ifx \reserved@c \@empty
```

In this case there is a `\nocorr` at the start but not at the end, so `\check@icl` should be empty.

```
70   \let \check@icl \@empty
71 \else
```

Otherwise there is a `\nocorr` both at the start and elsewhere, so no italic corrections should be added.

```
72   \let \check@icl \@empty
73   \let \check@icr \@empty
74 \fi
```

```

75  \else
76  \ifx \reserved@c \@empty

```

In this case there is no `\nocorr` anywhere, so we need to check for an italic correction at both the beginning and the end. This has been set up as the default so no code is needed here.

```

77  \else

```

In this case there is no `\nocorr` at the start but there is one elsewhere, so no `\aftergroup` is needed.

```

78      \let \check@icr \@empty
79  \fi
80  \fi
81 }

```

*(End definition for \text@command and \check@nocorr@. These functions are documented on page ??.)*

`\ifmaybe@ic` Switch used solely within `\maybe@ic` not interfering with other switches.

```

82 \newif\ifmaybe@ic

```

*(End definition for \ifmaybe@ic. This function is documented on page ??.)*

`\maybe@ic` These macros implement the italic correction.

```

\maybe@ic@
83 \def \maybe@ic {\futurelet\@let@token\maybe@ic@}
84 \def \maybe@ic@ {%

```

We first check to see if the current font is positively sloped. (But do not forget the message Rainer sent about an upright font with non-zero slope! Or is this an urban myth?) It has been suggested that this should test against a small positive value, but what?

```

85  \ifdim \fontdimen\@ne\font>\z@
86  \else
87  \maybe@ictrue

```

It would be possible, but probably not worthwhile, to continue the forward scan beyond any closing braces.

```

88  \expandafter\@tfor\expandafter\reserved@a\expandafter:\expandafter=%
89  \nocorrlist

```

We have to hide the `\@let@token` in the macro `\t@st@ic` rather than testing it directly in the loop since it might be `\let` to a `\fi` or `\else`, which would result in chaos.

```

90  \do \t@st@ic

```

Frank thinks that the next bit it is inefficient if done after the second change. Chris thinks that most all of this is inefficient for the commonest cases: but that is the price of a cleverer algorithm. It is certainly needed to deal with the use of `\nolinebreak`.

```

91  \ifmaybe@ic \sw@slant \fi
92  \fi
93 }

```

*(End definition for \maybe@ic and \maybe@ic@. These functions are documented on page ??.)*

`\t@st@ic` The next token in the input stream is stored in `\@let@token` via a `\let`, the current token from `\nocorrlist` is stored via `\def` in `\reserved@a`. To compare them we have to fiddle around a bit.

If the only things to check were characters then this could be done via an `\if` thus their catcodes would not matter; but this will not work whilst `\futurelet` is used above.

```

94 \def \t@st@ic {%
95   \expandafter\let\expandafter\reserved@b\expandafter=\reserved@a\relax
96   \ifx\reserved@b\@let@token

```

If they are the same we record the fact and jump out of the loop.

```

97     \maybe@icfalse
98     \@break@tfor
99   \fi
100 }

```

(End definition for `\t@st@ic`. This function is documented on page ??.)

`\sw@slant` The definition of the mysterious `\sw@slant` command is as follows.  
`\fix@penalty`

```

101 \def \sw@slant {%

```

It is surely correct to put in an italic correction when there is no skip. If the last thing on the list is actually a zero skip (including things whose dimension part is zero, such as `\hfill`), or anything other than a character, then the italic correction will have no effect.

In order to work correctly with unbreakable spaces from `~` (and other common forms of line-breaking control) we also move back across a penalty before the glue.

```

102   \ifdim \lastskip=\z@
103     \fix@penalty
104   \else
105     \skip@ \lastskip
106     \unskip
107     \fix@penalty
108     \hskip \skip@
109   \fi
110 }

```

The above code means: “If there is a non-zero space just before the current position (`\ifdim...`) save the amount of that space (`\skip@\lastskip`), remove it (`\unskip`), then do a similar thing if there is a penalty just before the skip, and finally put the space back in.”

Since zero glue cannot be distinguished in this context from no glue, we dare not put in an `\hskip` in this case as this may produce an unwanted breakpoint. This is not satisfactory.

The penalty before the glue is handled similarly, with the same caveats concerning the zero case. Is this the first recorded use of `\unpenalty` in standard L<sup>A</sup>T<sub>E</sub>X code?

```

111 \def \fix@penalty {%
112   \ifnum \lastpenalty=\z@
113     @@italiccorr
114   \else
115     \count@ \lastpenalty
116     \unpenalty
117     @@italiccorr

```



```

118     \penalty \count@
119     \fi
120 }

```

(End definition for `\sw@slant` and `\fix@penalty`. These functions are documented on page ??.)

**\nocorrlist** This holds the list of characters that should prevent italic correction. They should be ordered by decreasing frequency of use. If any such character is made active later on one needs to redefine the list so that the active character becomes part of it.

```

121 \def \nocorrlist {,.}

```

(End definition for `\nocorrlist`. This function is documented on page ??.)

**\nfss@text** This command will by default behave like a L<sup>A</sup>T<sub>E</sub>X `\mbox` but may be redefined by packages such as `amstext.sty` to be a bit cleverer.

```

122 \ifx \nfss@text\undefined
123   \def \nfss@text {\leavevmode\hbox}
124 \fi

```

(End definition for `\nfss@text`. This function is documented on page ??.)

**\DeclareOldFontCommand** This is the function used to create declarative font-changing commands that can also be used to change alphabets in math-mode.

Usage: `\DeclareOldFontCommand \fn{<font-change decls>} <math-alphabet>`

Here `\fn` is the font-declaration command being defined, `<font-change decls>` is the declaration it will expand to in text-mode, and `<math-alphabet>` is the (single) math alphabet specifier which is to be used in math-mode.

It does not care whether the command being defined already exists but it does give a warning if it redefines anything.

Here are some typical examples of its use in conjunction with more basic NFSS2 font commands.

```

\DeclareOldFontCommand{\rm}{\normalfont\rmfamily}{\mathrm}
\DeclareOldFontCommand{\sf}{\normalfont\sffamily}{\mathsf}
\DeclareOldFontCommand{\tt}{\normalfont\ttfamily}{\mathtt}

```

```

125 \def \DeclareOldFontCommand #1#2#3{%
126   \DeclareRobustCommand #1{\@fontswitch {#2}{#3}}%
127 }

```

(End definition for `\DeclareOldFontCommand`. This function is documented on page ??.)

**\@fontswitch** **\@math@egroup** **\@math@egroup** These two commands actually do the necessary tests and declarative font- or alphabet-changing.

```

128 \def \@fontswitch #1#2{%
129   \ifmmode
130     \let \math@bgroup \relax
131     \def \math@egroup {\let \math@bgroup \@math@bgroup
132                       \let \math@egroup \@math@egroup}%

```

We need to have a `\relax` in the following line in case the `#2` is something like `\mathsf` grabbing the next token as an argument. For this reason the code also uses explicit arguments again (see pr/1275).

```

133     #2\relax
134   \else
135     #1%
136   \fi
137 }
138 \let \@@math@bgroup \math@bgroup
139 \let \@@math@egroup \math@egroup

```

*(End definition for \fontswitch, \@@math@egroup, and \@@math@egroup. These functions are documented on page ??.)*

These commands are available only in the preamble.

```

140 \onlypreamble \DeclareTextFontCommand
141 \onlypreamble \DeclareOldFontCommand

```

### 3 Initialization

`\normalsize` This is defined to produce an error.

```

142 \def\normalsize{%
143   \@latex@error {The font size command \protect\normalsize\space
144                 is not defined:\MessageBreak
145                 there is probably something wrong with
146                 the class file}\@eha
147 }
148 </2ekernel>

```

*(End definition for \normalsize. This function is documented on page ??.)*

## File A

# ltxtextcomp.dtx

This file contains the implementation for accessing the glyphs provided by the TS1 encoding (Text Companion Encoding). This is now offered as part of the kernel and so the `textcomp` package which used to provide the definitions is now mainly needed for compatibility reasons (and doesn't do much any more).

`\oldstylenums`  
`\legacyoldstylenums`

Preserve the old definition of `\oldstylenums` under a different name.

This macro implements old style numerals but only works if we assume that the standard math fonts are used. Thus it needs changing in case other math encodings are used.

```
1 <*2ekernel | latexrelease>
2 <latexrelease>\IncludeInRelease{2020/02/02}%
3 <latexrelease>          {\oldstylenums}{Old style numerals}%
4 \DeclareRobustCommand\legacyoldstylenums[1]{%
5   \begingroup
```

Provide spacing using the interword space of the current font.

```
6   \spaceskip\fontdimen\tw@\font
```

Then switch to the math italic font. We don't change the current value of `\f@series` which means that you can use bold numerals if `\bfseries` is in force. As family we use `\rmdefault` which means that this only works if there exist an OML encoded version of that font or rather a corresponding `.fd` file (which is the case for standard L<sup>A</sup>T<sub>E</sub>X fonts even though they only contain substitutions).

```
7   \usefont{OML}{\rmdefault}{\f@series}{it}%
8   \mathgroup\symletters #1%
9   \endgroup
10 }
```

And here is the improved one that adjusts depending on surroundings.

```
11 \DeclareRobustCommand\oldstylenums[1]{%
12   \begingroup
13   \ifmmode
14     \mathgroup\symletters #1%
15   \else
```

The `\CheckEncodingSubset` is discussed below.

```
16   \CheckEncodingSubset\@use@text@encoding{TS1}\tc@oldstylesubst2{\#1}%
17   \fi
18   \endgroup
19 }
```

The helper to select the substitution if needed.

```
20 \def\tc@oldstylesubst#1{%
21   \tc@errorwarn
22     {Oldstyle digits unavailable for
23     family \f@family.\MessageBreak
24     Default oldstyle digits used instead}\@eha
25   \bgroup
26   \expand@font@defaults
```

The substitution defaults are provided in the file `fonttext.ltx`.

```

27     \ifx\f@family\rmdef@ult
28         \fontfamily\rmsubstdefault
29     \else\ifx\f@family\sfdef@ult
30         \fontfamily\sfsbstdefault
31     \else\ifx\f@family\ttdef@ult
32         \fontfamily\ttsbstdefault
33     \else
34         \fontfamily\textcompsubstdefault
35     \fi\fi\fi
36     \fontencoding{TS1}\selectfont#1%
37 \egroup
38 }

```

(End definition for `\oldstylenums` and `\legacyoldstylenums`. These functions are documented on page ??.)

`\textcompsubstdefault` Here is the default for the “unknown” case:

```

39 \def\textcompsubstdefault{\rmsubstdefault}

```

(End definition for `\textcompsubstdefault`. This function is documented on page ??.)

```

40 </2ekernel | latexrelease>
41 <latexrelease>\EndIncludeInRelease
42 <latexrelease>\IncludeInRelease{0000/00/00}%
43 <latexrelease>         {\oldstylenums}{Old style numerals}%
44 <latexrelease>
45 <latexrelease>\DeclareRobustCommand\oldstylenums[1]{%
46 <latexrelease>     \begingroup
47 <latexrelease>     \spaceskip\fontdimen\tw@font
48 <latexrelease>     \usefont{OML}{\rmdefault}{\f@series}{it}%
49 <latexrelease>     \mathgroup\symletters #1%
50 <latexrelease>     \endgroup
51 <latexrelease>}
52 <latexrelease>\let\legacyoldstylenums\@undefined
53 <latexrelease>\def\textcompsubstdefault{cmr}
54 <latexrelease>
55 <latexrelease>\EndIncludeInRelease

```

Everything else in the this file got introduced 2020/02/02, so we do a single rollback (for now).

```

56 <*2ekernel>
57 </2ekernel>
58 <*2ekernel | latexrelease>
59 <latexrelease>\IncludeInRelease{2020/02/02}%
60 <latexrelease>     {\DeclareEncodingSubset}{Text companion symbols}%

```

`\DeclareEncodingSubset` The declaration takes 3 mandatory arguments: an *encoding* for which a subsetting is wanted (currently always `TS1`, and most likely forever), the *font family* for which we declare the subset and finally the *subset* number (between 0 (all of the encoding is supported) and 9 many glyphs are missing).

For `TS1` the numbers have been choosen in a way that most fonts can be fairly correctly categorized, but the default settings are always conservative, that is they may claim that less glyphs are supported than there actually are.

As these days many font families are set up to end in `-LF` (lining figures), `-OsF` (oldstyle figures), etc. the declaration supports a shortcut: if the *font family* name ends in `-*` then the star gets replaced by these common ending, e.g.,

```
\DeclareEncodingSubset{TS1}{Alegreya-*}{2}
```

is the same as writing

```
\DeclareEncodingSubset{TS1}{Alegreya-LF}{2}
\DeclareEncodingSubset{TS1}{Alegreya-OsF}{2}
\DeclareEncodingSubset{TS1}{Alegreya-TLF}{2}
\DeclareEncodingSubset{TS1}{Alegreya-TOsF}{2}
```

If only some are needed then one can define them individually but in many cases all four are wanted, hence the shortcut.

The coding of the declaration has no error checking as it is mostly for internal use.

```
61 \def\DeclareEncodingSubset#1#2{%
62   \DeclareEncodingSubset@aux{#1}#2*\DeclareEncodingSubset@aux
63 }
64 \def\DeclareEncodingSubset@aux#1#2*#3\DeclareEncodingSubset@aux#4{%
```

if `#3` is empty then there was no star, otherwise we define all four variants.

```
65   \expandafter\ifx\expandafter X\detokenize{#3}X%
66     \DeclareEncodingSubset{#1}{#2}{#4}%
67   \else
68     \DeclareEncodingSubset{#1}{#2LF}{#4}%
69     \DeclareEncodingSubset{#1}{#2TLF}{#4}%
70     \DeclareEncodingSubset{#1}{#2OsF}{#4}%
71     \DeclareEncodingSubset{#1}{#2TOsF}{#4}%
72   \fi
73 }
```

The subset info is stored in a command with the name `\family:subset` so if that already exists we change otherwise declare a subset.

```
74 \def\@DeclareEncodingSubset#1#2#3{%
75   \ifundefined{#1:#2}%
76     {\font@info{Setting #2 sub-encoding to #1/#3}}%
77     {\font@info{Changing #2 sub-encoding to #1/#3}}%
78     \namedef{#1:#2}{#3}}
```

Any reason to allow those in the middle of documents?

```
79 \@onlypreamble\DeclareEncodingSubset
80 \@onlypreamble\DeclareEncodingSubset@aux
81 \@onlypreamble\@DeclareEncodingSubset
```

(End definition for `\DeclareEncodingSubset`. This function is documented on page ??.)

**\CheckEncodingSubset** The command `\CheckEncodingSubset` will check if the current font family has the right encoding subset to typeset a certain command. It takes five arguments as follows: first argument is either `\UseTextSymbol`, `\UseTextAccent` depending on whether or not the symbol is a text symbol or a text accent.

The second argument is the encoding from which this symbol should be fetched.

The third argument is either a fake accessor command or an error message. the code in that argument (if ever executed) receives two arguments: `#2` and `#5` of `\CheckEncodingSubset`.

Argument four is the subset encoding id to test against: if this value is higher than the subset id of the current font family then we typeset the symbol, i.e., execute `#1{#2}#5` otherwise it runs `#3#5`, e.g., to produce an error message or fake the glyph somehow.

Argument five is the symbol or accent command that is being checked.

For usage examples see definitions below.

```

82 \def\CheckEncodingSubset#1#2#3#4#5{%
83   \ifnum #4>%
84     \expandafter\ifx\csname #2:\f@family\endcsname\relax
85     0\csname #2:?\endcsname
86   \else
87     \csname #2:\f@family\endcsname
88   \fi
89   \relax
90   \expandafter\@firstoftwo
91 \else
92   \expandafter\@secondoftwo
93 \fi
94   {#1{#2}}{#3}%
95   #5%
96 }
```

(End definition for `\CheckEncodingSubset`. This function is documented on page ??.)

To set up the glyphs for the subsets we need a number helpers.

`\tc@errorwarn` To we produce errors, warnings, or only info in the transcripts if glyphs require substitutions? By default it is “info” only. With the `textcomp` package that can be changed.

```

97 \def\tc@errorwarn#1#2{\@latex@info{#1}}
```

(End definition for `\tc@errorwarn`. This function is documented on page ??.)

`\tc@subst`

```

98 \def\tc@subst#1{%
99   \tc@errorwarn
100   {Symbol \string#1 not provided by\MessageBreak
101    font family \f@family\space
102    in TS1 encoding.\MessageBreak Default family used instead}\@eha
103   \bgroup
104     \expand@font@defaults
105     \ifx\f@family\rmdef@ult
106       \fontfamily\rmsubstdefault
107     \else\ifx\f@family\sfddef@ult
108       \fontfamily\sfsbstdefault
109     \else\ifx\f@family\ttdef@ult
110       \fontfamily\ttsbstdefault
111     \else
112       \fontfamily\textcompsubstdefault
113     \fi\fi\fi
```

Whatever default was chosen, we claim now (locally hopefully) that it can handle all slots (even if not true) to avoid looping in certain situations, e.g., when something was set up incorrectly.

```

114     \@namedef{TS1:\f@family}{0}%
115     \selectfont#1%
116   \egroup
117 }
```

(End definition for `\tc@subst`. This function is documented on page ??.)

`\tc@fake@euro` `\tc@fake@euro` is an example of a “fake” definition to use in arg #3 of `\CheckEncodingSubset` when a symbol is not available in a certain font family. Here we produce a poor man’s Euro symbol by combining a “C” with a “=”.

```

118 \def\tc@fake@euro#1{%
119   \leavevmode
120   \@font@info{Faking \noexpand#1for font family
121               \f@family\MessageBreak in TS1 encoding}%
122   \valign{##\cr
123     \vfil\hbox to 0.07em{\dimen@\f@size\p@
124                         \math@fontsfalse
125                         \fontsize{.7\dimen@}\z@\selectfont=\hss}%
126     \vfil\cr%
127     \hbox{C}\crrcr
128   }%
129 }
```

(End definition for `\tc@fake@euro`. This function is documented on page ??.)

`\tc@check@symbol` These are two abbreviations that we use below to check symbols and accents in TS1.  
`\tc@check@accent` Only there to save some space, e.g., we can then write

`DeclareTextCommandDefault{\textcurrency}{\tc@check@symbol3\textcurrency}`

to ensure that `\textcurrency` is only typeset if the current font has a TS1 subset id of less than 3. Otherwise `\tc@error` is called telling the user that for this font family `\textcurrency` is not available.

```

130 \def\tc@check@symbol{\CheckEncodingSubset\UseTextSymbol{TS1}\tc@subst}

    Accents and been mad an error in the textcomp package when not available. Now
    that we provide the functionality in the kernel we avoid the error by swapping in a T1
    accent if the TS1 accent is not available.

131 %\def\tc@check@accent{\CheckEncodingSubset\UseTextAccent{TS1}\tc@error}
132 \def\tc@check@accent#1{\CheckEncodingSubset\UseTextAccent{TS1}{\tc@swap@accent#1}}
133 \def\tc@swap@accent#1#2{\UseTextAccent{T1}#1}
```

(End definition for `\tc@check@symbol` and `\tc@check@accent`. These functions are documented on page ??.)

## 1 Sub-encodings

Here are the default definitions for the TS1 symbols. First those that we assume are always available if a font implements TS1.

```

134 \DeclareTextSymbolDefault{\textdollar}{TS1}
135 \UndeclareTextCommand{\textdollar} {OT1}           % don't use the OT1 def any longer
136 \DeclareTextSymbolDefault{\textsterling}{TS1}
137 \UndeclareTextCommand{\textsterling}{OT1}          % don't use the OT1 def any longer
138 \DeclareTextSymbolDefault{\textperthousand}{TS1}
139 \UndeclareTextCommand{\textperthousand}{T1}        % don't use the T1 def
```

Using `\UndeclareTextCommand` above is enough only if the encoding definition files are not reloaded afterwards. In the past that happened if `fontenc` was used in the document preamble (not any longer). So in some sense it is better to fully remove them from the encoding files, but for rollbacks it is easier to keep them in for now.

These are the standard `itemize` and footnote symbols originally taken from OMS and now from TS1:

```

140 \DeclareTextSymbolDefault{\textasteriskcentered}{TS1}
141 \DeclareTextSymbolDefault{\textbullet}{TS1}
142 \DeclareTextSymbolDefault{\textdaggerdbl}{TS1}
143 \DeclareTextSymbolDefault{\textdagger}{TS1}
144 \DeclareTextSymbolDefault{\textparagraph}{TS1}
145 \DeclareTextSymbolDefault{\textperiodcentered}{TS1}
146 \DeclareTextSymbolDefault{\textsection}{TS1}

```

And here are the other TS1 glyphs that are implemented by every font (or nearly everyone—a few are commented out and moved to sub-encoding 9, because they aren't around in one or two fonts.

```

147 %%\DeclareTextSymbolDefault{\textbardbl}{TS1} % subst in sub-enc 9 above
148 \DeclareTextSymbolDefault{\textbrokenbar}{TS1}
149 %%\DeclareTextSymbolDefault{\textcelsius}{TS1} % subst in sub-enc 9 above
150 \DeclareTextSymbolDefault{\textcent}{TS1}
151 \DeclareTextSymbolDefault{\textcopyright}{TS1}
152 \DeclareTextSymbolDefault{\textdegree}{TS1}
153 \DeclareTextSymbolDefault{\textdiv}{TS1}
154 \DeclareTextSymbolDefault{\textlnot}{TS1}
155 \DeclareTextSymbolDefault{\textonehalf}{TS1}
156 \DeclareTextSymbolDefault{\textonequarter}{TS1}
157 %%\DeclareTextSymbolDefault{\textonesuperior}{TS1} % subst in sub-enc 9 above
158 \DeclareTextSymbolDefault{\textordfeminine}{TS1}
159 \DeclareTextSymbolDefault{\textordmasculine}{TS1}
160 \DeclareTextSymbolDefault{\textpm}{TS1}
161 \DeclareTextSymbolDefault{\textquotesingle}{TS1}
162 \DeclareTextSymbolDefault{\textquotestraightbase}{TS1}
163 \DeclareTextSymbolDefault{\textquotestraightdblbase}{TS1}
164 \DeclareTextSymbolDefault{\textregistered}{TS1}
165 %%\DeclareTextSymbolDefault{\textthreequartersemdash}{TS1} % subst in sub-enc 9 above
166 \DeclareTextSymbolDefault{\textthreequarters}{TS1}
167 %%\DeclareTextSymbolDefault{\textthreesuperior}{TS1} % subst in sub-enc 9 above
168 \DeclareTextSymbolDefault{\texttimes}{TS1}
169 \DeclareTextSymbolDefault{\texttrademark}{TS1}
170 %%\DeclareTextSymbolDefault{\texttwelveudash}{TS1} % subst in sub-enc 9 above
171 %%\DeclareTextSymbolDefault{\texttwosuperior}{TS1} % subst in sub-enc 9 above
172 \DeclareTextSymbolDefault{\textyen}{TS1}

173 \DeclareTextSymbolDefault{\textcapitalcompwordmark}{TS1}
174 \DeclareTextSymbolDefault{\textascendercompwordmark}{TS1}

```

In the following sections the remaining default definitions are ordered by sub-encoding in which they are become unavailable (i.e., they are not provided in the sub-encoding with that number and all sub-encodings with higher numbers.

Thus the symbols that are available in sub-encoding  $x$  are the symbols above (always available) and the symbols list in the sections for sub-encodings  $x + 1$  and higher.



## 1.1 Sub-encoding 1 (drop symbols not working in Latin Modern)

The `\textcircled` is available but the glyph is simply too small so we keep using the OMS glyph.

```
175 \DeclareTextCommandDefault{\textcircled}
176   {\CheckEncodingSubset\UseTextAccent{TS1}{\UseTextAccent{OMS}}1\textcircled}
```

## 1.2 Sub-encoding 2 (majority of new OTF fonts via autointst)

```
177 \DeclareTextCommandDefault{\t}
178   {\CheckEncodingSubset\UseTextAccent{TS1}{\UseTextAccent{OML}}2\t}
```

Capital accents are really only very seldom implemented, so from sub-encoding 2 onwards we use the normal T1 accents if they are asked for in the document.

In Unicode engines we don't implement them at all but always use the basic accents instead. whether that works or not really depends on the font, something like `\"X` usually comes out wrong in Unicode engines.

```
179 \ifx\Umathcode\@undefined
180   \DeclareTextCommandDefault{\capitalacute}      {\tc@check@accent{'}2\capitalacute}
181   \DeclareTextCommandDefault{\capitalbreve}      {\tc@check@accent{\u}2\capitalbreve}
182   \DeclareTextCommandDefault{\capitalcaron}      {\tc@check@accent{\v}2\capitalcaron}
183   \DeclareTextCommandDefault{\capitalcedilla}    {\tc@check@accent{\c}2\capitalcedilla}
184   \DeclareTextCommandDefault{\capitalcircumflex} {\tc@check@accent{\^}2\capitalcircumflex}
185   \DeclareTextCommandDefault{\capitaldieresis}   {\tc@check@accent{\"}2\capitaldieresis}
186   \DeclareTextCommandDefault{\capitaldotaccent}  {\tc@check@accent{\.}2\capitaldotaccent}
187   \DeclareTextCommandDefault{\capitalgrave}      {\tc@check@accent{\`}2\capitalgrave}
188   \DeclareTextCommandDefault{\capitalhungarumlaut}{\tc@check@accent{\H}2\capitalhungarumlaut}
189   \DeclareTextCommandDefault{\capitalmacron}     {\tc@check@accent{\=}2\capitalmacron}
190   \DeclareTextCommandDefault{\capitalogonek}     {\tc@check@accent{\k}2\capitalogonek}
191   \DeclareTextCommandDefault{\capitalring}       {\tc@check@accent{\r}2\capitalring}
192   \DeclareTextCommandDefault{\capitaltie}        {\tc@check@accent{\t}2\capitaltie}
193   \DeclareTextCommandDefault{\capitaltilde}      {\tc@check@accent{\~}2\capitaltilde}
```

For `\newtie` and `\capitalnewtie` this is actually wrong, they should pick up the accent from the substitution font (not done yet).

```
194   \DeclareTextCommandDefault{\newtie}            {\tc@check@accent{\t}2\newtie}
195   \DeclareTextCommandDefault{\capitalnewtie}     {\tc@check@accent{\t}2\capitalnewtie}
```

In Unicode engines we just execute the simple accents:

```
196 \else
197   \DeclareTextCommandDefault\capitalacute{\@tabacckludge'}
198   \DeclareTextCommandDefault\capitalbreve{\u}
199   \DeclareTextCommandDefault\capitalcaron{\v}
200   \DeclareTextCommandDefault\capitalcedilla{\c}
201   \DeclareTextCommandDefault\capitalcircumflex{\^}
202   \DeclareTextCommandDefault\capitaldieresis{\"}
203   \DeclareTextCommandDefault\capitaldotaccent{\.}
204   \DeclareTextCommandDefault\capitalgrave{\@tabacckludge`}
205   \DeclareTextCommandDefault\capitalhungarumlaut{\H}
206   \DeclareTextCommandDefault\capitalmacron{\@tabacckludge=}
207   \DeclareTextCommandDefault\capitalnewtie{\t}
208   \DeclareTextCommandDefault\capitalogonek{\k}
209   \DeclareTextCommandDefault\capitalring{\r}
210   \DeclareTextCommandDefault\capitaltie{\t}
211   \DeclareTextCommandDefault\capitaltilde{\~}
```

```

212 \DeclareTextCommandDefault\newtie{\t}
213 \fi

```

The next two symbols exist in some fonts (faked?), but we ignore that to keep the subsets reasonable compact and most important linear.

```

214 \DeclareTextCommandDefault{\textlbrackdbl} {\tc@check@symbol2\textlbrackdbl}
215 \DeclareTextCommandDefault{\textrbrackdbl} {\tc@check@symbol2\textrbrackdbl}

```

Old style numerals are again in some fonts but using -OsF, etc. is the better approach to get them, so we claim they aren't in sub-encoding 2 as that's true for most fonts.

```

216 \DeclareTextCommandDefault{\texteightoldstyle} {\tc@check@symbol2\texteightoldstyle}
217 \DeclareTextCommandDefault{\textfiveoldstyle} {\tc@check@symbol2\textfiveoldstyle}
218 \DeclareTextCommandDefault{\textfouroldstyle} {\tc@check@symbol2\textfouroldstyle}
219 \DeclareTextCommandDefault{\textnineoldstyle} {\tc@check@symbol2\textnineoldstyle}
220 \DeclareTextCommandDefault{\textoneoldstyle} {\tc@check@symbol2\textoneoldstyle}
221 \DeclareTextCommandDefault{\textsevenoldstyle} {\tc@check@symbol2\textsevenoldstyle}
222 \DeclareTextCommandDefault{\textsixoldstyle} {\tc@check@symbol2\textsixoldstyle}
223 \DeclareTextCommandDefault{\textthreeoldstyle} {\tc@check@symbol2\textthreeoldstyle}
224 \DeclareTextCommandDefault{\texttwooldstyle} {\tc@check@symbol2\texttwooldstyle}
225 \DeclareTextCommandDefault{\textzerooldstyle} {\tc@check@symbol2\textzerooldstyle}

```

The next set of glyphs is special to TeX fonts (and available with a few older PS fonts supported in the virtual fonts), but not any longer in the majority of fonts provided through autinst, so we pretend there aren't available in sub-encoding 2 and below.

```

226 \DeclareTextCommandDefault{\textacutedbl} {\tc@check@symbol2\textacutedbl}
227 \DeclareTextCommandDefault{\textasciiaacute} {\tc@check@symbol2\textasciiaacute}
228 \DeclareTextCommandDefault{\textasciibreve} {\tc@check@symbol2\textasciibreve}
229 \DeclareTextCommandDefault{\textasciicaron} {\tc@check@symbol2\textasciicaron}
230 \DeclareTextCommandDefault{\textasciidieresis} {\tc@check@symbol2\textasciidieresis}
231 \DeclareTextCommandDefault{\textasciigrave} {\tc@check@symbol2\textasciigrave}
232 \DeclareTextCommandDefault{\textasciimacron} {\tc@check@symbol2\textasciimacron}
233 \DeclareTextCommandDefault{\textgravedbl} {\tc@check@symbol2\textgravedbl}
234 \DeclareTextCommandDefault{\texttildelow} {\tc@check@symbol2\texttildelow}

```

Finally those below are only available in CM-based fonts but in no font that has its origin outside of the T<sub>E</sub>X world.

```

235 \DeclareTextCommandDefault{\textbaht} {\tc@check@symbol2\textbaht}
236 \DeclareTextCommandDefault{\textbigcircle} {\tc@check@symbol2\textbigcircle}
237 \DeclareTextCommandDefault{\textborn} {\tc@check@symbol2\textborn}
238 \DeclareTextCommandDefault{\textcentoldstyle} {\tc@check@symbol2\textcentoldstyle}
239 \DeclareTextCommandDefault{\textcircledP} {\tc@check@symbol2\textcircledP}
240 \DeclareTextCommandDefault{\textcopyleft} {\tc@check@symbol2\textcopyleft}
241 \DeclareTextCommandDefault{\textdblhyphenchar} {\tc@check@symbol2\textdblhyphenchar}
242 \DeclareTextCommandDefault{\textdblhyphen} {\tc@check@symbol2\textdblhyphen}
243 \DeclareTextCommandDefault{\textdied} {\tc@check@symbol2\textdied}
244 \DeclareTextCommandDefault{\textdiscount} {\tc@check@symbol2\textdiscount}
245 \DeclareTextCommandDefault{\textdivorced} {\tc@check@symbol2\textdivorced}
246 \DeclareTextCommandDefault{\textdollaroldstyle} {\tc@check@symbol2\textdollaroldstyle}
247 \DeclareTextCommandDefault{\textguarani} {\tc@check@symbol2\textguarani}
248 \DeclareTextCommandDefault{\textleaf} {\tc@check@symbol2\textleaf}
249 \DeclareTextCommandDefault{\textlquill} {\tc@check@symbol2\textlquill}
250 \DeclareTextCommandDefault{\textmarried} {\tc@check@symbol2\textmarried}
251 \DeclareTextCommandDefault{\textmho} {\tc@check@symbol2\textmho}
252 \DeclareTextCommandDefault{\textmusicalnote} {\tc@check@symbol2\textmusicalnote}
253 \DeclareTextCommandDefault{\textnaira} {\tc@check@symbol2\textnaira}
254 \DeclareTextCommandDefault{\textopenbullet} {\tc@check@symbol2\textopenbullet}

```

```

255 \DeclareTextCommandDefault{\textpeso}          {\tc@check@symbol2\textpeso}
256 \DeclareTextCommandDefault{\textpildcrow}      {\tc@check@symbol2\textpildcrow}
257 \DeclareTextCommandDefault{\textrecipe}         {\tc@check@symbol2\textrecipe}
258 \DeclareTextCommandDefault{\textreferencemark}  {\tc@check@symbol2\textreferencemark}
259 \DeclareTextCommandDefault{\texttrquill}        {\tc@check@symbol2\texttrquill}
260 \DeclareTextCommandDefault{\textservicemark}    {\tc@check@symbol2\textservicemark}
261 \DeclareTextCommandDefault{\textsurd}           {\tc@check@symbol2\textsurd}

```

The `\textpertenthousand` also belongs in this group but here we have a choice: in T1 there is definition for `\textpertenthousand` making the symbol up from % and `\char 24` (twice) but in many fonts that char doesn't exist and the slot is reused for random ligatures. So better not use it because often it is wrong. But pointing to TS1 is also not great as only a few fonts have it as a real symbol, so we get a substitution to CM or LM.

Alternatively we could just state that the symbol is unavailable in those fonts. For now I substitute.

```

262 \DeclareTextCommandDefault{\textpertenthousand} {\tc@check@symbol2\textpertenthousand}
263 \UndeclareTextCommand{\textpertenthousand}{T1}

```

### 1.3 Sub-encoding 3

Sub-encoding 2 is the one where we loose many symbols. In the higher-numbered sub-encodings we see only a few dropped additionally.

```

264 \DeclareTextCommandDefault{\textlangle}        {\tc@check@symbol3\textlangle}
265 \DeclareTextCommandDefault{\textrangle}        {\tc@check@symbol3\textrangle}

```

### 1.4 Sub-encoding 4

```

266 \DeclareTextCommandDefault{\textcolonmonetary} {\tc@check@symbol4\textcolonmonetary}
267 \DeclareTextCommandDefault{\textdong}          {\tc@check@symbol4\textdong}
268 \DeclareTextCommandDefault{\textdownarrow}     {\tc@check@symbol4\textdownarrow}
269 \DeclareTextCommandDefault{\textleftarrow}     {\tc@check@symbol4\textleftarrow}
270 \DeclareTextCommandDefault{\textlira}          {\tc@check@symbol4\textlira}
271 \DeclareTextCommandDefault{\textrightarrow}    {\tc@check@symbol4\textrightarrow}
272 \DeclareTextCommandDefault{\textuparrow}       {\tc@check@symbol4\textuparrow}
273 \DeclareTextCommandDefault{\textwon}           {\tc@check@symbol4\textwon}

```

### 1.5 Sub-encoding 5 (most older PS fonts)

Most older PS fonts (supported in T<sub>E</sub>X since the early nineties when virtual fonts became available) are sorted under this sub-encoding. But in reality, many of them don't have all glyphs that should be available in sub-encoding 5. Instead they show little squares, i.e., they produce “tofu” if you are unlucky.

But the coverage is so random that it is impossible to sort them properly and if we tried to ensure that they only typeset those glyphs that are really always available wouput put them all into sub-encoding 9 so that's a compromise really.

Modern fonts that don't typeset a tofu character if a glyph is missing are only cataloged as sub-encoding 5 if they really support of its glyph set.

```

274 \DeclareTextCommandDefault{\textestimated}     {\tc@check@symbol5\textestimated}
275 \DeclareTextCommandDefault{\textnumero}        {\tc@check@symbol5\textnumero}

```

## 1.6 Sub-encoding 6

```
276 \DeclareTextCommandDefault{\textflorin}      {\tc@check@symbol6\textflorin}
277 \DeclareTextCommandDefault{\textcurrency}     {\tc@check@symbol6\textcurrency}
```

## 1.7 Sub-encoding 7

```
278 \DeclareTextCommandDefault{\textfractionsolidus}{\tc@check@symbol7\textfractionsolidus}
279 \DeclareTextCommandDefault{\textohm}           {\tc@check@symbol7\textohm}
280 \DeclareTextCommandDefault{\textmu}            {\tc@check@symbol7\textmu}
281 \DeclareTextCommandDefault{\textminus}         {\tc@check@symbol7\textminus}
```

## 1.8 Sub-encoding 8

```
282 \DeclareTextCommandDefault{\textblank}          {\tc@check@symbol8\textblank}
283 \DeclareTextCommandDefault{\textinterrobangdown}{\tc@check@symbol8\textinterrobangdown}
284 \DeclareTextCommandDefault{\textinterrobang}     {\tc@check@symbol8\textinterrobang}
```

Fonts with this sub-encoding don't have a Euro symbol, but instead of substituting we fake it.

```
285 \DeclareTextCommandDefault{\texteuro}
286      {\CheckEncodingSubset\UseTextSymbol{TS1}\tc@fake@euro{8}\texteuro}
```

## 1.9 Sub-encoding 9 (most missing)

```
287 \DeclareTextCommandDefault{\textcelsius}{\tc@check@symbol9\textcelsius}
288 \DeclareTextCommandDefault{\textonesuperior}{\tc@check@symbol9\textonesuperior}
289 \DeclareTextCommandDefault{\textthreequartersemdash}{\tc@check@symbol9\textthreequartersemdash}
290 \DeclareTextCommandDefault{\textthreesuperior}{\tc@check@symbol9\textthreesuperior}
291 \DeclareTextCommandDefault{\texttwelveudash}{\tc@check@symbol9\texttwelveudash}
292 \DeclareTextCommandDefault{\texttwosuperior}{\tc@check@symbol9\texttwosuperior}
293 \DeclareTextCommandDefault{\textbardbl}{\tc@check@symbol9\textbardbl}
```

## 2 Unicode engine specials

If we are using a unicode engine we handle some glyphs differently, so this here are the definitions for the Unicode encoding (overwriting the defaults above).

```
294 \ifx \Umathcode\@undefined \else
```

This set should be taken from TS1 encoding even if it means you get it from the default font for that encoding.

```
295 %\DeclareTextSymbol{\textcopyleft}{TS1}{171}
296 %\DeclareTextSymbol{\textdblhyphen}{TS1}{45}
297 %\DeclareTextSymbol{\textdblhyphenchar}{TS1}{127}
298 %\DeclareTextSymbol{\textquotestraightbase}{TS1}{13}
299 %\DeclareTextSymbol{\textquotestraightdblbase}{TS1}{18}
300 %\DeclareTextSymbol{\textleaf}{TS1}{108}
301 %\DeclareTextSymbol{\texttwelveudash}{TS1}{21}
302 %\DeclareTextSymbol{\textthreequartersemdash}{TS1}{22}
```

If oldstyle numerals are asked for we just use \oldstylenums.

```
303 \DeclareTextCommand{\textzerooldstyle} \UnicodeEncodingName{\oldstylenums{0}}
304 \DeclareTextCommand{\textoneoldstyle} \UnicodeEncodingName{\oldstylenums{1}}
305 \DeclareTextCommand{\texttwooldstyle} \UnicodeEncodingName{\oldstylenums{2}}
306 \DeclareTextCommand{\textthreeoldstyle} \UnicodeEncodingName{\oldstylenums{3}}
307 \DeclareTextCommand{\textfouroldstyle} \UnicodeEncodingName{\oldstylenums{4}}
308 \DeclareTextCommand{\textfiveoldstyle} \UnicodeEncodingName{\oldstylenums{5}}
```

```

309 \DeclareTextCommand{\textsixoldstyle} \UnicodeEncodingName{\oldstylenums{6}}
310 \DeclareTextCommand{\textsevenoldstyle}\UnicodeEncodingName{\oldstylenums{7}}
311 \DeclareTextCommand{\texteightoldstyle}\UnicodeEncodingName{\oldstylenums{8}}
312 \DeclareTextCommand{\textnineoldstyle} \UnicodeEncodingName{\oldstylenums{9}}

```

These have Unicode slots so this should be integrated into TU explicitly

```

313 \DeclareTextSymbol{\textpilcrow}      \UnicodeEncodingName{"00B6}
314 \DeclareTextSymbol{\textborn}         \UnicodeEncodingName{"002A}
315 \DeclareTextSymbol{\textdied}         \UnicodeEncodingName{"2020}
316 \DeclareTextSymbol{\textlbrackdbl}    \UnicodeEncodingName{"27E6}
317 \DeclareTextSymbol{\textrbrackdbl}    \UnicodeEncodingName{"27E7}
318 \DeclareTextSymbol{\textguarani}      \UnicodeEncodingName{"20B2}

```

We could make `\textcentoldstyle` and `\textdollaroldstyle` point to dollar and cent in the Unicode encoding

```

319 %\DeclareTextSymbol{\textcentoldstyle} \UnicodeEncodingName{"00A2}
320 %\DeclareTextSymbol{\textdollaroldstyle} \UnicodeEncodingName{"0024}

```

but I think it is better to pick them up from TS1 even if that usually means LMR fonts

```

321 \DeclareTextSymbol{\textdollaroldstyle}{TS1}{138}
322 \DeclareTextSymbol{\textcentoldstyle} {TS1}{139}
323 \fi                                     % --- END of Unicode engines specials

```

### 3 Font family sub-encodings setup

We declare the subsets for a good number of fonts in the kernel ...

But first the default for anything that is not declared. We use 9 which is most likely much too conservative, but with the advantage that we aren't getting missing glyphs (or at least that this is very unlikely). For nearly all font in the T<sub>E</sub>X Live distribution of 2019 "correct" classifications are given below, so that this default is only used for new font families, and over time the right classifications can be added here too.

```

324 \DeclareEncodingSubset{TS1}{?}{9}

```

This first block contains the fonts that have been already supported by the `textcomp` package way back, i.e., the font families that have T<sub>E</sub>X support since the mid-nineties.

```

325 \DeclareEncodingSubset{TS1}{ccr}      {0}
326 \DeclareEncodingSubset{TS1}{cmbr}     {0}
327 \DeclareEncodingSubset{TS1}{cmr}      {0}
328 \DeclareEncodingSubset{TS1}{cmss}     {0}
329 \DeclareEncodingSubset{TS1}{cmtl}     {0}
330 \DeclareEncodingSubset{TS1}{cmtt}     {0}
331 \DeclareEncodingSubset{TS1}{cmvtt}    {0}
332 \DeclareEncodingSubset{TS1}{pxr}      {0}
333 \DeclareEncodingSubset{TS1}{pxss}     {0}
334 \DeclareEncodingSubset{TS1}{pxtt}     {0}
335 \DeclareEncodingSubset{TS1}{qag}      {0}
336 \DeclareEncodingSubset{TS1}{qbk}      {0}
337 \DeclareEncodingSubset{TS1}{qcr}      {0}
338 \DeclareEncodingSubset{TS1}{qcs}      {0}
339 \DeclareEncodingSubset{TS1}{qhvc}     {0}
340 \DeclareEncodingSubset{TS1}{qhv}      {0}
341 \DeclareEncodingSubset{TS1}{qpl}      {0}
342 \DeclareEncodingSubset{TS1}{qtm}      {0}

```

```

343 \DeclareEncodingSubset{TS1}{qzc} {0}
344 \DeclareEncodingSubset{TS1}{txr} {0}
345 \DeclareEncodingSubset{TS1}{txss} {0}
346 \DeclareEncodingSubset{TS1}{txtt} {0}

347 \DeclareEncodingSubset{TS1}{lmr} {1}
348 \DeclareEncodingSubset{TS1}{lmdh} {1}
349 \DeclareEncodingSubset{TS1}{lmss} {1}
350 \DeclareEncodingSubset{TS1}{lmssq} {1}
351 \DeclareEncodingSubset{TS1}{lmvtt} {1}
352 \DeclareEncodingSubset{TS1}{lmtt} {1} % missing TM, SM, pertenthousand for some reason

353 \DeclareEncodingSubset{TS1}{ptmx} {2}
354 \DeclareEncodingSubset{TS1}{ptmj} {2}
355 \DeclareEncodingSubset{TS1}{ul8} {2}

356 \DeclareEncodingSubset{TS1}{bch} {5} % tofu for blank, ohm
357 \DeclareEncodingSubset{TS1}{futj} {5} % tofu for blank, interrobang/down, ohm
358 \DeclareEncodingSubset{TS1}{futs} {5} % tofu for blank, ohm
359 \DeclareEncodingSubset{TS1}{futex} {5} % probably (currently broken distrib)
360 \DeclareEncodingSubset{TS1}{pag} {5} % tofu for blank, interrobang/down, ohm
361 \DeclareEncodingSubset{TS1}{pbk} {5} % tofu for blank, interrobang/down, ohm
362 \DeclareEncodingSubset{TS1}{pcr} {5} % tofu for blank, interrobang/down, ohm
363 \DeclareEncodingSubset{TS1}{phv} {5} % tofu for blank, interrobang/down, ohm
364 \DeclareEncodingSubset{TS1}{pnc} {5} % tofu for blank, interrobang/down, ohm
365 \DeclareEncodingSubset{TS1}{pplj} {5} % tofu for blank
366 \DeclareEncodingSubset{TS1}{pplx} {5} % tofu for blank
367 \DeclareEncodingSubset{TS1}{ppl} {5} % tofu for blank interrobang/down
368 \DeclareEncodingSubset{TS1}{ptm} {5} % tofu for blank, interrobang/down, ohm
369 \DeclareEncodingSubset{TS1}{pzc} {5} % tofu for blank, interrobang/down, ohm
370 \DeclareEncodingSubset{TS1}{ul9} {5} % tofu for blank, interrobang/down, ohm

371 \DeclareEncodingSubset{TS1}{dayroms} {6} % tofu for blank, interrobang/down, ohm
372 \DeclareEncodingSubset{TS1}{dayrom} {6} % tofu for blank, interrobang/down, ohm

373 \DeclareEncodingSubset{TS1}{augie} {8} % really only missing euro
374 \DeclareEncodingSubset{TS1}{put} {8}
375 \DeclareEncodingSubset{TS1}{uag} {8} % probably (currently broken distrib)
376 \DeclareEncodingSubset{TS1}{ugq} {8}

377 \DeclareEncodingSubset{TS1}{zi4} {9}

```

LucidaBright (sold through TUG) probably not quite correct, I guess as I have the older fonts ...

```

378 \DeclareEncodingSubset{TS1}{hls} {5}
379 \DeclareEncodingSubset{TS1}{hlst} {5}
380 \DeclareEncodingSubset{TS1}{hlct} {5}
381 \DeclareEncodingSubset{TS1}{hlh} {5}
382 \DeclareEncodingSubset{TS1}{hlx} {8}
383 \DeclareEncodingSubset{TS1}{hlce} {8}
384 \DeclareEncodingSubset{TS1}{hlcn} {8}
385 \DeclareEncodingSubset{TS1}{hlcw} {8}
386 \DeclareEncodingSubset{TS1}{hlcf} {8}

```

Below are the newer fonts that have support files for L<sup>A</sup>T<sub>E</sub>X. With very few exceptions the classifications are done so that all characters are correctly produced (either being available in the font or substituted).

There are a few fonts that contain “tofu” squares in places (instead of a real glyph) and in a few cases some really seldom needed chars are unavailable, i.e., produce missing glyphs (to avoid that a large number of available chars are unnecessarily substituted).

```

387 \DeclareEncodingSubset{TS1}{lato-*}           {0} % with a bunch of tofu inside
388 \DeclareEncodingSubset{TS1}{opensans-*}       {0} % with a bunch of tofu inside
389 \DeclareEncodingSubset{TS1}{cantarell-*}      {0} % with a bunch of tofu inside
390 \DeclareEncodingSubset{TS1}{fbb-*}            {0} % missing centoldstyle
391 \DeclareEncodingSubset{TS1}{tli}              {1} % with lots of tofu inside
392 \DeclareEncodingSubset{TS1}{Alegreya-*}       {2}
393 \DeclareEncodingSubset{TS1}{AlegreyaSans-*}   {2}
394 \DeclareEncodingSubset{TS1}{DejaVuSans-TLF}   {2}
395 \DeclareEncodingSubset{TS1}{DejaVuSansCondensed-TLF} {2}
396 \DeclareEncodingSubset{TS1}{DejaVuSansMono-TLF} {2}
397 \DeclareEncodingSubset{TS1}{EBGaramond-*}    {2}
398 \DeclareEncodingSubset{TS1}{Tempora-TLF}      {2}
399 \DeclareEncodingSubset{TS1}{Tempora-TOfF}     {2}
400 \DeclareEncodingSubset{TS1}{Arimo-TLF}        {3}
401 \DeclareEncodingSubset{TS1}{Carlito-*}        {3}
402 \DeclareEncodingSubset{TS1}{FiraSans-*}       {3}
403 \DeclareEncodingSubset{TS1}{IBMPlexSans-TLF}  {3}
404 \DeclareEncodingSubset{TS1}{Merriweather-OfF} {3}
405 \DeclareEncodingSubset{TS1}{Montserrat-*}     {3}
406 \DeclareEncodingSubset{TS1}{MontserratAlternates-*} {3}
407 \DeclareEncodingSubset{TS1}{SourceCodePro-TLF} {3}
408 \DeclareEncodingSubset{TS1}{SourceCodePro-TOfF} {3}
409 \DeclareEncodingSubset{TS1}{SourceSansPro-*}  {3}
410 \DeclareEncodingSubset{TS1}{SourceSerifPro-*} {3}
411 \DeclareEncodingSubset{TS1}{Tinos-TLF}        {3}
412 \DeclareEncodingSubset{TS1}{AccanthisADFSStdNoThree-LF} {4}
413 \DeclareEncodingSubset{TS1}{Cabin-TLF}        {4}
414 \DeclareEncodingSubset{TS1}{Caladea-TLF}      {4}
415 \DeclareEncodingSubset{TS1}{Chivo-*}          {4}
416 \DeclareEncodingSubset{TS1}{ClearSans-TLF}    {4}
417 \DeclareEncodingSubset{TS1}{Coelacanth-LF}    {4}
418 \DeclareEncodingSubset{TS1}{CrimsonPro-*}     {4}
419 \DeclareEncodingSubset{TS1}{FiraMono-TLF}     {4}
420 \DeclareEncodingSubset{TS1}{FiraMono-TOfF}    {4}
421 \DeclareEncodingSubset{TS1}{Go-TLF}           {4}
422 \DeclareEncodingSubset{TS1}{GoMono-TLF}       {4}
423 \DeclareEncodingSubset{TS1}{InriaSans-*}      {4}
424 \DeclareEncodingSubset{TS1}{InriaSerif-*}     {4}
425 \DeclareEncodingSubset{TS1}{LibertinusSans-*} {4}
426 \DeclareEncodingSubset{TS1}{LibertinusSerif-*} {4}
427 \DeclareEncodingSubset{TS1}{LibreBodoni-TLF}  {4}
428 \DeclareEncodingSubset{TS1}{LibreFranklin-TLF} {4}
429 \DeclareEncodingSubset{TS1}{LinguisticsPro-LF} {4}
430 \DeclareEncodingSubset{TS1}{LinguisticsPro-OfF} {4}
431 \DeclareEncodingSubset{TS1}{LinuxBioluminumT-*} {4}
432 \DeclareEncodingSubset{TS1}{LinuxLibertineT-*} {4}
433 \DeclareEncodingSubset{TS1}{MerriweatherSans-OfF} {4}
434 \DeclareEncodingSubset{TS1}{MintSpirit-*}     {4}
435 \DeclareEncodingSubset{TS1}{MintSpiritNoTwo-*} {4}

```

```

436 \DeclareEncodingSubset{TS1}{PTMono-TLF} {4}
437 \DeclareEncodingSubset{TS1}{PTSans-TLF} {4}
438 \DeclareEncodingSubset{TS1}{PTSansCaption-TLF} {4}
439 \DeclareEncodingSubset{TS1}{PTSansNarrow-TLF} {4}
440 \DeclareEncodingSubset{TS1}{PTSerif-TLF} {4}
441 \DeclareEncodingSubset{TS1}{PTSerifCaption-TLF} {4}
442 \DeclareEncodingSubset{TS1}{Raleway-TLF} {4}
443 \DeclareEncodingSubset{TS1}{Raleway-T0sF} {4}
444 \DeclareEncodingSubset{TS1}{Roboto-*} {4}
445 \DeclareEncodingSubset{TS1}{RobotoMono-TLF} {4}
446 \DeclareEncodingSubset{TS1}{RobotoSlab-TLF} {4}
447 \DeclareEncodingSubset{TS1}{Rosario-*} {4}
448 \DeclareEncodingSubset{TS1}{SticksTooText-*} {4}
449 \DeclareEncodingSubset{TS1}{UniversalisADFStd-LF} {4}

450 \DeclareEncodingSubset{TS1}{Almendra-0sF} {5}
451 \DeclareEncodingSubset{TS1}{Baskervaldx-*} {5}
452 \DeclareEncodingSubset{TS1}{BaskervilleF-*} {5}
453 \DeclareEncodingSubset{TS1}{Bitter-TLF} {5}
454 \DeclareEncodingSubset{TS1}{Cinzel-LF} {5}
455 \DeclareEncodingSubset{TS1}{CinzelDecorative-LF} {5}
456 \DeclareEncodingSubset{TS1}{DejaVuSerif-TLF} {5}
457 \DeclareEncodingSubset{TS1}{DejaVuSerifCondensed-TLF} {5}
458 \DeclareEncodingSubset{TS1}{GilliusADF-LF} {5}
459 \DeclareEncodingSubset{TS1}{GilliusADFCond-LF} {5}
460 \DeclareEncodingSubset{TS1}{GilliusADFNoTwo-LF} {5}
461 \DeclareEncodingSubset{TS1}{GilliusADFNoTwoCond-LF} {5}
462 \DeclareEncodingSubset{TS1}{LobsterTwo-LF} {5}
463 \DeclareEncodingSubset{TS1}{OldStandard-TLF} {5}
464 \DeclareEncodingSubset{TS1}{PlayfairDisplay-TLF} {5}
465 \DeclareEncodingSubset{TS1}{PlayfairDisplay-T0sF} {5}
466 \DeclareEncodingSubset{TS1}{TheanoDidot-TLF} {5}
467 \DeclareEncodingSubset{TS1}{TheanoDidot-T0sF} {5}
468 \DeclareEncodingSubset{TS1}{TheanoModern-TLF} {5}
469 \DeclareEncodingSubset{TS1}{TheanoModern-T0sF} {5}
470 \DeclareEncodingSubset{TS1}{TheanoOldStyle-TLF} {5}
471 \DeclareEncodingSubset{TS1}{TheanoOldStyle-T0sF} {5}

472 \DeclareEncodingSubset{TS1}{Crimson-TLF} {6}
473 \DeclareEncodingSubset{TS1}{IBMPlexMono-TLF} {6}
474 \DeclareEncodingSubset{TS1}{IBMPlexSerif-TLF} {6}
475 \DeclareEncodingSubset{TS1}{LibertinusMono-TLF} {6}
476 \DeclareEncodingSubset{TS1}{LibertinusSerifDisplay-LF} {6}
477 \DeclareEncodingSubset{TS1}{LinuxLibertineDisplayT-*} {6}
478 \DeclareEncodingSubset{TS1}{LinuxLibertineMonoT-LF} {6}
479 \DeclareEncodingSubset{TS1}{LinuxLibertineMonoT-TLF} {6}
480 \DeclareEncodingSubset{TS1}{Overlock-LF} {6}

481 \DeclareEncodingSubset{TS1}{CormorantGaramond-*} {7}
482 \DeclareEncodingSubset{TS1}{Heuristica-TLF} {7}
483 \DeclareEncodingSubset{TS1}{Heuristica-T0sF} {7}
484 \DeclareEncodingSubset{TS1}{IMFELLEnglish-TLF} {7}
485 \DeclareEncodingSubset{TS1}{LibreBaskerville-TLF} {7}
486 \DeclareEncodingSubset{TS1}{LibreCaslon-*} {7}
487 \DeclareEncodingSubset{TS1}{Marcellus-LF} {7}
488 \DeclareEncodingSubset{TS1}{NotoSans-*} {7}

```



```

489 \DeclareEncodingSubset{TS1}{NotoSansMono-TLF}      {7}
490 \DeclareEncodingSubset{TS1}{NotoSansMono-TOfF}     {7}
491 \DeclareEncodingSubset{TS1}{NotoSerif-*}            {7}
492 \DeclareEncodingSubset{TS1}{Quattrocento-TLF}      {7}
493 \DeclareEncodingSubset{TS1}{QuattrocentoSans-TLF}  {7}
494 \DeclareEncodingSubset{TS1}{XCharter-TLF}           {7}
495 \DeclareEncodingSubset{TS1}{XCharter-TOfF}          {7}
496 \DeclareEncodingSubset{TS1}{erewhon-*}             {7}
497 \DeclareEncodingSubset{TS1}{ComicNeue-TLF}         {7}
498 \DeclareEncodingSubset{TS1}{ComicNeueAngular-TLF}  {7}
499 \DeclareEncodingSubset{TS1}{Forum-LF}              {7} % the superiors are missing
500 \DeclareEncodingSubset{TS1}{Cochineal-*}           {8}
501 \DeclareEncodingSubset{TS1}{AlgolRevived-TLF}      {9}

```

## 4 Legacy symbol support for lists and footnote symbols

`\UseLegacyTextSymbols`

```

502 \def\UseLegacyTextSymbols{%
503   \DeclareTextSymbolDefault{\textasteriskcentered}{OMS}%
504   \DeclareTextSymbolDefault{\textbardbl}{OMS}%
505   \DeclareTextSymbolDefault{\textbullet}{OMS}%
506   \DeclareTextSymbolDefault{\textdaggerdbl}{OMS}%
507   \DeclareTextSymbolDefault{\textdagger}{OMS}%
508   \DeclareTextSymbolDefault{\textparagraph}{OMS}%
509   \DeclareTextSymbolDefault{\textperiodcentered}{OMS}%
510   \DeclareTextSymbolDefault{\textsection}{OMS}%
511   \UndeclareTextCommand{\textsection}{T1}%
512   \expandafter\let\csname oldstylenums \expandafter\endcsname
513     \csname legacyoldstylenums \endcsname
514 }

```

*(End definition for \UseLegacyTextSymbols. This function is documented on page ??.)*

`\textlegacyasteriskcentered` Here are new names for the legacy symbols that L<sup>A</sup>T<sub>E</sub>X used to pick up from the OMS encoded fonts (and used for itemize lists or footnote symbols).

`\textlegacybardbl` We go the roundabout way via separate OMS declarations so that

`\textlegacybullet` `\renewcommand\textbullet{\textlegacybullet}`

`\textlegacydaggerdbl`

`\textlegacydagger`

`\textlegacyparagraph`

doesn't produce an endless loop.

`\textlegacyperiodcentered`

`\textlegacysection`

```

515 \DeclareTextSymbol{\textlegacyasteriskcentered}{OMS}{3} % "03
516 \DeclareTextSymbol{\textlegacybardbl}{OMS}{107} % "6B
517 \DeclareTextSymbol{\textlegacybullet}{OMS}{15} % "0F
518 \DeclareTextSymbol{\textlegacydaggerdbl}{OMS}{122} % "7A
519 \DeclareTextSymbol{\textlegacydagger}{OMS}{121} % "79
520 \DeclareTextSymbol{\textlegacyparagraph}{OMS}{123} % "7B
521 \DeclareTextSymbol{\textlegacyperiodcentered}{OMS}{1} % "01
522 \DeclareTextSymbol{\textlegacysection}{OMS}{120} % "78

```

```

523 \DeclareTextSymbolDefault{\textlegacyasteriskcentered}{OMS}
524 \DeclareTextSymbolDefault{\textlegacybardbl}{OMS}
525 \DeclareTextSymbolDefault{\textlegacybullet}{OMS}
526 \DeclareTextSymbolDefault{\textlegacydaggerdbl}{OMS}
527 \DeclareTextSymbolDefault{\textlegacydagger}{OMS}
528 \DeclareTextSymbolDefault{\textlegacyparagraph}{OMS}
529 \DeclareTextSymbolDefault{\textlegacyperiodcentered}{OMS}
530 \DeclareTextSymbolDefault{\textlegacysection}{OMS}

```

(End definition for `\textlegacyasteriskcentered` and others. These functions are documented on page ??.)

Supporting rollback ...

```

531 \</2kernel | latexrelease>
532 \<latexrelease>\EndIncludeInRelease
533 \<latexrelease>\IncludeInRelease{0000/00/00}%
534 \<latexrelease> \<\DeclareEncodingSubset>\<Text companion symbols>%
535 \<latexrelease>
536 \<latexrelease>\let\DeclareEncodingSubset\@undefined
537 \<latexrelease>\let\CheckEncodingSubset\@undefined
538 \<latexrelease>
539 \<latexrelease>\DeclareTextSymbolDefault{\textdollar}{OT1}
540 \<latexrelease>\DeclareTextSymbolDefault{\textsterling}{OT1}
541 \<latexrelease>\DeclareTextCommand{\textdollar}{OT1}{\hmode\bgroup
542 \<latexrelease> \ifdim \fontdimen\@ne\font >\z@
543 \<latexrelease> \slshape
544 \<latexrelease> \else
545 \<latexrelease> \upshape
546 \<latexrelease> \fi
547 \<latexrelease> \char'\$<\egroup>
548 \<latexrelease>\DeclareTextCommand{\textsterling}{OT1}{\hmode\bgroup
549 \<latexrelease> \ifdim \fontdimen\@ne\font >\z@
550 \<latexrelease> \itshape
551 \<latexrelease> \else
552 \<latexrelease> \fontshape{ui}<\selectfont
553 \<latexrelease> \fi
554 \<latexrelease> \char'\$<\egroup>
555 \<latexrelease>\DeclareTextCommand{\textperthousand}{T1}
556 \<latexrelease> {\%<\char 24 }
557 \<latexrelease>
558 \<latexrelease>\DeclareTextSymbolDefault{\textasteriskcentered}{OMS}
559 \<latexrelease>\DeclareTextSymbolDefault{\textbullet}{OMS}
560 \<latexrelease>\DeclareTextSymbolDefault{\textdaggerdbl}{OMS}
561 \<latexrelease>\DeclareTextSymbolDefault{\textdagger}{OMS}
562 \<latexrelease>\DeclareTextSymbolDefault{\textparagraph}{OMS}
563 \<latexrelease>\DeclareTextSymbolDefault{\textperiodcentered}{OMS}
564 \<latexrelease>\DeclareTextSymbolDefault{\textsection}{OMS}
565 \<latexrelease>
566 \<latexrelease>\DeclareTextSymbolDefault{\textbardbl}{OMS}
567 \<latexrelease>\let\textbrokenbar\@undefined
568 \<latexrelease>\let\textcelsius\@undefined
569 \<latexrelease>\let\textcent\@undefined
570 \<latexrelease>\DeclareTextCommandDefault{\textcopyright}{\textcircled{c}}
571 \<latexrelease>\let\textdegree\@undefined
572 \<latexrelease>\let\textdiv\@undefined

```

```

573 <latexrelease>\let\textlnot\@undefined
574 <latexrelease>\let\textonehalf\@undefined
575 <latexrelease>\let\textonequarter\@undefined
576 <latexrelease>\let\textonesuperior\@undefined
577 <latexrelease>\DeclareTextCommandDefault{\textordfeminine}{\textsuperscript{a}}
578 <latexrelease>\DeclareTextCommandDefault{\textordmasculine}{\textsuperscript{o}}
579 <latexrelease>\let\textpm\@undefined
580 <latexrelease>\let\textquotesingle\@undefined
581 <latexrelease>\let\textquotestraightbase\@undefined
582 <latexrelease>\let\textquotestraightdblbase\@undefined
583 <latexrelease>\DeclareTextCommandDefault{\textregistered}{\textcircled{%
584 <latexrelease> \check@mathfonts\fontsize\sf@size\z@\math@fontsfalse\selectfont R}}
585 <latexrelease>\let\textthreequartersemdash\@undefined
586 <latexrelease>\let\textthreequarters\@undefined
587 <latexrelease>\let\textthreesuperior\@undefined
588 <latexrelease>\let\texttimes\@undefined
589 <latexrelease>\DeclareTextCommandDefault{\texttrademark}{\textsuperscript{TM}}
590 <latexrelease>\let\texttwelveudash\@undefined
591 <latexrelease>\let\texttwosuperior\@undefined
592 <latexrelease>\let\textyen\@undefined
593 <latexrelease>
594 <latexrelease>\let\textcapitalcompwordmark\@undefined
595 <latexrelease>\let\textascendercompwordmark\@undefined
596 <latexrelease>
597 <latexrelease>\DeclareTextAccentDefault{\textcircled}{OMS}
598 <latexrelease>\DeclareTextAccentDefault{\t}{OML}
599 <latexrelease>
600 <latexrelease>\let\capitalacute\@undefined
601 <latexrelease>\let\capitalbreve\@undefined
602 <latexrelease>\let\capitalcaron\@undefined
603 <latexrelease>\let\capitalcedilla\@undefined
604 <latexrelease>\let\capitalcircumflex\@undefined
605 <latexrelease>\let\capitaldieresis\@undefined
606 <latexrelease>\let\capitaldotaccent\@undefined
607 <latexrelease>\let\capitalgrave\@undefined
608 <latexrelease>\let\capitalhungarumlaut\@undefined
609 <latexrelease>\let\capitalmacron\@undefined
610 <latexrelease>\let\capitalnewtie\@undefined
611 <latexrelease>\let\capitalogonek\@undefined
612 <latexrelease>\let\capitalring\@undefined
613 <latexrelease>\let\capitaltie\@undefined
614 <latexrelease>\let\capitaltilde\@undefined
615 <latexrelease>\let\newtie\@undefined
616 <latexrelease>
617 <latexrelease>\let\textlbrackdbl\@undefined
618 <latexrelease>\let\textrrackdbl\@undefined
619 <latexrelease>
620 <latexrelease>\let\texteightoldstyle\@undefined
621 <latexrelease>\let\textfiveoldstyle\@undefined
622 <latexrelease>\let\textfouroldstyle\@undefined
623 <latexrelease>\let\textnineoldstyle\@undefined
624 <latexrelease>\let\textoneoldstyle\@undefined
625 <latexrelease>\let\textsevenoldstyle\@undefined
626 <latexrelease>\let\textsixoldstyle\@undefined

```

```

627 <latexrelease>\let\textthreeoldstyle\@undefined
628 <latexrelease>\let\texttwooldstyle\@undefined
629 <latexrelease>\let\textzerooldstyle\@undefined
630 <latexrelease>
631 <latexrelease>\let\textacutedbl\@undefined
632 <latexrelease>\let\textasciicute\@undefined
633 <latexrelease>\let\textasciibreve\@undefined
634 <latexrelease>\let\textasciicaron\@undefined
635 <latexrelease>\let\textasciidieresisis\@undefined
636 <latexrelease>\let\textasciigrave\@undefined
637 <latexrelease>\let\textasciimacron\@undefined
638 <latexrelease>\let\textgravedbl\@undefined
639 <latexrelease>\let\texttildelow\@undefined
640 <latexrelease>
641 <latexrelease>\let\textbaht\@undefined
642 <latexrelease>\let\textbigcircle\@undefined
643 <latexrelease>\let\textborn\@undefined
644 <latexrelease>\let\textcentoldstyle\@undefined
645 <latexrelease>\let\textcircledP\@undefined
646 <latexrelease>\let\textcopyleft\@undefined
647 <latexrelease>\let\textdblhyphenchar\@undefined
648 <latexrelease>\let\textdblhyphen\@undefined
649 <latexrelease>\let\textdied\@undefined
650 <latexrelease>\let\textdiscount\@undefined
651 <latexrelease>\let\textdivorced\@undefined
652 <latexrelease>\let\textdollaroldstyle\@undefined
653 <latexrelease>\let\textguarani\@undefined
654 <latexrelease>\let\textleaf\@undefined
655 <latexrelease>\let\textlquill\@undefined
656 <latexrelease>\let\textmarried\@undefined
657 <latexrelease>\let\textmho\@undefined
658 <latexrelease>\let\textmusicalnote\@undefined
659 <latexrelease>\let\textnaira\@undefined
660 <latexrelease>\let\textopenbullet\@undefined
661 <latexrelease>\let\textpeso\@undefined
662 <latexrelease>\let\textpilcrow\@undefined
663 <latexrelease>\let\textrecipe\@undefined
664 <latexrelease>\let\textreferencemark\@undefined
665 <latexrelease>\let\texttrquill\@undefined
666 <latexrelease>\let\textservicemark\@undefined
667 <latexrelease>\let\textsurd\@undefined
668 <latexrelease>
669 <latexrelease>\DeclareTextCommand{\textpertenthousand}{T1}
670 <latexrelease>                {\%\char 24\char 24 }
671 <latexrelease>
672 <latexrelease>\let\textlangle\@undefined
673 <latexrelease>\let\textrangle\@undefined
674 <latexrelease>
675 <latexrelease>\let\textcolonmonetary\@undefined
676 <latexrelease>\let\textdong\@undefined
677 <latexrelease>\let\textdownarrow\@undefined
678 <latexrelease>\let\textleftarrow\@undefined
679 <latexrelease>\let\textlira\@undefined
680 <latexrelease>\let\textrightarrow\@undefined

```

```

681 <latexrelease>\let\textuparrow@undefined
682 <latexrelease>\let\textwon@undefined
683 <latexrelease>
684 <latexrelease>\let\textestimated@undefined
685 <latexrelease>\let\textnumero@undefined
686 <latexrelease>
687 <latexrelease>\let\textflorin@undefined
688 <latexrelease>\let\textcurrency@undefined
689 <latexrelease>
690 <latexrelease>\let\textfractionsolidus@undefined
691 <latexrelease>\let\textohm@undefined
692 <latexrelease>\let\textmu@undefined
693 <latexrelease>\let\textminus@undefined
694 <latexrelease>
695 <latexrelease>\let\textblank@undefined
696 <latexrelease>\let\textinterrobangdown@undefined
697 <latexrelease>\let\textinterrobang@undefined
698 <latexrelease>
699 <latexrelease>\let\texteuro@undefined
700 <latexrelease>
701 <latexrelease>\let\textcelsius@undefined
702 <latexrelease>\let\textonesuperior@undefined
703 <latexrelease>\let\textthreequartersemdash@undefined
704 <latexrelease>\let\textthreesuperior@undefined
705 <latexrelease>\let\texttwelveudash@undefined
706 <latexrelease>\let\texttwosuperior@undefined
707 <latexrelease>\let\textbardbl@undefined
708 <latexrelease>
709 <latexrelease>\let\UseLegacyTextSymbols@undefined
710 <latexrelease>\let\textlegacyasteriskcentered@undefined
711 <latexrelease>\let\textlegacybardbl@undefined
712 <latexrelease>\let\textlegacybullet@undefined
713 <latexrelease>\let\textlegacydaggerdbl@undefined
714 <latexrelease>\let\textlegacydagger@undefined
715 <latexrelease>\let\textlegacyparagraph@undefined
716 <latexrelease>\let\textlegacyperiodcentered@undefined
717 <latexrelease>\let\textlegacysection@undefined
718 <latexrelease>
719 <latexrelease>\EndIncludeInRelease
720 <*2ekernel>
721 </2ekernel>

```

## 5 The textcomp package

```

722 <*TS1sty>
723 \providecommand\DeclareRelease[3]{}
724 \providecommand\DeclareCurrentRelease[2]{}
725
726 \DeclareRelease{}{2018-08-11}{textcomp-2018-08-11.sty}
727 \DeclareCurrentRelease{}{2020-02-02}
728
729 \ProvidesPackage{textcomp}
730 [2020/02/02 v2.0n Standard LaTeX package]

```

A precaution in case this is used without rebuilding the format.

```
731 \NeedsTeXFormat{LaTeX2e}[2020/02/02]
```

This is implemented by defining the default subset:

```
732 \DeclareOption{full}{\DeclareEncodingSubset{TS1}{?}{0}}
733 \DeclareOption{almostfull}{\DeclareEncodingSubset{TS1}{?}{1}}
734 \DeclareOption{euro}{\DeclareEncodingSubset{TS1}{?}{8}}
735 \DeclareOption{safe}{\DeclareEncodingSubset{TS1}{?}{9}}
```

The default is set up in the kernel is “safe” these days for unknown fonts but LaTeX has definitions for most families so it seldom applies.

If a different default is used then one needs to check the results to ensure that there aren’t “missing glyphs”.

The next set of options define the warning level (default in the kernel is info only). Using the package options you can change this behavior.

```
736 \DeclareOption{error}{\gdef\tc@errorwarn{\PackageError{textcomp}}
737 \DeclareOption{warn}{\gdef\tc@errorwarn#1#2{\PackageWarning{textcomp}{#1}}}
738 \DeclareOption{info}{\gdef\tc@errorwarn#1#2{\PackageInfo{textcomp}{#1}}}
739 \DeclareOption{quiet}{\gdef\tc@errorwarn#1#2{}}
```

The “force” option basically changes the sub-encoding to that of the default (which, unless changes, is 9 these days), i.e., it no longer depends on the font in use. This is mainly there because it might have been used in older documents, but not something that is recommended.

```
740 \DeclareOption{force}{%
741   \def\CheckEncodingSubset#1#2#3#4#5{%
742     \ifnum #4>%
743       0\csname #2:?\endcsname
744       \relax
745     \expandafter\@firstoftwo
746     \else
747     \expandafter\@secondoftwo
748     \fi
749     {#1{#2}}{#3}%
750     #5}%
751 }
752 \ExecuteOptions{info}
753 \ProcessOptions\relax
```

There is not much else to do nowadays, because everything is already set up in the LaTeX kernel.

```
754 \InputIfFileExists{textcomp.cfg}
755 {\PackageInfo{textcomp}{Local configuration file used}}{}
756 \end{TS1sty}
```

## 5.1 The old textcomp package code

This section contains the old code for the textcomp package and its documentation. It is only used if we roll back prior to 2020. Thus all the rest is mainly for historians. Note that the old code categorised in the sub-encodings only into 6 classes not 10.

```
757 \*TS1oldsty
758 \ProvidesPackage{textcomp}
759 [2018/08/11 v2.0j Standard LaTeX package]
```

This one is for the **TS1** encoding which contains text symbols for use with the **T1**-encoded text fonts. It therefore first inputs the file **TS1enc.def** and then sets (or resets) the defaults for the symbols it contains. The result of this is that when one of these symbols is accessed and the current encoding does not provide it, the symbol will be supplied by a silent, local change to this encoding.

Since many PostScript fonts only implement a subset of **TS1** many commands only produce black blobs of ink. To resolve the resulting problems a number of options have been introduced and some code has been developed to distinguish sub-encodings.

The sub-encodings have a numerical id and are defined as follows for **TS1**:

**#5** those **TS1** symbols that are also in the ISO-Adobe character set; without **textcurrency**, which is often misused for the Euro. Older Type1 fonts from the non-**T<sub>E</sub>X** world provide only this subset.

**#4** = **#5** + **\texteuro**. Most newer fonts provide this.

**#3** = **#4** + **\textomega**. Can also be described as **TS1**  $\cap$  (**ISO-Adobe**  $\cup$  **MacRoman**). (Except for the missing "currency".)

**#2** = **#3** + **\textestimated** + **\textcurrency**. Can also be described as **TS1**  $\cap$  **Adobe-Western-2**. This may be relevant for OpenType fonts, which usually show the Adobe-Western-2 character set.

**#1** = **TS1** without **\textcircled** and **\t**. These two glyphs are often not implemented and if their kernel defaults are changed commands like **\copyright** unnecessarily fail.

**#0** = full **TS1**

And here a summary to go in the transcript file:

```

760 \PackageInfo{textcomp}{Sub-encoding information:\MessageBreak
761   \space\space 5 = only ISO-Adobe without
762                       \string\textcurrency\MessageBreak
763   \space\space 4 = 5 + \string\texteuro\MessageBreak
764   \space\space 3 = 4 + \string\textohm\MessageBreak
765   \space\space 2 = 3 + \noexpand\textestimated+
766                       \string\textcurrency\MessageBreak
767   \space\space 1 = TS1 - \noexpand\textcircled-
768                       \string\t\MessageBreak
769   \space\space 0 = TS1 (full)\MessageBreak
770   Font families with sub-encoding setting implement\MessageBreak
771   only a restricted character set as indicated.\MessageBreak
772   Family '?' is the default used for unknown fonts.\MessageBreak
773   See the documentation for details\@gobble}

```

**\DeclareEncodingSubset** An encoding subset to which a font family belongs is declared by the command **\DeclareEncodingSubset** that takes the major encoding as the first argument (e.g., **TS1**), the family name as the second argument (e.g., **cmr**), and the subset encoding id as a third, (e.g., 0 for **cmr**).

The default encoding subset to use when nothing is known about the current font family is named **?**.

```

774 \def\DeclareEncodingSubset#1#2#3{%
775   \ifundefined{#1:#2}%

```

```

776     {\PackageInfo{textcomp}{Setting #2 sub-encoding to #1/#3}}%
777     {\PackageInfo{textcomp}{Changing #2 sub-encoding to #1/#3}}%
778     \@namedef{#1:#2}{#3}}
779 \@onlypreamble\DeclareEncodingSubset

```

(End definition for `\DeclareEncodingSubset`. This function is documented on page ??.)

The options for the package are the following:

**safe** for unknown font families enables only symbols that are also in the ISO-Adobe character set; without "currency", which is often misused for the Euro. Older Type1 fonts from the non-TeX world provide only this subset.

**euro** enables the “safe” symbols plus the `\texteuro` command. Most newer fonts provide this.

**full** enables all TS1 commands; useful only with fonts like EC or CM bright.

**almostfull** same as “full”, except that `\textcircled` and `\t` are *not* redefined from their defaults to avoid that commands like `\copyright` suddenly no longer work.

**force** ignore all subset encoding definitions stored in the package itself or in the configuration file and always use the default subset as specified by one of the other options (seldom useful, only dangerous).

`\iftc@forced` Switch used to implement the **force** option

```

780 \newif\iftc@forced    \tc@forcedfalse

```

(End definition for `\iftc@forced`. This function is documented on page ??.)

This is implemented by defining the default subset:

```

781 \DeclareOption{full}{\DeclareEncodingSubset{TS1}{?}{0}}
782 \DeclareOption{almostfull}{\DeclareEncodingSubset{TS1}{?}{1}}
783 \DeclareOption{euro}{\DeclareEncodingSubset{TS1}{?}{4}}
784 \DeclareOption{safe}{\DeclareEncodingSubset{TS1}{?}{5}}

```

The default is “almostfull” which means that old documents will work except that `\textcircled` and `\t` will use the kernel defaults (with the advantage that this also works if the current font (as often the case) doesn’t implement these glyphs.

The “force” option simply sets the switch to true.

```

785 \DeclareOption{force}{\tc@forcedtrue}

```

The suggestions to user is to use the “safe” option always unless that balks in which case they could switch to “almostfull” but then better check their output manually.

```

786 \def\tc@errorwarn{\PackageError}
787 \DeclareOption{warn}{\gdef\tc@errorwarn#1#2#3{\PackageWarning{#1}{#2}}}
788 \DeclareOption{quiet}{\gdef\tc@errorwarn#1#2#3{}}
789 \ExecuteOptions{almostfull}
790 \ProcessOptions\relax

```

`\CheckEncodingSubset` The command `\CheckEncodingSubset` will check if the current font family has the right encoding subset to typeset a certain command. It takes five arguments as follows: first argument is either `\UseTextSymbol`, `\UseTextAccent` depending on whether or not the symbol is a text symbol or a text accent.

The second argument is the encoding from which this symbol should be fetched.



The third argument is either a fake accessor command or an error message. the code in that argument (if ever executed) receives two arguments: #2 and #5 of `\CheckEncodingSubset`.

Argument four is the subset encoding id to test against: if this value is higher than the subset id of the current font family then we typeset the symbol, i.e., execute `#1{#2}#5` otherwise it runs `#3#5`, e.g., to produce an error message or fake the glyph somehow.

Argument five is the symbol or accent command that is being checked.

For usage examples see definitions below.

```
791 \iftc@forced
```

If the “force” option was given we always use the default for testing against.

```
792 \def\CheckEncodingSubset#1#2#3#4#5{%
793   \ifnum #4>%
794     0\csname #2:\endcsname
795     \relax
796   \expandafter\@firstoftwo
797   \else
798   \expandafter\@secondoftwo
799   \fi
800   {#1{#2}}{#3}%
801   #5%
802 }
```

In normal circumstances the test is a bit more complicated: first check if there exists a macro `\(arg2):⟨current-family⟩` and if so use that value to test against, otherwise use the default to test against.

```
803 \else
804 \def\CheckEncodingSubset#1#2#3#4#5{%
805   \ifnum #4>%
806     \expandafter\ifx\csname #2:\f@family\endcsname\relax
807     0\csname #2:\endcsname
808     \else
809     \csname #2:\f@family\endcsname
810     \fi
811     \relax
812   \expandafter\@firstoftwo
813   \else
814   \expandafter\@secondoftwo
815   \fi
816   {#1{#2}}{#3}%
817   #5%
818 }
819 \fi
```

(End definition for `\CheckEncodingSubset`. This function is documented on page ??.)

`\tc@subst`

```
820 \def\tc@subst#1{%
821   \tc@errorwarn{textcomp}%
822   {Symbol \string#1 not provided by\MessageBreak
823     font family \f@family\space
824     in TS1 encoding.\MessageBreak Default family used instead}\@eha
825   \bgroup\fontfamily\textcompstubdefault\selectfont#1\egroup
826 }
```

(End definition for `\tc@subst`. This function is documented on page ??.)

`\tc@error` `\tc@error` is going to be used in arg #3 of `\CheckEncodingSubset` when a symbol is not available in a certain font family. It gets pass the encoding it normally lives in (arg one) and the name of the symbol or accent that has a problem.

```
827 % error commands take argument:
828 % #1 symbol to be used
829 \def\tc@error#1{%
830   \PackageError{textcomp}% % should be latex error if general
831   {Accent \string#1 not provided by\MessageBreak
832    font family \f@family\space
833    in TS1 encoding}\@eha
834 }
```

(End definition for `\tc@error`. This function is documented on page ??.)

`\tc@fake@euro` `\tc@fake@euro` is an example of a “fake” definition to use in arg #3 of `\CheckEncodingSubset` when a symbol is not available in a certain font family. Here we produce an Euro symbol by combining a “C” with a “=”.

```
835 \def\tc@fake@euro#1{%
836   \leavevmode
837   \PackageInfo{textcomp}{Faking \noexpand#1 for font family
838                    \f@family\MessageBreak in TS1 encoding}%
839   \valign{##\cr
840     \vfil\hbox to 0.07em{\dimen@\f@size\p@
841                        \math@fontsfalse
842                        \fontsize{.7\dimen@}\z@\selectfont=\hss}%
843     \vfil\cr%
844     \hbox{C}\crrcr
845   }%
846 }
```

(End definition for `\tc@fake@euro`. This function is documented on page ??.)

`\tc@check@symbol` These are two abbreviations that we use below to check symbols and accents in TS1.  
`\tc@check@accent` Only there to save some space, e.g., we can then write

`DeclareTextCommandDefault{\textcurrency}{\tc@check@symbol3\textcurrency}`

to ensure that `\textcurrency` is only typeset if the current font has a TS1 subset id of less than 3. Otherwise `\tc@error` is called telling the user that for this font family `\textcurrency` is not available.

```
847 \def\tc@check@symbol{\CheckEncodingSubset\UseTextSymbol{TS1}\tc@subst}
848 \def\tc@check@accent{\CheckEncodingSubset\UseTextAccent{TS1}\tc@error}
```

(End definition for `\tc@check@symbol` and `\tc@check@accent`. These functions are documented on page ??.)

We start with the commands that are “safe” and which can be unconditionally set up, first the accents...

```
849 \DeclareTextAccentDefault{\capitalcedilla}{TS1}
850 \DeclareTextAccentDefault{\capitalogonek}{TS1}
851 \DeclareTextAccentDefault{\capitalgrave}{TS1}
852 \DeclareTextAccentDefault{\capitalacute}{TS1}
853 \DeclareTextAccentDefault{\capitalcircumflex}{TS1}
```

```

854 \DeclareTextAccentDefault{\capitaltilde}{TS1}
855 \DeclareTextAccentDefault{\capitaldieresis}{TS1}
856 \DeclareTextAccentDefault{\capitalhungarumlaut}{TS1}
857 \DeclareTextAccentDefault{\capitalring}{TS1}
858 \DeclareTextAccentDefault{\capitalcaron}{TS1}
859 \DeclareTextAccentDefault{\capitalbreve}{TS1}
860 \DeclareTextAccentDefault{\capitalmacron}{TS1}
861 \DeclareTextAccentDefault{\capitaldotaccent}{TS1}
... and then the other glyphs.
862 \DeclareTextSymbolDefault{\textcapitalcompwordmark}{TS1}
863 \DeclareTextSymbolDefault{\textascendercompwordmark}{TS1}
864 \DeclareTextSymbolDefault{\textquotestraightbase}{TS1}
865 \DeclareTextSymbolDefault{\textquotestraightdblbase}{TS1}
866 \DeclareTextSymbolDefault{\texttwelveudash}{TS1}
867 \DeclareTextSymbolDefault{\textthreequartersemdash}{TS1}
868 \DeclareTextSymbolDefault{\textdollar}{TS1}
869 \DeclareTextSymbolDefault{\textquotesingle}{TS1}
870 \DeclareTextSymbolDefault{\textasteriskcentered}{TS1}
871 \DeclareTextSymbolDefault{\textfractionsolidus}{TS1}
872 \DeclareTextSymbolDefault{\textminus}{TS1}
873 \DeclareTextSymbolDefault{\textlbrackdbl}{TS1}
874 \DeclareTextSymbolDefault{\textrbrackdbl}{TS1}
875 \DeclareTextSymbolDefault{\textasciigrave}{TS1}
876 \DeclareTextSymbolDefault{\texttildelow}{TS1}
877 \DeclareTextSymbolDefault{\textasciibreve}{TS1}
878 \DeclareTextSymbolDefault{\textasciicaron}{TS1}
879 \DeclareTextSymbolDefault{\textgravedbl}{TS1}
880 \DeclareTextSymbolDefault{\textacutedbl}{TS1}
881 \DeclareTextSymbolDefault{\textdagger}{TS1}
882 \DeclareTextSymbolDefault{\textdaggerdbl}{TS1}
883 \DeclareTextSymbolDefault{\textbardbl}{TS1}
884 \DeclareTextSymbolDefault{\textperthousand}{TS1}
885 \DeclareTextSymbolDefault{\textbullet}{TS1}
886 \DeclareTextSymbolDefault{\textcelsius}{TS1}
887 \DeclareTextSymbolDefault{\textflorin}{TS1}
888 \DeclareTextSymbolDefault{\texttrademark}{TS1}
889 \DeclareTextSymbolDefault{\textcent}{TS1}
890 \DeclareTextSymbolDefault{\textsterling}{TS1}
891 \DeclareTextSymbolDefault{\textyen}{TS1}
892 \DeclareTextSymbolDefault{\textbrokenbar}{TS1}
893 \DeclareTextSymbolDefault{\textsection}{TS1}
894 \DeclareTextSymbolDefault{\textasciidieresis}{TS1}
895 \DeclareTextSymbolDefault{\textcopyright}{TS1}
896 \DeclareTextSymbolDefault{\textordfeminine}{TS1}
897 \DeclareTextSymbolDefault{\textlnot}{TS1}
898 \DeclareTextSymbolDefault{\textregistered}{TS1}
899 \DeclareTextSymbolDefault{\textasciimacron}{TS1}
900 \DeclareTextSymbolDefault{\textdegree}{TS1}
901 \DeclareTextSymbolDefault{\textpm}{TS1}
902 \DeclareTextSymbolDefault{\texttwosuperior}{TS1}
903 \DeclareTextSymbolDefault{\textthreesuperior}{TS1}
904 \DeclareTextSymbolDefault{\textasciacute}{TS1}
905 \DeclareTextSymbolDefault{\textmu}{TS1}
906 \DeclareTextSymbolDefault{\textparagraph}{TS1}

```

```

907 \DeclareTextSymbolDefault{\textperiodcentered}{TS1}
908 \DeclareTextSymbolDefault{\textonesuperior}{TS1}
909 \DeclareTextSymbolDefault{\textordmasculine}{TS1}
910 \DeclareTextSymbolDefault{\textonequarter}{TS1}
911 \DeclareTextSymbolDefault{\textonehalf}{TS1}
912 \DeclareTextSymbolDefault{\textthreequarters}{TS1}
913 \DeclareTextSymbolDefault{\texttimes}{TS1}
914 \DeclareTextSymbolDefault{\textdiv}{TS1}

```

The `\texteuro` is only available for subsets with id 4 or less. Otherwise we fake the glyph using `\tc@fake@euro`

```

915 \DeclareTextCommandDefault{\texteuro}
916   {\CheckEncodingSubset\UseTextSymbol{TS1}\tc@fake@euro5\texteuro}

```

The `\textohm` is only available for subsets with id 3 or less. Otherwise we produce an error.

```

917 \DeclareTextCommandDefault{\textohm}{\tc@check@symbol4\textohm}

```

The `\textestimated` and `\textcurrency` are only provided for fonts with subset encoding with id 2 or less.

```

918 \DeclareTextCommandDefault{\textestimated}%
919   {\tc@check@symbol3\textestimated}
920 \DeclareTextCommandDefault{\textcurrency}%
921   {\tc@check@symbol3\textcurrency}

```

Nearly all of the remaining glyphs are provided only with fonts with id 1 or 0, i.e., are essentially complete.

```

922 \DeclareTextCommandDefault{\capitaltie}%
923   {\tc@check@accent2\capitaltie}
924 \DeclareTextCommandDefault{\newtie}%
925   {\tc@check@accent2\newtie}
926 \DeclareTextCommandDefault{\capitalnewtie}%
927   {\tc@check@accent2\capitalnewtie}
928 \DeclareTextCommandDefault{\textleftarrow}%
929   {\tc@check@symbol2\textleftarrow}
930 \DeclareTextCommandDefault{\textrightarrow}%
931   {\tc@check@symbol2\textrightarrow}
932 \DeclareTextCommandDefault{\textblank}%
933   {\tc@check@symbol2\textblank}
934 \DeclareTextCommandDefault{\texdblhyphen}%
935   {\tc@check@symbol2\texdblhyphen}
936 \DeclareTextCommandDefault{\textzerooldstyle}%
937   {\tc@check@symbol2\textzerooldstyle}
938 \DeclareTextCommandDefault{\textoneoldstyle}%
939   {\tc@check@symbol2\textoneoldstyle}
940 \DeclareTextCommandDefault{\texttwooldstyle}%
941   {\tc@check@symbol2\texttwooldstyle}
942 \DeclareTextCommandDefault{\textthreeoldstyle}%
943   {\tc@check@symbol2\textthreeoldstyle}
944 \DeclareTextCommandDefault{\textfouroldstyle}%
945   {\tc@check@symbol2\textfouroldstyle}
946 \DeclareTextCommandDefault{\textfiveoldstyle}%
947   {\tc@check@symbol2\textfiveoldstyle}
948 \DeclareTextCommandDefault{\textsixoldstyle}%
949   {\tc@check@symbol2\textsixoldstyle}

```

```

950 \DeclareTextCommandDefault{\textsevenoldstyle}%
951   {\tc@check@symbol2\textsevenoldstyle}
952 \DeclareTextCommandDefault{\texteightoldstyle}%
953   {\tc@check@symbol2\texteightoldstyle}
954 \DeclareTextCommandDefault{\textnineoldstyle}%
955   {\tc@check@symbol2\textnineoldstyle}
956 \DeclareTextCommandDefault{\textlangle}%
957   {\tc@check@symbol2\textlangle}
958 \DeclareTextCommandDefault{\textrangle}%
959   {\tc@check@symbol2\textrangle}
960 \DeclareTextCommandDefault{\textmho}%
961   {\tc@check@symbol2\textmho}
962 \DeclareTextCommandDefault{\textbigcircle}%
963   {\tc@check@symbol2\textbigcircle}
964 \DeclareTextCommandDefault{\textuparrow}%
965   {\tc@check@symbol2\textuparrow}
966 \DeclareTextCommandDefault{\textdownarrow}%
967   {\tc@check@symbol2\textdownarrow}
968 \DeclareTextCommandDefault{\textborn}%
969   {\tc@check@symbol2\textborn}
970 \DeclareTextCommandDefault{\textdivorced}%
971   {\tc@check@symbol2\textdivorced}
972 \DeclareTextCommandDefault{\textdied}%
973   {\tc@check@symbol2\textdied}
974 \DeclareTextCommandDefault{\textleaf}%
975   {\tc@check@symbol2\textleaf}
976 \DeclareTextCommandDefault{\textmarried}%
977   {\tc@check@symbol2\textmarried}
978 \DeclareTextCommandDefault{\textmusicalnote}%
979   {\tc@check@symbol2\textmusicalnote}
980 \DeclareTextCommandDefault{\textdblhyphenchar}%
981   {\tc@check@symbol2\textdblhyphenchar}
982 \DeclareTextCommandDefault{\textdollaroldstyle}%
983   {\tc@check@symbol2\textdollaroldstyle}
984 \DeclareTextCommandDefault{\textcentoldstyle}%
985   {\tc@check@symbol2\textcentoldstyle}
986 \DeclareTextCommandDefault{\textcolonmonetary}%
987   {\tc@check@symbol2\textcolonmonetary}
988 \DeclareTextCommandDefault{\textwon}%
989   {\tc@check@symbol2\textwon}
990 \DeclareTextCommandDefault{\textnaira}%
991   {\tc@check@symbol2\textnaira}
992 \DeclareTextCommandDefault{\textguarani}%
993   {\tc@check@symbol2\textguarani}
994 \DeclareTextCommandDefault{\textpeso}%
995   {\tc@check@symbol2\textpeso}
996 \DeclareTextCommandDefault{\textlira}%
997   {\tc@check@symbol2\textlira}
998 \DeclareTextCommandDefault{\textrecipe}%
999   {\tc@check@symbol2\textrecipe}
1000 \DeclareTextCommandDefault{\textinterrobang}%
1001   {\tc@check@symbol2\textinterrobang}
1002 \DeclareTextCommandDefault{\textinterrobangdown}%
1003   {\tc@check@symbol2\textinterrobangdown}

```

```

1004 \DeclareTextCommandDefault{\textdong}%
1005     {\tc@check@symbol2\textdong}
1006 \DeclareTextCommandDefault{\textpertenthousand}%
1007     {\tc@check@symbol2\textpertenthousand}
1008 \DeclareTextCommandDefault{\textpilcrow}%
1009     {\tc@check@symbol2\textpilcrow}
1010 \DeclareTextCommandDefault{\textbaht}%
1011     {\tc@check@symbol2\textbaht}
1012 \DeclareTextCommandDefault{\textnumero}%
1013     {\tc@check@symbol2\textnumero}
1014 \DeclareTextCommandDefault{\textdiscount}%
1015     {\tc@check@symbol2\textdiscount}
1016 \DeclareTextCommandDefault{\textopenbullet}%
1017     {\tc@check@symbol2\textopenbullet}
1018 \DeclareTextCommandDefault{\textservicemark}%
1019     {\tc@check@symbol2\textservicemark}
1020 \DeclareTextCommandDefault{\textlquill}%
1021     {\tc@check@symbol2\textlquill}
1022 \DeclareTextCommandDefault{\textrquill}%
1023     {\tc@check@symbol2\textrquill}
1024 \DeclareTextCommandDefault{\textcopyright}%
1025     {\tc@check@symbol2\textcopyright}
1026 \DeclareTextCommandDefault{\textcircledP}%
1027     {\tc@check@symbol2\textcircledP}
1028 \DeclareTextCommandDefault{\textreferencemark}%
1029     {\tc@check@symbol2\textreferencemark}
1030 \DeclareTextCommandDefault{\textsurd}%
1031     {\tc@check@symbol2\textsurd}

```

The `\textcircled` and `\t` are handled specially, unless the current font has a subset id of 0 (i.e. full TS1) we pick the symbols up from the math font encodings, i.e., the third argument to `\CheckEncodingSubset` uses `\UseTextAccent` to get them from there.

```

1032 \DeclareTextCommandDefault{\textcircled}
1033     {\CheckEncodingSubset\UseTextAccent{TS1}%
1034     {\UseTextAccent{OMS}}1\textcircled}
1035 \DeclareTextCommandDefault{\t}
1036     {\CheckEncodingSubset\UseTextAccent{TS1}%
1037     {\UseTextAccent{OML}}1\t}

```

Finally input the encoding-specific definitions for TS1 thus making the top-level definitions optimised for this encoding (and not for the default encoding).

```

1038 \input{ts1enc.def}

```

Now having the new glyphs available we also want to make sure that they are used. For most cases this will automatically happen but for some glyphs there are inferior definitions already known to L<sup>A</sup>T<sub>E</sub>X which will prevent the usage of the TS1 versions. So we better get rid of them:

```

1039 \UndeclareTextCommand{\textsterling}{OT1}
1040 \UndeclareTextCommand{\textdollar} {OT1}

```

Similar declarations should probably be made for other encodings like OT4 if they are in use.

```

1041 %\UndeclareTextCommand{\textsterling}{OT4}
1042 %\UndeclareTextCommand{\textdollar} {OT4}

```

From the T1 encoding there are two candidates for removal: %<sub>o</sub> and %<sub>oo</sub> since these are both constructed from % followed by a tiny ‘o’ rather than being a single glyph. The problem with this approach is that in PostScript fonts this small zero is usually not available resulting in %<sub>■</sub> rather than %<sub>o</sub> while the real glyph (at least for \textperthousand) is available in the PostScript version of TS1. So for the moment we compromise by removing the T1 declaration for \textperthousand but keeping the one for \textpertenthousand. This will have the effect that with Computer Modern fonts everything will come out (although %<sub>o</sub> and %<sub>oo</sub> are not taken from the same physical font) and with PostScript fonts %<sub>o</sub> will come out correctly while %<sub>oo</sub> will most likely look like %<sub>■</sub> — which is probably an improvement over just getting a single ‘■’ to indicate a completely missing glyph, which would happen if we also ‘undeclared’ \textpertenthousand.

```

1043 \UndeclareTextCommand{\textperthousand}{T1}
1044 %\UndeclareTextCommand{\textpertenthousand}{T1}

```

### 5.1.1 Supporting oldstyle digits

```

1045 \DeclareRobustCommand\oldstylenums[1]{%
1046   \begingroup
1047   \ifmmode
1048     \mathgroup\symletters #1%
1049   \else
1050     \CheckEncodingSubset\@use@text@encoding{TS1}%
1051     {\PackageWarning{textcomp}%
1052      {Oldstyle digits unavailable for
1053       family \f@family.\MessageBreak
1054       Lining digits used instead}}%
1055     \tw@{#1}%
1056   \fi
1057   \endgroup
1058 }

```

### 5.1.2 Subset encoding defaults

For many font families commonly used in the T<sub>E</sub>X world we provide the subset encoding data here. Users can add additional font families in the file `textcomp.cfg` if they own other fonts.

However, if the option “forced” was given then all subset encoding specifications are ignored, so there is no point in setting any of them up:

```

1059 \iftc@forced \else
    Computer modern based fonts (e.g., CM, CM-Bright, Concrete):
1060 \DeclareEncodingSubset{TS1}{cmr}{0}
1061 \DeclareEncodingSubset{TS1}{cmss}{0}
1062 \DeclareEncodingSubset{TS1}{cmtt}{0}
1063 \DeclareEncodingSubset{TS1}{cmvtt}{0}
1064 \DeclareEncodingSubset{TS1}{cmbr}{0}
1065 \DeclareEncodingSubset{TS1}{cmtl}{0}
1066 \DeclareEncodingSubset{TS1}{ccr}{0}
    PSNFSS fonts:
1067 \DeclareEncodingSubset{TS1}{ptm}{4}
1068 \DeclareEncodingSubset{TS1}{pcr}{4}
1069 \DeclareEncodingSubset{TS1}{phv}{4}
1070 \DeclareEncodingSubset{TS1}{ppl}{3}

```

```

1071 \DeclareEncodingSubset{TS1}{pag}      {4}
1072 \DeclareEncodingSubset{TS1}{pbk}      {4}
1073 \DeclareEncodingSubset{TS1}{pnc}      {4}
1074 \DeclareEncodingSubset{TS1}{pzc}      {4}
1075 \DeclareEncodingSubset{TS1}{bch}      {4}
1076 \DeclareEncodingSubset{TS1}{put}      {5}

    Other CTAN fonts (probably not complete):
1077 \DeclareEncodingSubset{TS1}{uag}      {5}
1078 \DeclareEncodingSubset{TS1}{ugq}      {5}
1079 \DeclareEncodingSubset{TS1}{ul8}      {4}
1080 \DeclareEncodingSubset{TS1}{ul9}      {4}    % (LuxiSans, one day)
1081 \DeclareEncodingSubset{TS1}{augie}     {5}
1082 \DeclareEncodingSubset{TS1}{dayrom}    {3}
1083 \DeclareEncodingSubset{TS1}{dayroms}   {3}
1084 \DeclareEncodingSubset{TS1}{pxr}       {0}
1085 \DeclareEncodingSubset{TS1}{pxss}      {0}
1086 \DeclareEncodingSubset{TS1}{pxtt}      {0}
1087 \DeclareEncodingSubset{TS1}{txr}       {0}
1088 \DeclareEncodingSubset{TS1}{txss}      {0}
1089 \DeclareEncodingSubset{TS1}{txtt}      {0}

    Latin Modern and TeX Gyre:
1090 \DeclareEncodingSubset{TS1}{lmr}       {0}
1091 \DeclareEncodingSubset{TS1}{lmdh}      {0}
1092 \DeclareEncodingSubset{TS1}{lmss}      {0}
1093 \DeclareEncodingSubset{TS1}{lmssq}     {0}
1094 \DeclareEncodingSubset{TS1}{lmvtt}     {0}
1095 \DeclareEncodingSubset{TS1}{lmtt}      {0}

1096 \DeclareEncodingSubset{TS1}{qhv}      {0}
1097 \DeclareEncodingSubset{TS1}{qag}      {0}
1098 \DeclareEncodingSubset{TS1}{qbk}      {0}
1099 \DeclareEncodingSubset{TS1}{qcr}      {0}
1100 \DeclareEncodingSubset{TS1}{qcs}      {0}
1101 \DeclareEncodingSubset{TS1}{qpl}      {0}
1102 \DeclareEncodingSubset{TS1}{qtm}      {0}
1103 \DeclareEncodingSubset{TS1}{qzc}      {0}
1104 \DeclareEncodingSubset{TS1}{qhvc}     {0}

    Fourier-GUTenberg:
1105 \DeclareEncodingSubset{TS1}{futs}      {4}
1106 \DeclareEncodingSubset{TS1}{futex}    {4}
1107 \DeclareEncodingSubset{TS1}{futj}      {4}

    Y&Y's Lucida Bright
1108 \DeclareEncodingSubset{TS1}{hlh}       {3}
1109 \DeclareEncodingSubset{TS1}{hls}       {3}
1110 \DeclareEncodingSubset{TS1}{hlst}      {3}

    The remaining settings for Lucida are conservative: the following fonts contain the
    \textohm character but not the \texteuro, i.e., belong to neither subset 4 nor subset 3.
    If you want to use the \textohm with these fonts copy these definition to textcomp.cfg
    and change the subset to 3. However in that case make sure that you do not use the
    \texteuro.
1111 \DeclareEncodingSubset{TS1}{hlct}      {5}

```



```

1112 \DeclareEncodingSubset{TS1}{hlx}      {5}
1113 \DeclareEncodingSubset{TS1}{hlce}     {5}
1114 \DeclareEncodingSubset{TS1}{hlcn}     {5}
1115 \DeclareEncodingSubset{TS1}{hlcw}     {5}
1116 \DeclareEncodingSubset{TS1}{hlcf}     {5}

```

Other commercial families...

```

1117 \DeclareEncodingSubset{TS1}{pplx}     {3}
1118 \DeclareEncodingSubset{TS1}{pplj}     {3}
1119 \DeclareEncodingSubset{TS1}{ptmx}     {4}
1120 \DeclareEncodingSubset{TS1}{ptmj}     {4}

```

If the file `textcomp.cfg` exists it will be loaded at this point. This allows to define further subset encodings for font families not covered by default.

```

1121 \InputIfFileExists{textcomp.cfg}
1122   {\PackageInfo{textcomp}{Local configuration file used}}{}
1123 \fi
1124 </TS1oldsty>

```

## File B

# ltpageno.dtx

## 1 Page Numbering

Page numbers are produced by a page counter, used just like any other counter. The only difference is that `\c@page` contains the number of the next page to be output (the one currently being produced), rather than one minus it. Thus, it is normally initialized to 1 rather than 0. `\c@page` is defined to be `\count0`, rather than a count assigned by `\newcount`.

`\pagenumbering` The user sets the pagenumber style with the `\pagenumbering{<foo>}` command, which sets the page counter to 1 and defines `\thepage` to be `\foo`. For example, `\pagenumbering{roman}` causes pages to be numbered i, ii, etc.

```
1 <*2kernel>
2 \message{page nos.,}

3 \countdef\c@page=0 \c@page=1
4 \def\c1@page{}
5 \def\pagenumbering#1{%
6   \global\c@page \c@ne \gdef\thepage{\csname @#1\endcsname
7     \c@page}}
8 </2kernel>
```

## File C

# ltxref.dtx

## 1 Cross Referencing

The user writes `\label{foo}` to define the following cross-references:

`\ref{foo}`: value of most recently incremented referencable counter. in the current environment. (Chapter, section, theorem and enumeration counters are referencable, footnote counters are not.)

`\pageref{foo}`: page number at which `\label{foo}` command appeared. where foo can be any string of characters not containing `\`, `{` or `}`.

Note: The scope of the `\label` command is delimited by environments, so `\begin{theorem} \label{foo} ... \end{theorem} \label{bar}` defines `\ref{foo}` to be the theorem number and `\ref{bar}` to be the current section number.

Note: `\label` does the right thing in terms of spacing – i.e., leaving a space on both sides of it is equivalent to leaving a space on either side.

### 1.1 Cross Referencing

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```
1 \<*2ekernel)
2 \message{x-ref,}
```

This is implemented as follows. A referencable counter CNT is incremented by the command `\refstepcounter{CNT}`, which sets `\@currentlabel == {CNT}{eval(\p@cnt\theCNT)}`. The command `\label{FOO}` then writes the following on file `\@auxout`:

```
\newlabel{FOO}{\eval(\@currentlabel)}{\eval(\thepage)}
```

```
\ref{FOO} ==
BEGIN
  if \r@foo undefined
  then  @refundefined := G T
        ??
        Warning: 'reference foo on page ... undefined'
  else  \@car \eval(\r@FOO)\@nil
  fi
END
```

```
\pageref{foo} =
BEGIN
  if \r@foo undefined
  then  @refundefined := G T
        ??
        Warning: 'reference foo on page ... undefined'
  else  \@cdr \eval(\r@FOO)\@nil
  fi
END
```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

`\labelformat`

A reference via `\ref` produces by default the data associated with the corresponding `\label` command (typically a number); any additional formatting has to be provided by the user. If, for example, references to equations are always to be typeset as “equation (*number*)”, one has to code “`equation (\ref{key})`”. With `\labelformat` there is a possibility to generate such frills automatically without resorting to low-level coding. The command takes two arguments: the first is the name of a counter and the second is its representation when referenced. This means that for a successful usage, one has to know the counter name being used for generating the label, though in practice this should not pose a problem. The current counter number is picked up as an argument. Here are two examples:

```
\labelformat{section}{section-#1}
\labelformat{equation}{equation~( #1 )}
```

`\Ref`

A side effect of using `\labelformat` is that, depending on the defined formatting, it becomes impossible to use `\ref` at the beginning of a sentence (if its replacement text starts with a lowercase letter). To overcome this problem we introduce the command `\Ref` that behave like `\ref` except that it uppercases the first token of the generated string.

To make `\Ref` work properly the very first token in the second argument of `\labelformat` has to be a simple ASCII or UTF-8 letter, otherwise the capitalization will fail or worse, you will end up with some error messages. If you actually need something more complicated in this place (e.g., an accented letter not written as a UTF-8 character) you have to explicitly surround it with braces, to identify the part that needs to be capitalized. For example, for figure references in the Hungarian language you might want to write `\labelformat{figure}{\‘a}bra~\thefigure}` or use `\labelformat{figure}{ábra~\thefigure}` which avoids the brace problem.

`\G@refundefinedtrue`  
`\@refundefined`

This does not save on name-space (since `\G@refundefinedfalse` was never needed) but it does make the implementation of such one-way switches more consistent. The extra macro to make the change is used since this change appears several times.

**Note** despite its name, `\G@refundefinedtrue` does *not* correspond to an `\if` command, and there is no matching `...false`. It would be more natural to call the command `\G@refundefined` (as inspection of the change log will reveal) but unfortunately such a change would break any package that had defined a `\ref`-like command that mimicked the definition of `\ref`, calling `\G@refundefinedtrue`. Inspection of the T<sub>E</sub>X archives revealed several such packages, and so this command has been named `...true` so that the definition of `\ref` need not be changed, and the packages will work without change.

```
3 % \newif\ifG@refundefined
4 % \def\G@refundefinedtrue{\global\let\ifG@refundefined\iftrue}
5 % \def\G@refundefinedfalse{\global\let\ifG@refundefined\iffalse}
6 \def\G@refundefinedtrue{%
7   \gdef\@refundefined{%
8     \@latex@warning@no@line{There were undefined references}}
9 \let\@refundefined\relax
```

*(End definition for \G@refundefinedtrue and \@refundefined. These functions are documented on page ??.)*

`\ref` Referencing a `\label`. RmS 91/10/25: added a few extra `\reset@font`, as suggested by  
`\pageref` Bernd Raichle  
`\setref` RmS 92/08/14: made `\ref` and `\pageref` robust  
RmS 93/09/08: Added setting of redefined switch.

```

10 \def\@setref#1#2#3{%
11   \ifx#1\relax
12     \protect\G@refundefinedtrue
13     \nfss@text{\reset@font\bfseries ??}%
14     \@latex@warning{Reference ‘#3’ on page \thepage \space
15       undefined}%
16   \else
17     \expandafter#2#1\null
18   \fi}
19 \def\ref#1{\expandafter\@setref\csname r@#1\endcsname\@firstoftwo{#1}}
20 \def\pageref#1{\expandafter\@setref\csname r@#1\endcsname
21   \@secondoftwo{#1}}

```

*(End definition for \ref, \pageref, and \@setref. These functions are documented on page ??.)*

`\newlabel` This command will be written to the .aux file to pass label information from one run to another.

`\@newl@bel` The internal form of `\newlabel` and `\bibcite`. Note that this macro does its work inside a group. That way the local assignments it needs to do don't clutter the save stack. This prevents large documents with many labels to run out of save stack.

```

22 \def\@newl@bel#1#2#3{%
23   \@ifundefined{#1@#2}%
24     \relax
25     {\gdef \@multiplelabels {%
26       \@latex@warning@no@line{There were multiply-defined labels}}%
27       \@latex@warning@no@line{Label ‘#2’ multiply defined}}%
28   \global\@namedef{#1@#2}{#3}}
29 \def\newlabel{\@newl@bel r}
30 \@onlypreamble\@newl@bel

```

*(End definition for \newlabel and \@newl@bel. These functions are documented on page ??.)*

`\if@multiplelabels` This is redefined to produce a warning if at least one label is defined more than once. It  
`\@multiplelabels` is executed by the `\enddocument` command.

```

31 \let \@multiplelabels \relax

```

*(End definition for \if@multiplelabels and \@multiplelabels. These functions are documented on page ??.)*

`\label` The commands `\label` and `\refstepcounter` have been changed to allow `\protect`'ed commands to work properly. For example,

```

\def\thechapter{\protect\foo{\arabic{chapter}.\roman{section}}}

```

will cause a `\label{bar}` command to define `\ref{bar}` to expand to something like `\foo{4.d}`. Change made 20 Jul 88.

```

32 \def\label#1{\@bsphack
33   \protected@write\@auxout{%
34     {\string\newlabel{#1}{\@currentlabel}\thepage}}%
35   \@esphack}

```

(End definition for \label. This function is documented on page ??.)

```

36 </2ekernel>
37 <*2ekernel | latexrelease>
38 <latexrelease>\IncludeInRelease{2020/10/01}%
39 <latexrelease>          {\refstepcounter}{Add \@currentcounter}%

```

**\refstepcounter** Step the counter and allow for labels to point to its current value.

```

40 \def\@currentcounter{}
41 \def\refstepcounter#1{\stepcounter{#1}%
42   \edef\@currentcounter{#1}%
43   \protected@edef\@currentlabel

```

By generating the second csname first the \p@... command can grab it as an argument which can be helpful for more complicated typesetting arrangements.

The trick is to ensure that \csname the#1\endcsname is turned into a single token before \p@... is expanded further. This way, if the \p@... command is a macro with one argument it will receive \the.... With the original kernel code (i.e., without the \expandafter) it will instead pick up \csname which would be disastrous.

Using \expandafter instead of braces delimiting the argument is better because, assuming that the \p@... command is not defined as a macro with one argument, the braces will stay and prohibit kerning that might otherwise happen between the glyphs generated by \the... and surrounding glyphs.

```

44   {\csname p@#1\expandafter\endcsname\csname the#1\endcsname}%
45 }

```

(End definition for \refstepcounter. This function is documented on page ??.)

**\labelformat** A shortcut to set the \p@... macro for a counter. It will pick up the counter representation as an argument so that it can be specially formatted.

```

46 \def\labelformat#1{\expandafter\def\csname p@#1\endcsname##1}

```

(End definition for \labelformat. This function is documented on page ??.)

**\Ref** This macro expands the result of \ref and then uppercases the first token. Only useful if the label was generated via \labelformat and contains some lower case letter at its start. If the label starts with a complicated construct (e.g., an accented letter that is provided via a command, e.g., \a instead of a UTF-8 character like ä) one has to surround everything that needs uppercasing in a brace group in the definition of \labelformat.<sup>17</sup>

```

47 \DeclareRobustCommand\Ref[1]{\protected@edef\@tempa{\ref{#1}}%
48   \expandafter\MakeUppercase\@tempa}

```

(End definition for \Ref. This function is documented on page ??.)

```

49 </2ekernel | latexrelease>
50 <latexrelease>\EndIncludeInRelease
51 <latexrelease>\IncludeInRelease{2019/10/01}%
52 <latexrelease>          {\refstepcounter}{Add \labelformat and \Ref}%
53 <latexrelease>\let\@currentcounter\@undefined
54 <latexrelease>\def\refstepcounter#1{\stepcounter{#1}%
55 <latexrelease>   \protected@edef\@currentlabel

```

<sup>17</sup>There is one problem with this approach: the braces are kept in a normal \ref which might spoil kerning. Perhaps one day this needs redoing.

```

56 <latexrelease>      {\csname p@#1\expandafter\endcsname\csname the#1\endcsname}%
57 <latexrelease>}
58 <latexrelease>\def\labelformat#1{\expandafter\def\csname p@#1\endcsname##1}
59 <latexrelease>\DeclareRobustCommand\Ref[1]{\protected@edef\@tempa{\ref{#1}}}%
60 <latexrelease>      \expandafter\MakeUppercase\@tempa}
61 <latexrelease>\EndIncludeInRelease
62 <latexrelease>\IncludeInRelease{0000/00/00}%
63 <latexrelease>      {\refstepcounter}{Add \labelformat and \Ref}%
64 <latexrelease>
65 <latexrelease>\def\refstepcounter#1{\stepcounter{#1}%
66 <latexrelease>      \protected@edef\@currentlabel
67 <latexrelease>      {\csname p@#1\endcsname\csname the#1\endcsname}%
68 <latexrelease>}
69 <latexrelease>\let\labelformat\@undefined
70 <latexrelease>\let\Ref\@undefined
71 <latexrelease>
72 <latexrelease>\EndIncludeInRelease
73 <*/2ekernel>

```

\@currentlabel Default for \label commands that come before any environment.

```

74 \def\@currentlabel{}

```

*(End definition for \@currentlabel. This function is documented on page ??.)*

```

75 </2ekernel>

```

## File D

# ltmiscen.dtx

## 1 Miscellaneous Environments

This section implements the basic environment mechanism, and also a few specific environments including `document`, The math environments and related commands, the ‘flushing’ environments, (`center`, `flushleft`, `flushright`), and `verbatim`.

```
1 \*2ekernel)
2 \message{environments,}
```

### 1.1 Environments

`\begin{foo}` and `\end{foo}` are used to delimit environment `foo`.

`\begin{foo}` starts a group and calls `\foo` if it is defined, otherwise it does nothing.

`\end{foo}` checks to see that it matches the corresponding `\begin` and if so, it calls `\endfoo` and does an `\endgroup`. Otherwise, `\end{foo}` does nothing.

If `\end{foo}` needs to ignore blanks after it, then `\endfoo` should globally set the `@ignore` switch true with `\@ignoretrue` (this will automatically be global).

NOTE: `\@@end` is defined to be the `\end` command of  $\text{\TeX}$ 82.

`\enddocument` is the user’s command for ending the manuscript file.

`\stop` is a panic button — to end  $\text{\TeX}$  in the middle.

*Historical  $\text{\LaTeX}$  2.09 comments (not necessarily accurate any more):*

```
\enddocument ==
BEGIN
  \@checkend{document}    %% checks for unmatched \begin
  \clearpage
  \begingroup
    if @filesw = true
    then close file @mainaux
    if G@refundefined = true
    then LaTeX Warning: 'There are undefined references.' fi
    if @multiplelabels = true
    then LaTeX Warning:
      'One or more label(s) multiply defined.'
    else
      \@setckpt {ARG1}{ARG2} == null
      \newlabel{LABEL}{VAL} ==
      BEGIN
        \reserved@a == VAL
        if def(\reserved@a) = def(\r@LABEL)
        else @tempswa := true          fi
      END
      \bibcite{LABEL}{VAL} == null
      BEGIN
        \reserved@a == VAL
        if def(\reserved@a) = def(\g@LABEL)
        else @tempswa := true          fi
```



```

                                END
                                @tempswa := false
                                make @ a letter
                                \input \jobname.AUX
                                if @tempswa = true
                                    then LaTeX Warning: 'Label may have changed.
                                                Rerun to get cross-references right.'
                                fi
                                fi
                                fi
                                \endgroup
                                finish up
                                END

                                \@writefile{EXT}{ENTRY} ==
                                    if tf@EXT undefined
                                        else \write\tf@EXT{ENTRY}
                                    fi
                                End of historical LATEX 2.09 comments.

\@currentvir The name of the current environment. Initialized to document to so that \end{document}
works correctly.
3 \def\@currentvir{document}

(End definition for \@currentvir. This function is documented on page ??.)

\if@ignore
\@ignoretrue 4 \def\@ignorefalse{\global\let\if@ignore\iffalse}
\@ignorefalse 5 \def\@ignoretrue {\global\let\if@ignore\iftrue}
6 \@ignorefalse

(End definition for \if@ignore, \@ignoretrue, and \@ignorefalse. These functions are documented
on page ??.)

\ignorespacesafterend
7 \let\ignorespacesafterend\@ignoretrue

(End definition for \ignorespacesafterend. This function is documented on page ??.)

\enddocument
8 \</2kernel>
9 \<*2kernel | latexrelease>
10 \<latexrelease>\IncludeInRelease{2020/10/01}%
11 \<latexrelease> {\enddocument}{Use Hooks}%
12 \def\enddocument{%

The \end{document} hook is executed first. If necessary it can contain a \clearpage to
output dangling floats first. In this position it can also contain something like \end{foo}
so that the whole document effectively starts and ends with some special environment.
However, this must be used with care, eg if two applications would use this without knowl-
edge of each other the order of the environments will be wrong after all. \AtEndDocument
is redefined at this point so that and such commands that get into the hook do not chase
their tail...

13 \UseOneTimeHook{enddocument}%
14 \@kernel@after@enddocument

```

```

15 \checkend{document}%
16 \clearpage
17 \UseOneTimeHook{enddocument/afterlastpage}%
18 \@kernel@after@enddocument@afterlastpage
19 \begin{group}
20   \if@filesw
21     \immediate\closeout\@mainaux
22     \let\@setckpt\@gobbletwo
23     \let\@newl@bel\@testdef

```

The previous line is equiv to setting

```

\def\newlabel{\@testdef r}%
\def\bibcite{\@testdef b}%

```

We use `\@input` to load the `.aux` file, so that it doesn't show up in the list of files produced by `\listfiles`.

```

24 \tempwafalse
25 \makeatletter \@input\jobname.aux
26 \fi
27 \UseOneTimeHook{enddocument/afteraux}%

```

Next hook is expect to contain only code for writing info messages on the terminal.

```

28 \UseOneTimeHook{enddocument/info}%
29 \endgroup
30 \UseOneTimeHook{enddocument/end}%
31 \deadcycles\z@%end}

```

The public hooks used in `\enddocument`:

```

32 \NewHook{enddocument}
33 \NewHook{enddocument/afterlastpage}
34 \NewHook{enddocument/afteraux}
35 \NewHook{enddocument/info}
36 \NewHook{enddocument/end}

```

This is one of the few places where we already add data and rules to a hook already in the kernel.

```

37 \AddToHook{enddocument/info}[kernel/filelist]{\@dofilelist}
38 \AddToHook{enddocument/info}[kernel/warnings]{\@enddocument@kernel@warnings}
39 \DeclareHookRule{enddocument/info}{kernel/filelist}{before}{kernel/warnings}

```

*(End definition for \enddocument. This function is documented on page ??.)*

```

\@kernel@after@enddocument
\@kernel@after@enddocument@afterlastpage

```

The two kernel hooks above are used by the shipout code.

```

40 \let\@kernel@after@enddocument\@empty
41 \let\@kernel@after@enddocument@afterlastpage\@empty

```

*(End definition for \@kernel@after@enddocument and \@kernel@after@enddocument@afterlastpage. These functions are documented on page ??.)*

```

\@enddocument@kernel@warnings

```

```

42 \def\@enddocument@kernel@warnings{%

```

First we check for font size substitution bigger than `\fontsubfuzz`. The `\relax` is necessary because this is a macro not a register.

```

43 \ifdim \font@submax >\fontsubfuzz\relax

```

In case you wonder about the `\@gobbletwo` inside the message below, this is a horrible hack to remove the tokens `\on@line`. that are added by `\@font@warning` at the end.

```
44     \@font@warning{Size substitutions with differences\MessageBreak
45                     up to \font@submax\space have occurred.\@gobbletwo}%
46     \fi
```

The macro `\@defaultsubs` is initially `\relax` but gets redefined to produce a warning if there have been some default font substitutions.

```
47     \@defaultsubs
```

The macro `\@refundefined` is initially `\relax` but gets redefined to produce a warning if there are undefined refs.

```
48     \@refundefined
```

If a label is defined more than once, `\@tempswa` will always be true and thus produce a “Label(s) may ...” warning. But since a rerun will not solve that problem (unless one uses a package like `varioref` that generates labels on the fly), we suppress this message.

```
49     \if@filesw
50         \ifx \@multiplelabels \relax
51             \if@tempswa
52                 \@latex@warning@no@line{Label(s) may have changed.
53                     Rerun to get cross-references right}%
54             \fi
55         \else
56             \@multiplelabels
57         \fi
58         \ifx \@extra@page@added \relax
59             \@latex@warning@no@line{Temporary extra page added at the end.
60                 Rerun to get it removed}%
61         \fi
```

We could think of adding a warning that nothing can be corrected while `\nofiles` is in force. In the past the warnings related to the aux file are simply suppressed in this case.

```
62     \fi
63 }
```

*(End definition for \@enddocument@kernel@warnings. This function is documented on page ??.)*

```
64 </2ekernel | latexrelease>
65 <latexrelease>\EndIncludeInRelease
66 <latexrelease>\IncludeInRelease{0000/00/00}%
67 <latexrelease>                {\enddocument}{Use Hooks}%
68 <latexrelease>
69 <latexrelease>\def\enddocument{%
70 <latexrelease>    \let\AtEndDocument\@firstofone
71 <latexrelease>    \@enddocumenthook
72 <latexrelease>    \@checkend{document}%
73 <latexrelease>    \clearpage
74 <latexrelease>    \begingroup
75 <latexrelease>        \if@filesw
76 <latexrelease>            \immediate\closeout\@mainaux
77 <latexrelease>            \let\@setckpt\@gobbletwo
78 <latexrelease>            \let\@newl@bel\@testdef
79 <latexrelease>            \@tempwafalse
80 <latexrelease>            \makeatletter \@input\jobname.aux
```

```

81 <latexrelease> \fi
82 <latexrelease> \@dofilelist
83 <latexrelease> \ifdim \font@submax >\fontsubfuzz\relax
84 <latexrelease> \font@warning{Size substitutions with differences\MessageBreak
85 <latexrelease> up to \font@submax\space have occurred.\@gobbletwo}%
86 <latexrelease> \fi
87 <latexrelease> \@defaultsubs
88 <latexrelease> \@refundefined
89 <latexrelease> \if@files
90 <latexrelease> \ifx \@multiplelabels \relax
91 <latexrelease> \if@tempwa
92 <latexrelease> \@latex@warning@no@line{Label(s) may have changed.
93 <latexrelease> Rerun to get cross-references right}%
94 <latexrelease> \fi
95 <latexrelease> \else
96 <latexrelease> \@multiplelabels
97 <latexrelease> \fi
98 <latexrelease> \fi
99 <latexrelease> \endgroup
100 <latexrelease> \deadcycles\z@\@@end}
101 <latexrelease>
102 <latexrelease>\let\@kernel@after@enddocument\@undefined
103 <latexrelease>\let\@kernel@after@enddocument@afterlastpage\@undefined
104 <latexrelease>\let\@enddocument@kernel@warnings\@undefined
105 <latexrelease>
106 <latexrelease>\EndIncludeInRelease
107 <*2kernel>

```

`\@testdef`

```

108 \def\@testdef #1#2#3{%
109 \def\reserved@a{#3}\expandafter \ifx \csname #1@#2\endcsname
110 \reserved@a \else \@tempwattrue \fi}

```

*(End definition for \@testdef. This function is documented on page ??.)*

Reading data from auxiliary files (like `.toc` normally happens in vertical mode and it therefore doesn't matter if line endings are converted to spaces by  $\mathrm{T\!E\!X}$  during that process.

However, especially the `.toc` file might be read in L-R mode (in cases the `\tableofcontents` attempts to put, say a list of sub-sections as a paragraph. In that case the newlines after a line like

```
\contentsline {subsubsection}{\numberline {1.1.1}A C-head}{2}
```

might result in spurious spaces (e.g., when that level is not included).

That could be fixed by reading in the file using `\endlinechar=-1` but that has the danger that it drops some valid endlines that should be converted to spaces (for example when the user edited the TOC and then used `\nofiles` to preserve it.

So the approach taken instead is this:

- `\addcontentsline` adds the command `\protected@file@percent` to the end of the second argument of `\@writefile` that is written to the `.aux`. As the name indicates this is a protected macro so it doesn't change if it is written out.

- When the `.aux` is read back in at the end of the run, `\@writefile` is executed and writes its second argument unmodified to the file with the extension given by its first argument. Or rather that was how it was in the past.
- Instead we change `\@writefile` slightly: basically it looks at the second argument and if the last token in there is `\protected@file@percent` then it is replaced by a percent character and that is then written out. If not (for example, if the data came from a user issued `\addtocontents`, or from some package that uses `\@writefile` for writing its own files) then the command behaves exactly as before.

`\protected@file@percent` Dummy cs to be replaced by a percent sign inside `\@writefile`. If it survives (when used incorrectly) it will expand to nothing in a typesetting context.

```

111 </2ekernel>
112 <*2ekernel | latexrelease>
113 <latexrelease>\IncludeInRelease{2018/12/01}%
114 <latexrelease>                {\protected@file@percent}{Mask line endings}%
115 \protected\def\protected@file@percent{}

```

(End definition for `\protected@file@percent`. This function is documented on page ??.)

`\add@percent@to@temptokena` Helper function which is used to inspect a sequence of tokens (the second argument of `\@writefile` and if the last token is `\protected@file@percent` it will replace it by a harmless percent. The result is saved in `\@temptokena` for later use.

```

116 \catcode'\^^A=9
117 \long\gdef\add@percent@to@temptokena
118     #1\protected@file@percent#2\add@percent@to@temptokena

```

When we call this macro in `\@writefile` we stick in `\@empty` at the beginning, so that in case the tokenlist consists of a single brace group the braces aren't stripped. The `\expandafter` then expands this extra token away again.

```

119     {\expandafter\ifx\expandafter X\detokenize{#2}X\expandafter\dont@add@percent@to@temptokena
120         \expandafter\do@add@percent@to@temptokena\fi{#1}}
121 \long\def\dont@add@percent@to@temptokena#1{%
122     \@temptokena\expandafter{#1}}

```

`latexrelease` will read this code in high-speed mode in certain situations. During that it will only look for `\if` tests but not actually execute the `\catcode` change above. As a result it will drop anything after the `%` character in the definition. Therefore the `\fi` needs to be on the next line and we need locally another comment character to avoid getting spaces into the definition—a weird problem :-)

```

123 \begingroup
124 \catcode'\%=12
125 \catcode'\^^A=14
126 \long\gdef\do@add@percent@to@temptokena#1{\@temptokena\expandafter{#1%\^^A

```

Can't be on the same line as the `%` — see above.

```

127     }}
128 \endgroup

```

(End definition for `\add@percent@to@temptokena`. This function is documented on page ??.)

`\@writefile`

```
129 \long\def\@writefile#1#2{%
130   \ifundefined{tf@#1}\relax
131   {%
132     \add@percent@to@temptokena
133     \@empty#2\protected@file@percent
134     \add@percent@to@temptokena
135     \immediate\write\csname tf@#1\endcsname{\the\@temptokena}%
136   }%
137 }

138 </2ekernel | latexrelease>
139 <latexrelease>\EndIncludeInRelease
140 <latexrelease>\IncludeInRelease{0000/00/00}%
141 <latexrelease>      {\protected@file@percent}{Mask line endings}%
142 <latexrelease>\let\protected@file@percent\@undefined
143 <latexrelease>\let\add@percent@to@temptokena\@undefined
144 <latexrelease>\let\do@add@percent@to@temptokena\@undefined
145 <latexrelease>\let\dont@add@percent@to@temptokena\@undefined
146 <latexrelease>\long\def\@writefile#1#2{%
147 <latexrelease>   \ifundefined{tf@#1}\relax
148 <latexrelease>     {\@temptokena{#2}}%
149 <latexrelease>     \immediate\write\csname tf@#1\endcsname{\the\@temptokena}%
150 <latexrelease>     }%
151 <latexrelease>}
152 <latexrelease>\EndIncludeInRelease
153 <*2ekernel>
```

*(End definition for \@writefile. This function is documented on page ??.)*

`\stop`

```
154 \def\stop{\clearpage\deadcycles\z@\let\par\@@par\@@end}
```

*(End definition for \stop. This function is documented on page ??.)*

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```
155 \everypar{\@nodocument} %% To get an error if text appears before the
156 \nullfont                %% \begin{document}
```

`\begin`, `\end`, and `\@checkend` changed so `\end{document}` will catch an unmatched `\begin`. Changed 24 May 89 as suggested by Frank Mittelbach and Rainer Sch\"opf.

```
\begin{NAME} ==
BEGIN
  IF \NAME undefined THEN \reserved@a == BEGIN report error END
  ELSE \reserved@a ==
    (\@currenvir :=L NAME) \NAME
  FI
  @ignore :=G F      %% Added 30 Nov 88
  \begingroup
```

```

\@endpe := F
\@currenvir :=L NAME
\NAME
END

\end{NAME} ==
BEGIN
\endNAME
\@checkend{NAME}
\endgroup
IF \@endpe = T                %% \@endpe set True by \@endparenv
    THEN \@doendpe            %% \@doendpe redefines \par and \everypar
                                %% to suppress paragraph indentation in
                                %% immediately following text
FI
IF \@ignore = T
    THEN \@ignore :=G F
        \ignorespaces
FI
END

\@checkend{NAME} ==
BEGIN
    IF \@currenvir = NAME
        ELSE \@badend{NAME}
    FI
END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

```

\begin
157 </2ekernel>
158 <*2ekernel | latexrelease>
159 <latexrelease>\IncludeInRelease{2020/10/01}%
160 <latexrelease>                {\begin}{Use hook system}%
161 \DeclareRobustCommand*\begin[1]{%
162   \UseHook{env/#1/before}%
163   \@ifundefined{#1}%
164     {\def\reserved@a{\@latex@error{Environment #1 undefined}\@eha}}%
165     {\def\reserved@a{\def\@currenvir{#1}%
166       \edef\@currencline{\on@line}%
167       \@execute@begin@hook{#1}%
168       \csname #1\endcsname}}%
169   \@ignorefalse
170   \begingroup\@endpefalse\reserved@a}

```

Before the `\document` code is executed we have to first undo the `\endgroup` as there should be none for this environment to avoid that changes on top-level unnecessarily go to T<sub>E</sub>X's savestack, and we have to initialize all hooks in the hook system. So we need to test for this environment name. But once it has been found all this testing is no longer needed and so we redefine `\@execute@begin@hook` to simply use the hook.

```

171 \def\@execute@begin@hook #1{%

```

```

172 \expandafter\ifx\csname #1\endcsname\document
173 \endgroup
174 \gdef\@execute@begin@hook##1{\UseHook{env/##1/begin}}%
175 \@expl@@@initialize@all@@
176 \fi

```

If this is an environment before `\begin{document}` we just run the hook so this can be outside the test.

```

177 \UseHook{env/#1/begin}%
178 }

```

The top level definition for `\end.` for an explanation see below (this is the same as the 2019 version where it was introduced, but for rollback we have to repeat it).

```

179 \edef\end
180 {\unexpanded{%
181   \romannumeral
182   \ifx\protect\@typeset@protect
183   \expandafter %1
184   \expandafter %2
185   \expandafter %1
186   \expandafter %3 expands the \csname inside \end<space>
187   \expandafter %1
188   \expandafter %2 expands \end<space>
189   \expandafter %1 expands the \else
190   \z@
191   \else
192   \expandafter\z@\expandafter\protect
193   \fi
194 }%
195 \expandafter\noexpand\csname end \endcsname
196 }

```

Version that adds hooks (so different from the 2019 version). It fixes tlb3722 but the change should perhaps be made in `tabularx` instead.

```

197 \@namedef{end }#1{%
198   \romannumeral
199   \IfHookEmptyTF{env/#1/end}%
200   {\expandafter\z@}%
201   {\z@\UseHook{env/#1/end}}%
202   \csname end#1\endcsname\@checkend{#1}%
203   \expandafter\endgroup\if@endpe\@doendpe\fi
204   \UseHook{env/#1/after}%
205   \if@ignore\@ignorefalse\ignorespaces\fi
206 }

```

Version without the fix for tlb3722 for the record:

```

207 %\@namedef{end }#1{%
208 % \UseHook{env/#1/end}%
209 % \csname end#1\endcsname\@checkend{#1}%
210 % \expandafter\endgroup\if@endpe\@doendpe\fi
211 % \UseHook{env/#1/after}%
212 % \if@ignore\@ignorefalse\ignorespaces\fi}%
213 </2ekernel | latexrelease>
214 <latexrelease>\EndIncludeInRelease

```



```

215 <latexrelease>\IncludeInRelease{2019/10/01}%
216 <latexrelease>          {\begin}{Making \begin/\end robust}%
217 <latexrelease>\DeclareRobustCommand\begin[1]{%
218 <latexrelease>  \ifundefined{#1}%
219 <latexrelease>    {\def\reserved@a{\@latex@error{Environment #1 undefined}\@eha}}%
220 <latexrelease>    {\def\reserved@a{\def\@currenvir{#1}%
221 <latexrelease>      \edef\@currenvline{\on@line}%
222 <latexrelease>      \csname #1\endcsname}}}%
223 <latexrelease>  \ignorefalse
224 <latexrelease>  \begingroup\@endpfalse\reserved@a}

```

A version that doesn't start out with `\relax` when in typesetting mode would be the following, but since `\begin` issues a `\begingroup` it wouldn't help much with respect to allowing things like `\noalign` or `\multicolumn` inside.

```

225 %\edef\begin
226 %  {\unexpanded{%
227 %    \ifx\protect\@typeset@protect
228 %      \expandafter\@gobble
229 %    \fi
230 %    \protect
231 %  }}%
232 %  \expandafter\noexpand\csname begin \endcsname
233 % }
234 %\@namedef{begin }#1{%
235 %  \ifundefined{#1}%
236 %    {\def\reserved@a{\@latex@error{Environment #1 undefined}\@eha}}%
237 %    {\def\reserved@a{\def\@currenvir{#1}%
238 %      \edef\@currenvline{\on@line}%
239 %      \csname #1\endcsname}}}%
240 %  \ignorefalse
241 %  \begingroup\@endpfalse\reserved@a}

```

While `\begin` was made robust simply by using `\DeclareRobustCommand` we need to be a bit more subtle with `\end` as there are packages out there that try to look into the top-level contents of `\end{foo}` (that is at the expansion of `\endfoo`) to see if it contains certain macros. This is done by hitting `\end{foo}` with three `\expandafters`, the first to get

```
\csname endfoo\endcsname          \@checkend{foo}% etc.
```

the second to expand the `\csname`, i.e., to get to

```
\endfoo                          \@checkend{foo}% etc.
```

and the third to finally get to the top-level content of `\endfoo`, i.e.

```
<top-level content of \endfoo> \@checkend{foo}% etc.
```

Therefore a robust replacement should produce the same results after three expansions (there first is obviously different).

Basically the definition of `\end` should either produce `\protect\end_` (when not doing typesetting) or it should produce `\end_` (without the `\protect`) when doing typesetting. Furthermore, it should (when in typesetting mode) show exactly the same result as `\end_` (which is the original fragile definition of `\end`) when you expand either of them twice, i.e.,

```
\endfoo \checkend{foo}% etc.
```

That is achieved with the code below (which is worth studying carefully).

There is some trickery involved here: in particular we use `\romannumeral` to change a single expansion into three successive expansions in one go. That primitive expands until it has scanned a number (0 in this case, so it doesn't produce any output) and so it allows us to place arbitrary many `\expandafters` inside that are all going to be executed when `\romannumeral` is hit by a single `\expandafter`.

```
242 <latexrelease>\edef\end
243 <latexrelease>  {\unexpanded{%
244 <latexrelease>    \romannumeral
245 <latexrelease>    \ifx\protect\@typeset@protect
246 <latexrelease>    \expandafter      %1
247 <latexrelease>    \expandafter      %2
248 <latexrelease>    \expandafter      %1
249 <latexrelease>    \expandafter      %3 expands the \csname inside \end<space>
250 <latexrelease>    \expandafter      %1
251 <latexrelease>    \expandafter      %2 expands \end<space>
252 <latexrelease>    \expandafter      %1 expands the \else
253 <latexrelease>    \z@
254 <latexrelease>    \else
255 <latexrelease>    \expandafter\z@\expandafter\protect
256 <latexrelease>    \fi
257 <latexrelease>  }%
258 <latexrelease>  \expandafter\noexpand\csname end \endcsname
259 <latexrelease> }
```

And here is the original definition of `\end` the way it was in L<sup>A</sup>T<sub>E</sub>X for several decades now hidden in `\end_`.

```
260 <latexrelease>\@namedef{end }#1{%
261 <latexrelease>  \csname end#1\endcsname\checkend{#1}%
262 <latexrelease>  \expandafter\endgroup\if@endpe\doendpe\fi
263 <latexrelease>  \if@ignore\ignorefalse\ignorespaces\fi}
264 <latexrelease>\EndIncludeInRelease
```

And here the rollback in case that is ever needed.

```
265 <latexrelease>\IncludeInRelease{0000/00/00}%
266 <latexrelease>  {\begin}{Making \begin/\end robust}%
267 <latexrelease>\def\begin#1{%
268 <latexrelease>  \@ifundefined{#1}%
269 <latexrelease>  {\def\reserved@a{\@latex@error{Environment #1 undefined}\@eha}}%
270 <latexrelease>  {\def\reserved@a{\def\@currentvir{#1}%
271 <latexrelease>    \edef\@currentvline{\on@line}%
272 <latexrelease>    \csname #1\endcsname}}}%
273 <latexrelease>  \@ignorefalse
274 <latexrelease>  \begingroup\@endpfalse\reserved@a}
275 <latexrelease>\def\end#1{%
276 <latexrelease>  \csname end#1\endcsname\checkend{#1}%
277 <latexrelease>  \expandafter\endgroup\if@endpe\doendpe\fi
278 <latexrelease>  \if@ignore\ignorefalse\ignorespaces\fi}
279 <latexrelease>
280 <latexrelease>\EndIncludeInRelease
281 (*2kernel)
```

(End definition for `\begin` and `\end`. These functions are documented on page ??.)

`\@checkend`

```
282 \def\@checkend#1{\def\reserved@a{#1}\ifx
283     \reserved@a\@currenvir \else\@badend{#1}\fi}
```

(End definition for \@checkend. This function is documented on page ??.)

`\@currenvline` We do need a default value for \@currenvline on top-level since the document environment cancels the brace group. This means that a mismatch with `\begin{document}` will not produce a line number. Thus the outer default must be `\@empty` or we will end up with two spaces.

```
284 \let\@currenvline\@empty
```

(End definition for \@currenvline. This function is documented on page ??.)

`\AtBeginEnvironment` We provide 4 high-level hook interfaces directly, the others only when etoolbox is loaded  
`\AtEndEnvironment`  
`\BeforeBeginEnvironment`  
`\AfterEndEnvironment`

```
285 </2ekernel>
286 <*2ekernel | latexrelease>
287 <latexrelease>\IncludeInRelease{2020/10/01}%
288 <latexrelease>          {\AtBeginEnvironment}{Hooks for environments}%
289 \newcommand\AtBeginEnvironment[2][.] {\AddToHook{env/#2/begin}[#1]}
290 \newcommand\AtEndEnvironment[2][.]   {\AddToHook{env/#2/end}[#1]}
291 \newcommand\BeforeBeginEnvironment[2][.] {\AddToHook{env/#2/before}[#1]}
292 \newcommand\AfterEndEnvironment[2][.]  {\AddToHook{env/#2/after}[#1]}
293 </2ekernel | latexrelease>
294 <latexrelease>\EndIncludeInRelease
295 <latexrelease>\IncludeInRelease{0000/00/00}%
296 <latexrelease>          {\AtBeginEnvironment}{Hooks for environments}%
297 <latexrelease>
298 <latexrelease>\let\AtBeginEnvironment\@undefined
299 <latexrelease>\let\AtEndEnvironment\@undefined
300 <latexrelease>\let\BeforeBeginEnvironment\@undefined
301 <latexrelease>\let\AfterEndEnvironment\@undefined
302 <latexrelease>
303 <latexrelease>\EndIncludeInRelease
304 <*2ekernel>
```

(End definition for \AtBeginEnvironment and others. These functions are documented on page 115.)

## 1.2 Center, Flushright, Flushleft

```
305 \message{center,}
```

Historical *L<sup>A</sup>T<sub>E</sub>X* 2.09 comments (not necessarily accurate any more):

```
\center, \flushright and \flushleft set
\rightskip = 0pt or \@flushglue (as appropriate)
\leftskip  = 0pt or \@flushglue (as appropriate)
\parindent = 0pt
\parfillskip = 0pt. (except \flushleft)
\\          == \par \vskip -\parskip
\\[LENGTH] == \\ \vskip LENGTH
\\*         == \par \penalty 10000 \vskip -\parskip
```

`\*[LEN] == \* \vskip LENGTH`

They invoke the `trivlist` environment to handle vertical spacing before and after them.

`\centering`, `\raggedright` and `\raggedleft` are the declaration analogs of the above.

`\raggedright` has a more universal effect, however. It sets `\@rightskip := flushglue`. Every environment, like the list environments, that set `\rightskip` to its 'normal' value set it to `\@rightskip`

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

`\@centercr`

```

306 </2ekernel>
307 <*2ekernel | latexrelease>
308 <latexrelease>\IncludeInRelease{2020/02/02}%
309 <latexrelease>                {\@centercr}{Make robust}%
310 \protected\def\@centercr{\ifhmode \unskip\else \@nolnerr\fi
311     \par\@ifstar{\nobreak\@xcentercr}\@xcentercr}
312 </2ekernel | latexrelease>

313 <latexrelease>\EndIncludeInRelease
314 <latexrelease>\IncludeInRelease{0000/00/00}%
315 <latexrelease>                {\@centercr}{Make robust}%
316 <latexrelease>
317 <latexrelease>\def\@centercr{\ifhmode \unskip\else \@nolnerr\fi
318 <latexrelease>     \par\@ifstar{\nobreak\@xcentercr}\@xcentercr}
319 <latexrelease>
320 <latexrelease>\EndIncludeInRelease
321 <*2ekernel>

```

*(End definition for \@centercr. This function is documented on page ??.)*

`\@xcentercr`

```

322 \def\@xcentercr{\addvspace{-\parskip}\@ifnextchar
323     [\@icentercr\ignorespaces}

```

*(End definition for \@xcentercr. This function is documented on page ??.)*

`\@icentercr`

```

324 </2ekernel>
325 <*2ekernel | latexrelease>
326 <latexrelease>\IncludeInRelease{2020/10/01}%
327 <latexrelease>                {\@icentercr}{centering, etc support calc}%
328 \def\@icentercr[#1]{\@vspace@calcify{#1}\ignorespaces}
329 </2ekernel | latexrelease>
330 <latexrelease>\EndIncludeInRelease

```

```

331 <latexrelease>\IncludeInRelease{0000/00/00}%
332 <latexrelease>                {\@icentercr}{centering, etc support calc}%
333 <latexrelease>
334 <latexrelease>\def\@icentercr[#1]{\vskip #1\ignorespaces}
335 <latexrelease>\EndIncludeInRelease
336 <*2ekernel>

(End definition for \@icentercr. This function is documented on page ??.)

center We use \relax to prevent \item scanning too far.
337 \def\center{\trivlist \centering\item\relax}
338 \def\endcenter{\endtrivlist}

339 </2ekernel>
340 <*2ekernel | latexrelease>
341 <latexrelease>\IncludeInRelease{2020/10/01}%
342 <latexrelease>                {\centering}{Set finaldhyphenemerits}%

\centering
343 \DeclareRobustCommand\centering{%
344   \let\\ \@centercr
345   \rightskip\@flushglue\leftskip\@flushglue
346   \finalhyphenemerits=\z@
347   \parindent\z@\parfillskip\z@skip}

(End definition for \centering. This function is documented on page ??.)

\raggedright
348 \DeclareRobustCommand\raggedright{%
349   \let\\ \@centercr\@rightskip\@flushglue \rightskip\@rightskip
350   \finalhyphenemerits=\z@
351   \leftskip\z@skip
352   \parindent\z@}

(End definition for \raggedright. This function is documented on page ??.)

\raggedleft
353 \DeclareRobustCommand\raggedleft{%
354   \let\\ \@centercr
355   \rightskip\z@skip\leftskip\@flushglue
356   \finalhyphenemerits=\z@
357   \parindent\z@\parfillskip\z@skip}

(End definition for \raggedleft. This function is documented on page ??.)

358 </2ekernel | latexrelease>
359 <latexrelease>\EndIncludeInRelease
360 <latexrelease>\IncludeInRelease{2019/10/01}%
361 <latexrelease>                {\centering}{Make commands robust}%
362 <latexrelease>
363 <latexrelease>\DeclareRobustCommand\centering{%
364   <latexrelease> \let\\ \@centercr
365   <latexrelease> \rightskip\@flushglue\leftskip\@flushglue
366   <latexrelease> \parindent\z@\parfillskip\z@skip}
367 <latexrelease>\DeclareRobustCommand\raggedright{%

```

```

368 <latexrelease> \let\\@centercr\@rightskip\@flushglue \rightskip\@rightskip
369 <latexrelease> \leftskip\z@skip
370 <latexrelease> \parindent\z@}
371 <latexrelease>\DeclareRobustCommand\raggedleft{%
372 <latexrelease> \let\\@centercr
373 <latexrelease> \rightskip\z@skip\leftskip\@flushglue
374 <latexrelease> \parindent\z@\parfillskip\z@skip}
375 <latexrelease>\EndIncludeInRelease
376 <latexrelease>
377 <latexrelease>\IncludeInRelease{0000/00/00}%
378 <latexrelease> \centering}{Make commands robust}%
379 <latexrelease>
380 <latexrelease>\kernel@make@fragile\centering
381 <latexrelease>\kernel@make@fragile\raggedright
382 <latexrelease>\kernel@make@fragile\raggedleft
383 <latexrelease>
384 <latexrelease>\EndIncludeInRelease
385 <*2ekernel>

```

**\@rightskip**

```

386 \newskip\@rightskip \@rightskip \z@skip

```

(End definition for \@rightskip. This function is documented on page ??.)

**flushleft** We use \relax to prevent \item scanning too far.

```

387 \def\flushleft{\trivlist \raggedright\item\relax}
388 \def\endflushleft{\endtrivlist}

```

**flushright** We use \relax to prevent \item scanning too far.

```

389 \def\flushright{\trivlist \raggedleft\item\relax}
390 \def\endflushright{\endtrivlist}

```

### 1.3 Verbatim

```

391 \message{verbatim,}

```

The verbatim environment uses the fixed-width \ttfamily font, turns blanks into spaces, starts a new line for each carriage return (or sequence of consecutive carriage returns), and interprets *every* character literally. I.e., all special characters \, {, \$, etc. are \catcode'd to 'other'.

The command \verb produces in-line verbatim text, where the argument is delimited by any pair of characters. E.g., \verb #...# takes '...' as its argument, and sets it verbatim in \ttfamily font.

The \*-variants of these commands are the same, except that spaces print as the T<sub>E</sub>Xbook's space character instead of as blank spaces.

**\@vobeyspaces**

```

392 {\catcode'\ =\active%
393 \gdef\@vobeyspaces{\catcode'\ \active\let \@xobeysp}}

```

(End definition for \@vobeyspaces. This function is documented on page ??.)

**\@xobeysp**

(End definition for \xobeysp. This function is documented on page ??.)

```

\@xverbatim
\@sxverbatim 394 \begingroup \catcode '\=0 \catcode '[= 1
395 \catcode']=2 \catcode '\{=12 \catcode '\}=12
396 \catcode'\=12 |gdef|\@xverbatim#1\end{verbatim} [#1|end[verbatim]]
397 |gdef|\@sxverbatim#1\end{verbatim*} [#1|end[verbatim*]]
398 |endgroup

```

(End definition for \@xverbatim and \@sxverbatim. These functions are documented on page ??.)

\@verbatim Real start of verbatim environment We use \relax to prevent \item scanning too far.

```

399 </2kernel>
400 <*2kernel | latexrelease>
401 <latexrelease>\IncludeInRelease{2017-04-15}{\@verbatim}%
402 <latexrelease> {Disable hyphenation in verbatim}%
403 \def\@verbatim{\trivlist \item\relax
404 \if@minipage\else\vskip\parskip\fi
405 \leftskip\@totalleftmargin\rightskip\z@skip
406 \parindent\z@\parfillskip\@flushglue\parskip\z@skip

```

Added \@par to clear possible \parshape definition from a surrounding list (the verbatim guru says). Switch language when in vertical mode.

```
407 \@@par
```

Set \language here to suppress hyphenation. Done this way rather than setting \hyphenchar as that is a global setting.

```

408 \language\l@nohyphenation
409 \@tempswafalse
410 \def\par{%
411 \if@tempswa

```

A \leavevmode added: needed if, for example, a blank verbatim line is the first thing in a list item (wow!).

```

412 \leavevmode \null \@@par\penalty\interlinepenalty
413 \else
414 \@tempswatrue
415 \ifhmode\@@par\penalty\interlinepenalty\fi
416 \fi}%

```

To allow customization we hide the font used in a separate macro.

```

417 \let\do\@makeother \dospecials
418 \obeylines \verbatim@font \@noligs

```

To avoid a breakpoint after the labels box, we remove the penalty put there by the list macros: another use of \unpenalty!

```

419 \everypar \expandafter{\the\everypar \unpenalty}%
420 }
421 </2kernel | latexrelease>
422 <latexrelease>\EndIncludeInRelease
423 <latexrelease>\IncludeInRelease{0000-00-00}{\@verbatim}%
424 <latexrelease> {Disable hyphenation in verbatim}%
425 <latexrelease>\def\@verbatim{\trivlist \item\relax
426 <latexrelease> \if@minipage\else\vskip\parskip\fi
427 <latexrelease> \leftskip\@totalleftmargin\rightskip\z@skip
428 <latexrelease> \parindent\z@\parfillskip\@flushglue\parskip\z@skip

```

```

429 <latexrelease> \@@par
430 <latexrelease> \@tempswafalse
431 <latexrelease> \def\par{%
432 <latexrelease> \if@tempswa
433 <latexrelease> \leavevmode \null \@@par\penalty\interlinepenalty
434 <latexrelease> \else
435 <latexrelease> \@tempswatrue
436 <latexrelease> \ifhmode\@@par\penalty\interlinepenalty\fi
437 <latexrelease> \fi}%
438 <latexrelease> \let\do\@makeother \dospecials
439 <latexrelease> \obeylines \verbatim@font \@noligs
440 <latexrelease> \hyphenchar\font\m@ne
441 <latexrelease> \everypar \expandafter{\the\everypar \unpenalty}%
442 <latexrelease> }
443 <latexrelease> \EndIncludeInRelease
444 <*2ekernel>

```

*(End definition for \@verbatim. This function is documented on page ??.)*

**\verbatim** (RmS 93/09/19) Protected against ‘missing item’ error message triggered by empty verbatim environment.

```

445 \def\verbatim{\@verbatim \frenchspacing\@vobeyspaces \@xverbatim}
446 \def\endverbatim{\if@newlist \leavevmode\fi\endtrivlist}

```

*(End definition for \verbatim and \endverbatim. These functions are documented on page ??.)*

**\verbatim@font** Macro to select the font used for verbatim typesetting. It also does other work if necessary for the font used.

```

447 \def\verbatim@font{\normalfont\ttfamily}

```

*(End definition for \verbatim@font. This function is documented on page ??.)*

```

448 </2ekernel>
449 <*2ekernel | latexrelease>
450 <latexrelease> \IncludeInRelease{2018/12/01}%
451 <latexrelease> \verbvisiblespace\Setup visible space for \verb}%

```

**\asciispace** The character in slot 32, in typewriter fonts (historically) a visible space but in other fonts a real space or something else

```

452 \DeclareRobustCommand\asciispace{\char 32 }

```

*(End definition for \asciispace. This function is documented on page ??.)*

**\verbvisiblespace** This defines how to get a visible space in **\verb\*** and friends. In classic T<sub>E</sub>X this is just the slot 32, but in T<sub>U</sub> encoded fonts we switch fonts and take the character from cm<sub>tt</sub>.

```

453 \ifx\Umathcode\@undefined
454 \let\verbvisiblespace\asciispace % Pdftex version
455 \else
456 \DeclareRobustCommand\verbvisiblespace
457 {\leavevmode{\usefont{OT1}{cmtt}{m}{n}\asciispace}} % xetex/luatex version
458 \fi

```

*(End definition for \verbvisiblespace. This function is documented on page ??.)*



`\@setupverbvisiblespace` In pdfTeX a catcode 12 space will produce the character in slot 32 which is assumed to be a visible space character (in a typewriter font in OT1 or T1 encoding). In XeTeX or LuaTeX a font in TU encoding is normally used and that has a real space in this slot. So what we do in this case is this: we check the definition of `\verbvisiblespace` and if it is `\asciispace` we assume that the char32 can be used (e.g., in pdfTeX). We then redefine `\@xobeysp` so that after running `\@vobeyspaces` we get characters from slot 32 for each active space.

```

459 \def\@setupverbvisiblespace{%
460   \ifx\verbvisiblespace\asciispace
461     \let\@xobeysp\asciispace
462   \else

```

Otherwise we measure the width of a character in the mon-spaced current font and place a `\verbvisiblespace` into a box of the right width which we are then using as the character for a space. By default this will be the space character from OT1 cmtt but by changing `\verbvisiblespace` one could use, for example, the `\textvisiblespace` of the current typewriter font.

```

463     \setbox\z@\hbox{x}%
464     \setbox\@verbvisiblespacebox\hbox to\wd\z@{\hss\verbvisiblespace\hss}%
465     \def\@xobeysp{\leavevmode\copy\@verbvisiblespacebox}%
466   \fi
467 }

```

(End definition for `\@setupverbvisiblespace`. This function is documented on page ??.)

`\@verbvisiblespacebox` The box to hold the visible space character if it isn't in slot 32 in the current typewriter font.

```

468 \newbox\@verbvisiblespacebox

```

(End definition for `\@verbvisiblespacebox`. This function is documented on page ??.)

**verbatim\*** For `verbatim*` we also set up the correct visible space character definition and then run `\@vobeyspaces`. As this code is not called as part of the normal `verbatim` environment (the method is done the other way around this time) we don't have to check if space is already active—it shouldn't be.

```

469 \@namedef{verbatim*}{\@verbatim
470   \@setupverbvisiblespace
471   \frenchspacing\@vobeyspaces\@sxverbatim}
472 \expandafter\let\csname endverbatim*\endcsname=\endverbatim

473 </2ekernel | latexrelease>
474 <latexrelease>\EndIncludeInRelease
475 <latexrelease>\IncludeInRelease{0000/00/00}%
476 <latexrelease>           {\verbvisiblespace}{Setup visible space for \verb}%
477 <latexrelease>
478 <latexrelease>\@namedef{verbatim*}{\@verbatim\@sxverbatim}
479 <latexrelease>
480 <latexrelease>\let\asciispace           \@undefined
481 <latexrelease>\let\verbvisiblespace     \@undefined
482 <latexrelease>\let\@setupverbvisiblespace\@undefined
483 <latexrelease>\let\@verbvisiblespacebox \@undefined
484 <latexrelease>\EndIncludeInRelease
485 <*2ekernel>

```

`\@sverb` Definitions of `\@sverb` and `\@verb` changed so `\verb+ foo+` does not lose leading blanks when it comes at the beginning of a line. Change made 24 May 89. Suggested by Frank Mittelbach and Rainer Schöpf.

```

486 </2ekernel>
487 <*2ekernel | latexrelease>
488 <latexrelease>\IncludeInRelease{2020/10/01}%
489 <latexrelease>          {\@sverb}{Drop spaces before \verb delimiter}%

```

If the users types `\verb !~! foo` then surprisingly we would get the space as the delimiter and thus `“!~!foo”` in the output. To avoid this scenario we check if `#1` has the character code of a space, if so we recurse otherwise we call `\@@sverb` (which is the original definition of `\@sverb`).

```

490 \def\@sverb#1{\if\noexpand#1 \expandafter\@sverb\else\@@sverb{#1}\fi}
491 \def\@@sverb#1{%
492   \catcode'#1\active
493   \lccode'\~'#1%
494   \gdef\verb@balance@group{\verb@egroup
495     \@latex@error{noexpand\verb illegal in command argument}\@ehc}%
496   \aftergroup\verb@balance@group
497   \lowercase{\let~\verb@egroup}%

```

If `\@sverb` is called from `\@verb` then space is already active and supposed to produce a real space. In this case we do nothing. Otherwise we run `\@setupverbvisiblespace` to setup the right visible space char and afterwards `\@vobeyspaces` to make it the definition for the active space character.

```

498   \ifnum\catcode'\ =\active
499   \else \@setupverbvisiblespace \@vobeyspaces \fi
500 }

```

```

501 </2ekernel | latexrelease>
502 <latexrelease>\EndIncludeInRelease
503 <latexrelease>\IncludeInRelease{2018/12/01}%
504 <latexrelease>          {\@sverb}{Setup visible space for \verb}%
505 <latexrelease>
506 <latexrelease>\def\@sverb#1{%
507 <latexrelease> \catcode'#1\active
508 <latexrelease> \lccode'\~'#1%
509 <latexrelease> \gdef\verb@balance@group{\verb@egroup
510 <latexrelease>   \@latex@error{noexpand\verb illegal in command argument}\@ehc}%
511 <latexrelease> \aftergroup\verb@balance@group
512 <latexrelease> \lowercase{\let~\verb@egroup}%
513 <latexrelease> \ifnum\catcode'\ =\active
514 <latexrelease> \else \@setupverbvisiblespace \@vobeyspaces \fi
515 <latexrelease>}
516 <latexrelease>\let\@@sverb\undefined
517 <latexrelease>\EndIncludeInRelease
518 <latexrelease>
519 <latexrelease>\IncludeInRelease{0000/00/00}%
520 <latexrelease>          {\@sverb}{Setup visible space for \verb}%
521 <latexrelease>\def\@sverb#1{%
522 <latexrelease> \catcode'#1\active
523 <latexrelease> \lccode'\~'#1%
524 <latexrelease> \gdef\verb@balance@group{\verb@egroup
525 <latexrelease>   \@latex@error{noexpand\verb illegal in command argument}\@ehc}%

```

```

526 <latexrelease> \aftergroup\verb@balance@group
527 <latexrelease> \lowercase{\let~\verb@egroup}}}%
528 <latexrelease>
529 <latexrelease>\EndIncludeInRelease
530 <*2ekernel>

(End definition for \@sverb and @@sverb. These functions are documented on page ??.)

```

`\@makeother`

```

531 \def\@makeother#1{\catcode'\#112\relax}

(End definition for \@makeother. This function is documented on page ??.)

```

`\verb@balance@group`

```

532 \let\verb@balance@group\@empty

(End definition for \verb@balance@group. This function is documented on page ??.)

```

`\verb@egroup`

```

533 \def\verb@egroup{\global\let\verb@balance@group\@empty\egroup}

(End definition for \verb@egroup. This function is documented on page ??.)

```

`\verb@eol@error`

```

534 \begingroup
535   \obeylines%
536   \gdef\verb@eol@error{\obeylines%
537     \def~M{\verb@egroup\@latex@error{%
538       \noexpand\verb ended by end of line}\@ehc}}}%
539 \endgroup

(End definition for \verb@eol@error. This function is documented on page ??.)

```

`\verb` Typesetting a small piece verbatim.

```

540 </2ekernel>
541 <*2ekernel | latexrelease>
542 <latexrelease>\IncludeInRelease{2017-04-15}{\verb}%
543 <latexrelease>           {Disable hyphenation in verb}%
544 \def\verb{\relax\ifmmode\hbox\else\leavevmode\null\fi
545   \bgroup
546     \verb@eol@error \let\do\@makeother \dospecials
547     \verbatim@font\@noligs

Set \language here to suppress hyphenation. Done this way rather than setting
\hyphenchar as that is a global setting.

548   \language\l@nohyphenation
549   \@ifstar\@sverb\@verb}
550 </2ekernel | latexrelease>
551 <latexrelease>\EndIncludeInRelease
552 <latexrelease>\IncludeInRelease{0000-00-00}{\verb}%
553 <latexrelease>           {Disable hyphenation in verb}%
554 <latexrelease>\def\verb{\relax\ifmmode\hbox\else\leavevmode\null\fi
555 <latexrelease>   \bgroup
556 <latexrelease>     \verb@eol@error \let\do\@makeother \dospecials
557 <latexrelease>     \verbatim@font\@noligs
558 <latexrelease>     \@ifstar\@sverb\@verb}
559 <latexrelease>\EndIncludeInRelease
560 <*2ekernel>

```

*(End definition for \verb. This function is documented on page ??.)*

**\@verb**

```
561 \def\@verb{\@vobeyspaces \frenchspacing \@sverb}
```

*(End definition for \@verb. This function is documented on page ??.)*

**\verbatim@nolig@list**

```
562 \def\verbatim@nolig@list{\do\'\do\<\do\>\do\,\do\'\do\~}
```

*(End definition for \verbatim@nolig@list. This function is documented on page ??.)*

**\do@noligs**

```
563 \def\do@noligs#1{%
564   \catcode'#1\active
565   \begingroup
566     \lccode'\~'#1\relax
567     \lowercase{\endgroup\def~{\leavevmode\kern\z@\char'#1}}}
```

*(End definition for \do@noligs. This function is documented on page ??.)*

**\@noligs** To stay compatible with packages that use \@noligs we keep it.

```
568 \def\@noligs{\let\do\do@noligs \verbatim@nolig@list}
```

*(End definition for \@noligs. This function is documented on page ??.)*

```
569 \</2kernel>
```

## File E

# lmath.dtx

## 1 Math setup

This file contains a lot of the original plain T<sub>E</sub>X code, as well as the L<sup>A</sup>T<sub>E</sub>X environments for math. It still needs sorting out.

```
1 \*2kernel)
2 \message{math definitions,}
```

### 1.1 Math commands based on plain T<sub>E</sub>X

#### 1.1.1 The log-like functions

`\log` The standard operators:

```
3 \DeclareRobustCommand\log{\mathop{\operator@font log}\nolimits}
4 \DeclareRobustCommand\lg{\mathop{\operator@font lg}\nolimits}
5 \DeclareRobustCommand\ln{\mathop{\operator@font ln}\nolimits}
6 \DeclareRobustCommand\lim{\mathop{\operator@font lim}}
7 \DeclareRobustCommand\limsup{\mathop{\operator@font lim}\nolimits,\sup}
8 \DeclareRobustCommand\liminf{\mathop{\operator@font lim}\nolimits,\inf}
9 \DeclareRobustCommand\sin{\mathop{\operator@font sin}\nolimits}
10 \DeclareRobustCommand\arcsin{\mathop{\operator@font arcsin}\nolimits}
11 \DeclareRobustCommand\sinh{\mathop{\operator@font sinh}\nolimits}
12 \DeclareRobustCommand\cos{\mathop{\operator@font cos}\nolimits}
13 \DeclareRobustCommand\arccos{\mathop{\operator@font arccos}\nolimits}
14 \DeclareRobustCommand\cosh{\mathop{\operator@font cosh}\nolimits}
15 \DeclareRobustCommand\tan{\mathop{\operator@font tan}\nolimits}
16 \DeclareRobustCommand\arctan{\mathop{\operator@font arctan}\nolimits}
17 \DeclareRobustCommand\tanh{\mathop{\operator@font tanh}\nolimits}
18 \DeclareRobustCommand\cot{\mathop{\operator@font cot}\nolimits}
19 \DeclareRobustCommand\coth{\mathop{\operator@font coth}\nolimits}
20 \DeclareRobustCommand\sec{\mathop{\operator@font sec}\nolimits}
21 \DeclareRobustCommand\csc{\mathop{\operator@font csc}\nolimits}
22 \DeclareRobustCommand\max{\mathop{\operator@font max}}
23 \DeclareRobustCommand\min{\mathop{\operator@font min}}
24 \DeclareRobustCommand\sup{\mathop{\operator@font sup}}
25 \DeclareRobustCommand\inf{\mathop{\operator@font inf}}
26 \DeclareRobustCommand\arg{\mathop{\operator@font arg}\nolimits}
27 \DeclareRobustCommand\ker{\mathop{\operator@font ker}\nolimits}
28 \DeclareRobustCommand\dim{\mathop{\operator@font dim}\nolimits}
29 \DeclareRobustCommand\hom{\mathop{\operator@font hom}\nolimits}
30 \DeclareRobustCommand\det{\mathop{\operator@font det}}
31 \DeclareRobustCommand\exp{\mathop{\operator@font exp}\nolimits}
32 \DeclareRobustCommand\Pr{\mathop{\operator@font Pr}}
33 \DeclareRobustCommand\gcd{\mathop{\operator@font gcd}}
34 \DeclareRobustCommand\deg{\mathop{\operator@font deg}\nolimits}
```

*(End definition for \log. This function is documented on page ??.)*

`\bmod` And some operators have to be done by hand:

```

35 \DeclareRobustCommand\bmod{%
36   \nonscript\mskip-\medmuskip\mkern5mu%
37   \mathbin{\operator@font mod}\penalty900\mkern5mu%
38   \nonscript\mskip-\medmuskip}

```

(End definition for \bmod. This function is documented on page ??.)

**\pmod**

```

39 \DeclareRobustCommand\pmod[1]{%
40   \allowbreak\mkern18mu({\operator@font mod}\,\,\,#1)}

```

(End definition for \pmod. This function is documented on page ??.)

### 1.1.2 Biggggg

**\big** Variants on \big and friends for use with delimiters:

```

41 \DeclareRobustCommand\bigl{\mathopen\big}
42 \DeclareRobustCommand\bigm{\mathrel\big}
43 \DeclareRobustCommand\bigl{\mathclose\big}
44 \DeclareRobustCommand\Bigl{\mathopen\Big}
45 \DeclareRobustCommand\Bigm{\mathrel\Big}
46 \DeclareRobustCommand\Bigl{\mathclose\Big}
47 \DeclareRobustCommand\biggl{\mathopen\bigg}
48 \DeclareRobustCommand\biggm{\mathrel\bigg}
49 \DeclareRobustCommand\biggr{\mathclose\bigg}
50 \DeclareRobustCommand\Biggl{\mathopen\Bigg}
51 \DeclareRobustCommand\Biggm{\mathrel\Bigg}
52 \DeclareRobustCommand\Biggr{\mathclose\Bigg}

```

(End definition for \big. This function is documented on page ??.)

### 1.1.3 The UNSORTED Rest

The other math commands are lifted from plain T<sub>E</sub>X.

**\jot**

```

53 \newdimen\jot
54 \jot=3pt

```

(End definition for \jot. This function is documented on page ??.)

**\interdisplaylinepenalty**

```

55 \newcount\interdisplaylinepenalty
56 \interdisplaylinepenalty=100

```

(End definition for \interdisplaylinepenalty. This function is documented on page ??.)

**\choose**

```

57 \def\choose{\atopwithdelims()}

```

(End definition for \choose. This function is documented on page ??.)

**\brack**

```

58 \def\brack{\atopwithdelims[]}

```

(End definition for \brack. This function is documented on page ??.)

```

\brace
59 \def\brace{\atopwithdelims\{\}}
(End definition for \brace. This function is documented on page ??.)

\mathpalette
60 \def\mathpalette#1#2{%
61   \mathchoice
62     {#1\displaystyle{#2}}%
63     {#1\textstyle{#2}}%
64     {#1\scriptstyle{#2}}%
65     {#1\scriptscriptstyle{#2}}
(End definition for \mathpalette. This function is documented on page ??.)

\root
\rootbox
\root
66 \newbox\rootbox
67 \def\root#1\of{%
68   \setbox\rootbox\hbox{$\m@th\scriptscriptstyle{#1}$}%
69   \mathpalette\root
70 \def\root#1#2{%
71   \setbox\rootbox\hbox{$\m@th#1\sqrt{#2}$}%
72   \dimen@=\ht\rootbox \advance\dimen@-\dp\rootbox
73   \mkern5mu\raise.6\dimen@\copy\rootbox
74   \mkern-10mu\box\rootbox
(End definition for \root, \rootbox, and \root. These functions are documented on page ??.)

\phantom
\hphantom
\mathphantom
75 \newif\ifv@
76 \newif\ifh@
77 \</2kernel>
78 \<*2kernel | latexrelease>
79 \<latexrelease>\IncludeInRelease{2019/10/01}%
80 \<latexrelease>{\vphantom}{Make commands robust}%
81 \DeclareRobustCommand\vphantom{\v@true\h@false\ph@nt}
82 \DeclareRobustCommand\hphantom{\v@false\h@true\ph@nt}
83 \DeclareRobustCommand\phantom{\v@true\h@true\ph@nt}
84 \DeclareRobustCommand\mathstrut{\vphantom{}}

\mathstrut
85 \</2kernel | latexrelease>
86 \<latexrelease>\EndIncludeInRelease
87 \<latexrelease>\IncludeInRelease{0000/00/00}%
88 \<latexrelease>{\vphantom}{Make commands robust}%
89 \<latexrelease>
90 \<latexrelease>\kernel@make@fragile\vphantom
91 \<latexrelease>\kernel@make@fragile\hphantom
92 \<latexrelease>\kernel@make@fragile\phantom
93 \<latexrelease>\kernel@make@fragile\mathstrut
94 \<latexrelease>
95 \<latexrelease>\EndIncludeInRelease
96 \<*2kernel>

```

```

97 \def\ph@nt{%
98   \ifmode
99     \expandafter\mathpalette\expandafter\mathph@nt
100   \else
101     \expandafter\makeph@nt
102   \fi}

103 \def\makeph@nt#1{%
104   \setbox\z@\hbox{\color@begingroup#1\color@endgroup}\finph@nt}

105 \def\mathph@nt#1#2{%
106   \setbox\z@\hbox{\$ \m@th#1{#2}$}\finph@nt}

107 \</2ekernel>
108 \<*2ekernel | latexrelease>
109 \<latexrelease>\IncludeInRelease{2018/12/01}%
110 \<latexrelease>          {\finph@nt}{Start LR-mode}%
111 \def\finph@nt{%
112   \setbox\tw@\null
113   \ifv@ \ht\tw@\ht\z@ \dp\tw@\dp\z@\fi
114   \ifh@ \wd\tw@\wd\z@\fi

115   \leavevmode@ifvmode\box\tw@}
116 \</2ekernel | latexrelease>
117 \<latexrelease>\EndIncludeInRelease
118 \<latexrelease>\IncludeInRelease{0000/00/00}%
119 \<latexrelease>          {\finph@nt}{Start LR-mode}%
120 \<latexrelease>\def\finph@nt{%
121 \<latexrelease>   \setbox\tw@\null
122 \<latexrelease>   \ifv@ \ht\tw@\ht\z@ \dp\tw@\dp\z@\fi
123 \<latexrelease>   \ifh@ \wd\tw@\wd\z@\fi \box\tw@}
124 \<latexrelease>\EndIncludeInRelease
125 \<*2ekernel>

```

(End definition for \phantom and others. These functions are documented on page ??.)

\smash

```

126 \DeclareRobustCommand\smash{%
127   \relax % \relax, in case this comes first in \halign
128   \ifmode
129     \expandafter\mathpalette\expandafter\mathsm@sh
130   \else
131     \expandafter\makesm@sh
132   \fi}

133 \def\makesm@sh#1{%
134   \setbox\z@\hbox{\color@begingroup#1\color@endgroup}\finsm@sh}
135 \def\mathsm@sh#1#2{%
136   \setbox\z@\hbox{\$ \m@th#1{#2}$}\finsm@sh}

137 \</2ekernel>
138 \<*2ekernel | latexrelease>
139 \<latexrelease>\IncludeInRelease{2018/12/01}%
140 \<latexrelease>          {\finsm@sh}{Start LR-mode}%
141 \def\finsm@sh{\ht\z@\z@ \dp\z@\z@ \leavevmode@ifvmode\box\z@}
142 \</2ekernel | latexrelease>
143 \<latexrelease>\EndIncludeInRelease

```



```

144 <latexrelease>\IncludeInRelease{0000/00/00}%
145 <latexrelease>{\finsm@sh}{Start LR-mode}%
146 <latexrelease>\def\finsm@sh{\ht\z@\z@ \dp\z@\z@ \box\z@}
147 <latexrelease>\EndIncludeInRelease
148 <*2ekernel>

```

(End definition for \smash. This function is documented on page ??.)

\buildrel

```

149 \def\buildrel#1\over#2{\mathrel{\mathop{\kern\z@#2}\limits^{#1}}}

```

(End definition for \buildrel. This function is documented on page ??.)

```

150 </2ekernel>
151 <*2ekernel | latexrelease>
152 <latexrelease>\IncludeInRelease{2019/10/01}%
153 <latexrelease>{\cases}{Make commands robust}%

```

\cases

```

154 \DeclareRobustCommand*\cases[1]{\left\{\,\,\vcenter{\normalbaselines\m@th
155 \ialign{##\hfil$&\quad{##}\hfil\crr#1\crr}\right.}

```

(End definition for \cases. This function is documented on page ??.)

\matrix

```

156 \DeclareRobustCommand*\matrix[1]{\null\,\vcenter{\normalbaselines\m@th
157 \ialign{\hfil$##$\hfil&\quad\hfil$##$\hfil\crr
158 \mathstrut\crr\noalign{\kern-\baselineskip}
159 #1\crr\mathstrut\crr\noalign{\kern-\baselineskip}}\,}

```

(End definition for \matrix. This function is documented on page ??.)

\pmatrix

```

160 \DeclareRobustCommand*\pmatrix[1]{\left(\matrix{#1}\right)}

```

(End definition for \pmatrix. This function is documented on page ??.)

```

161 </2ekernel | latexrelease>
162 <latexrelease>\EndIncludeInRelease
163 <latexrelease>\IncludeInRelease{0000/00/00}%
164 <latexrelease>{\cases}{Make commands robust}%
165 <latexrelease>
166 <latexrelease>\kernel@make@fragile\cases
167 <latexrelease>\kernel@make@fragile\matrix
168 <latexrelease>\kernel@make@fragile\pmatrix
169 <latexrelease>
170 <latexrelease>\EndIncludeInRelease
171 <*2ekernel>

```

\bordermatrix

```

172 \def\bordermatrix#1{\begingroup \m@th
173 \@tempdima 8.75\p@
174 \setbox\z@\vbox{%
175 \def\cr{\crr\noalign{\kern2\p@\global\let\cr\endline}}%
176 \ialign{##$\hfil\kern2\p@\kern\@tempdima&\thinspace\hfil$##$\hfil
177 &\quad\hfil$##$\hfil\crr

```

```

178 \omit\strut\hfil\crr\noalign{\kern-\baselineskip}%
179 #1\crr\omit\strut\cr}}%
180 \setbox\tw@\vbox{\unvcopy\z@\global\setbox\@ne\lastbox}%
181 \setbox\tw@\hbox{\unhbox\@ne\unskip\global\setbox\@ne\lastbox}%
182 \setbox\tw@\hbox{\$ \kern\wd\@ne\kern-\@tempdima\left(\kern-\wd\@ne
183 \global\setbox\@ne\vbox{\box\@ne\kern2\p@}%
184 \vcenter{\kern-\ht\@ne\unvbox\z@\kern-\baselineskip}\,,\right)$}%
185 \null\;\vbox{\kern\ht\@ne\box\tw@}\endgroup}

```

(End definition for `\bordermatrix`. This function is documented on page ??.)

`\openup`

```

186 \def\openup{\afterassignment\@openup\dimen@}
187 \def\@openup{\advance\lineskip\dimen@
188 \advance\baselineskip\dimen@
189 \advance\lineskiplimit\dimen@}

```

(End definition for `\openup`. This function is documented on page ??.)

`\displaylines`

```

190 \newif\ifdt@p
191 \def\displ@y{\global\dt@ptrue\openup\jot\m@th
192 \everycr{\noalign{\ifdt@p \global\dt@pfalse \ifdim\prevdepth>-1000\p@
193 \vskip-\lineskiplimit \vskip\normallineskiplimit \fi
194 \else \penalty\interdisplaylinepenalty \fi}}}
195 \def\@lign{\tabskip\z@skip\everycr{}} % restore inside \displ@y
196 \def\displaylines#1{\displ@y \tabskip\z@skip
197 \halign{\hb@xt@\displaywidth{\$ \@lign\hfil\displaystyle##\hfil$}\crr
198 #1\crr}}

```

(End definition for `\displaylines`. This function is documented on page ??.)

`\sp`

`\sb`

```

199 \let\sp=~
200 \let\sb=_

```

(End definition for `\sp` and `\sb`. These functions are documented on page ??.)

`\tmspace` Originally L<sup>A</sup>T<sub>E</sub>X only provided a small set of spacing commands for use in text and math, some of the commands like `\;` were only supported in math mode. `amsmath` normalized and provided all of them in text and math. This code has now been moved to the kernel so that it is generally available.

`\thinspace`

`\!`

`\negthinspace`

`\:`

`\medspace`

`\negmedspace`

`\;`

`\thickspace`

`\negthickspace`

```

201 </2ekernel>
202 <*2ekernel | latexrelease>
203 <latexrelease>\IncludeInRelease{2020/10/01}%
204 <latexrelease> \tmspace\amsmath spacing commands}%
205 \DeclareRobustCommand\tmspace[3]{%
206 \ifmode\mskip#1#2\else\leavevmode\ifvmode\kern#1#3\fi\relax}

```

`\tmspace` is really meant to be an internal command so it doesn't necessarily has to be robust but it was robust in `amsmath` so we leave it like that.

In `amsmath` the text kern is `.1667em`. For compatibility reasons we keep the longer one.

```
207 \DeclareRobustCommand\,{\tmspace+\thinmuskip{.16667em}}
208 \let\thinspace\,
209 \DeclareRobustCommand\!{\tmspace-\thinmuskip{.16667em}}
210 \let\negthinspace\!
211 \DeclareRobustCommand\:{\tmspace+\medmuskip{.2222em}}
212 \let\medspace\:
```

L<sup>A</sup>T<sub>E</sub>X has a second name for this in its manual:

```
213 \let\>=\:
214 \DeclareRobustCommand\negmedspace{\tmspace-\medmuskip{.2222em}}
215 \DeclareRobustCommand\;{\tmspace+\thickmuskip{.2777em}}
216 \let\thickspace\;
217 \DeclareRobustCommand\negthickspace{\tmspace-\thickmuskip{.2777em}}
218 </2ekernel | latexrelease>
219 <latexrelease>\EndIncludeInRelease
220 <latexrelease>\IncludeInRelease{0000/00/00}%
221 <latexrelease>          {\tmspace}{amsmath spacing commands}%
222 <latexrelease>
223 <latexrelease>\let\tmspace@undefined
224 <latexrelease>\DeclareRobustCommand{,}{%
225 <latexrelease>    \relax\ifmode\mskip\thinmuskip\else\thinspace\fi
226 <latexrelease>\DeclareRobustCommand\thinspace{\leavevmode@ifvmode\kern .16667em }
227 <latexrelease>\DeclareRobustCommand\negthinspace{\leavevmode@ifvmode\kern-.16667em }
228 <latexrelease>\def\>{\mskip\medmuskip}
229 <latexrelease>\let\:=\>
230 <latexrelease>\def\;{\mskip\thickmuskip}
231 <latexrelease>\def\!{\mskip-\thinmuskip}
232 <latexrelease>
233 <latexrelease>\EndIncludeInRelease
234 <*2ekernel>
```

*(End definition for `\tmspace` and others. These functions are documented on page ??.)*

`\*`

```
235 \DeclareRobustCommand\*{\discretionary{\thinspace\the\textfont2\char2}{-}{}}
```

*(End definition for `\*`. This function is documented on page ??.)*

`\:` Nickname for the medium space since `\>` is not available inside `tabbing`.

```
236 %\let\:=\>
```

*(End definition for `\:`. This function is documented on page ??.)*

`\active@math@prime` This is the definition of the active math prime.

```
237 \def\active@math@prime{~\bgroup\prim@s}
```

*(End definition for `\active@math@prime`. This function is documented on page ??.)*

`\prime@s`

```
238 {\catcode'\=' \active \global\let'\active@math@prime}
239 \def\prim@s{%
240   \prime\futurelet\@let@token\pr@m@s}
```

```

241 \def\prime@s{%
242   \ifx'\@let@token
243     \expandafter\prime@@s
244   \else
245     \ifx^'\@let@token
246       \expandafter\expandafter\expandafter\prime@@t
247     \else
248       \egroup
249     \fi
250   \fi}
251 \def\prime@@s#1{\prime@s}
252 \def\prime@@t#1#2{#2\egroup}

```

(End definition for `\prime@s`. This function is documented on page ??.)

```

253 {\catcode'\_=\active \gdef\_{} } % _ in math is
254                                     % either subscript or \_

```

## 1.2 Math Environments

`\(` Produces  $\dots$  with checks that `\(` isn't used in math mode, and that `\)` is only used in math mode begun with `\(`.

```

255 \</2kernel>
256 \<latexrelease>\IncludeInRelease{2015/01/01}{\<}{Make \< robust}%
257 \<*2kernel | latexrelease>
258 \DeclareRobustCommand\<{%
259   \relax\ifmmode\@badmath\else$\fi}%
260 \DeclareRobustCommand\>{%
261   \relax\ifmmode\ifinner$\else\@badmath\fi\else \@badmath\fi}%
262 \</2kernel | latexrelease>
263 \<latexrelease>\EndIncludeInRelease
264 \<latexrelease>\IncludeInRelease{0000/00/00}{\<}{Make \< robust}%
265 \<latexrelease>\def\<{%
266 \<latexrelease> \relax\ifmmode\@badmath\else$\fi}%
267 \<latexrelease>\expandafter\let\csname\string\< \endcsname\@undefined
268 \<latexrelease>\def\>{%
269 \<latexrelease> \relax\ifmmode\ifinner$\else\@badmath\fi\else \@badmath\fi}%
270 \<latexrelease>\expandafter\let\csname\string\> \endcsname\@undefined
271 \<latexrelease>\EndIncludeInRelease
272 \<*2kernel>

```

(End definition for `\(` and `\)`. These functions are documented on page ??.)

`\[` Produces  $\dots$  with checks that `\[` isn't used in math mode, and that `\]` is only used in display math mode (though there is no real test that this display math started with `\[` and not with  $\dots$ ).

```

273 \</2kernel>
274 \<latexrelease>\IncludeInRelease{2015/01/01}{\<}{Make \< robust}%
275 \<*2kernel | latexrelease>
276 \DeclareRobustCommand\<{%
277   \relax\ifmmode
278     \@badmath
279   \else

```

```

280     \ifvmode
281         \nointerlineskip
282         \makebox[.6\linewidth]{}%
283     \fi
284     $$$ BRACE MATCH HACK
285 \fi
286 }%

287 \DeclareRobustCommand\[%
288     \relax\ifmmode
289         \ifinner
290             \@badmath
291         \else
292             $$$ BRACE MATCH HACK
293         \fi
294     \else
295         \@badmath
296     \fi
297     \ignorespaces
298 }%

299 </2ekernel | latexrelease>
300 <latexrelease>\EndIncludeInRelease
301 <latexrelease>\IncludeInRelease{0000/00/00}{\[%{Make \[% robust}}%
302 <latexrelease>\def\[%
303 <latexrelease>     \relax\ifmmode
304 <latexrelease>         \@badmath
305 <latexrelease>     \else
306 <latexrelease>         \ifvmode
307 <latexrelease>             \nointerlineskip
308 <latexrelease>             \makebox[.6\linewidth]{}%
309 <latexrelease>         \fi
310 <latexrelease>         $$$ BRACE MATCH HACK
311 <latexrelease>     \fi
312 <latexrelease>}%
313 <latexrelease>\expandafter\let\csname\string[ \endcsname\@undefined

314 <latexrelease>\def\[%
315 <latexrelease>     \relax\ifmmode
316 <latexrelease>         \ifinner
317 <latexrelease>             \@badmath
318 <latexrelease>         \else
319 <latexrelease>             $$$ BRACE MATCH HACK
320 <latexrelease>         \fi
321 <latexrelease>     \else
322 <latexrelease>         \@badmath
323 <latexrelease>     \fi
324 <latexrelease>     \ignorespaces
325 <latexrelease>}%
326 <latexrelease>\expandafter\let\csname\string[ \endcsname\@undefined
327 <latexrelease>\EndIncludeInRelease
328 <*2ekernel>

```

*(End definition for \[ and \]. These functions are documented on page ??.)*

**math** Disguises for  $\langle \dots \rangle$  and  $\langle [\dots] \rangle$ .  
**displaymath**

```

329 \let\math=\(
330 \let\endmath=\)

331 \def\displaymath{\[}
332 \def\enddisplaymath{\]\@ignoretrue}

\c@equation Numbered equations, using the counter \c@equation. Note: The document style must
define \theequation etc., and do the appropriate \addtoreset. It should also redefine
\@eqnnum if another format for the equation number is desired other than the standard
(...), or to move the equation numbers to the flushleft. (See comment on the \def of
\@eqnnum.)

333 \@definecounter{equation}
334 \def\equation{$$\refstepcounter{equation}}
335 \def\endequation{\eqno \hbox{\@eqnnum}$$\@ignoretrue}
(End definition for \c@equation. This function is documented on page ??.)

\@eqnnum Produces the equation number for equation and eqnarray environments. The following
definition is for flushright numbers; for flushleft numbers, see leqno.clo. The equation
number is set in black roman type even if an eqnarray environment appears in an italic
environment.

336 \def\@eqnnum{\normalfont \normalcolor (\theequation)}
(End definition for \@eqnnum. This function is documented on page ??.)

\stackrel A disguise for plain TEX's buildrel.

337 \DeclareRobustCommand\stackrel[2]{\mathrel{\mathop{#2}\limits^{#1}}}}
(End definition for \stackrel. This function is documented on page ??.)

\frac A disguise for plain TEX's \over.

338 \DeclareRobustCommand\frac[2]{\begingroup#1\endgroup\over#2}}
(End definition for \frac. This function is documented on page ??.)

\sqrt Add an optional argument to plain's \sqrt to give the nth root of an expression  $\sqrt[n]{e}$ .
\@sqrt
339 \DeclareRobustCommand\sqrt{\@ifnextchar[\@sqrt\sqrtsign}
340 \def\@sqrt[#1]{\root #1\of}
(End definition for \sqrt and \@sqrt. These functions are documented on page ??.)

\eqnarray Here's the eqnarray environment: Default is for left-hand side of equations to be
flushright. To make them flushleft, \let\@eqnrel = \hfil.
\@eqnrel
\if@eqnsw 341 \newcount\@eqcnt
\@eqnrel 342 \newcount\@eqpen
343 \newif\if@eqnsw\@eqnswtrue
344 \newskip\@centering
345 \@centering = 0pt plus 1000pt

```

To get a proper `\@currentlabel` we have to redefine it for the whole display. Note that we can't use `\refstepcounter` as this results in `\@currentlabel` getting restored at the wrong and thus always writing the first label to the `.aux` file.

```

346 \def\eqnarray{%
347   \stepcounter{equation}%
348   \def\@currentlabel{\p@equation\theequation}%
349   \global\@eqnswtrue
350   \m@th
351   \global\@eqcnt\z@
352   \tabskip\@centering
353   \let\\\@eqnocr
354   $$\everycr{}\halign to\displaywidth\bgroup
355     \hskip\@centering$\displaystyle\tabskip\z@skip{##}$\@eqnscr
356     &\global\@eqcnt\@ne\hskip \tw@\arraycolsep \hfil${##}$\hfil
357     &\global\@eqcnt\tw@ \hskip \tw@\arraycolsep
358     $\displaystyle{##}$\hfil\tabskip\@centering
359     &\global\@eqcnt\thr@@ \hb@xt@\z@\bgroup\hss##\egroup
360     \tabskip\z@skip
361   \cr
362 }

363 \def\endeqnarray{%
364   \@eqnocr
365   \egroup
366   \global\advance\c@equation\m@ne
367   $$\ignoretrue
368 }

369 \let\@eqnscr=\relax

```

(End definition for `\@eqcnt` and others. These functions are documented on page ??.)

**\nonumber** Switches off equation numbering.

```

370 \def\nonumber{\global\@eqnswfalse}

```

(End definition for `\nonumber`. This function is documented on page ??.)

**\@eqnocr**

**\@xeqnocr**

**\@yeqnocr**

```

371 \def\@eqnocr{%
372   {\ifnum0='}\fi
373   \@ifstar{%
374     \global\@eqpen\@M\@yeqnocr
375   }{%
376     \global\@eqpen\interdisplaylinepenalty \@yeqnocr
377   }%
378 }

379 \def\@yeqnocr{\@testopt\@xeqnocr\z@skip}

380 </2ekernel>
381 <*2ekernel | latexrelease>
382 <latexrelease>\IncludeInRelease{2020/10/01}%
383 <latexrelease>          {\@xeqnocr}{eqnarray support calc syntax}%
384 \def\@xeqnocr[#1]{%
385   \ifnum0='{\fi}%
386   \@eqnocr

```

```

387 \noalign{\penalty\@eqpen\vskip\jot\@vspace@calcify{#1}}%
388 }
389 </2ekernel | latexrelease>
390 <latexrelease>\EndIncludeInRelease
391 <latexrelease>\IncludeInRelease{0000/00/00}%
392 <latexrelease> \{\@eqnocr\}{eqnarray support calc syntax}%
393 <latexrelease>
394 <latexrelease>\def\@eqnocr[#1]{%
395 <latexrelease> \ifnum0='{ \fi}%
396 <latexrelease> \@eqnocr
397 <latexrelease> \noalign{\penalty\@eqpen\vskip\jot\vskip #1\relax}%
398 <latexrelease>}
399 <latexrelease>\EndIncludeInRelease
400 <*2ekernel>

```

(End definition for \@eqnocr, \@eqnocr, and \@eqnocr. These functions are documented on page ??.)

\@eqnocr

```

401 \def\@eqnocr{\let\reserved@a\relax
402 \ifcase\@eqcnt \def\reserved@a{& &}\or \def\reserved@a{& &}%
403 \or \def\reserved@a{&}\else
404 \let\reserved@a\empty
405 \latexerror{Too many columns in eqnarray environment}\@ehc\fi
406 \reserved@a \if@eqnsw\@eqnnum\stepcounter{equation}\fi
407 \global\@eqnswtrue\global\@eqcnt\z@\cr}

```

(End definition for \@eqnocr. This function is documented on page ??.)

**eqnarray\*** Here's the eqnarray\* environment:

```

408 \let\@seqnocr=\@eqnocr
409 \namedef{eqnarray*}{\def\@eqnocr{\nonumber\@seqnocr}\eqnarray}
410 \namedef{endeqnarray*}{\nonumber\endeqnarray}

```

(End definition for \@seqnocr. This function is documented on page ??.)

**\lefteqn** \lefteqn{FORMULA} typesets FORMULA in display math style flushleft in a box of width zero.

```

411 \def\lefteqn#1{\rlap{$\displaystyle #1$}}

```

(End definition for \lefteqn. This function is documented on page ??.)

**\ensuremath** In math mode, \ensuremath{text} is equivalent to text; in LR or paragraph mode, it is equivalent to \$text\$. \relax is not needed in front of the \ifmmode as \protect will be \let to \relax. This version (due to Donald Arseneau) avoids duplicating its argument in the 'then' and 'else' part of the \ifmath which is necessary in nested 'tabular' like environments. See amslatex/2104.

```

412 \DeclareRobustCommand{\ensuremath}{%
413 \ifmmode
414 \expandafter\@firstofone
415 \else
416 \expandafter\@ensuredmath
417 \fi}

```

(End definition for \ensuremath. This function is documented on page ??.)



`\@ensuredmath` The `\relax` stops `\ensuremath{}` starting display math.

```
418 \long\def\@ensuredmath#1{\relax#1$}
```

(End definition for `\@ensuredmath`. This function is documented on page ??.)

```
419 \endkernel
```

## 1.3 External options to the standard document classes

### 1.3.1 Left equation numbering

`\@eqnnum` To put the equation number on the left side of an equation we have to use a little trick. The number is shifted `\displaywidth` to the left inside a box of (approximately) zero width. This fails when the equation is too wide, the equation number then may overprint the equation itself.

```
420 \def\@eqnnum{\hbox{\normalfont\normalcolor
421 \rlap{\normalfont\normalcolor
422 \hspace{-\displaywidth}\theequation}}
423 \enddef
424 \enddef
```

(End definition for `\@eqnnum`. This function is documented on page ??.)

### 1.3.2 Flush left equations

To get the displayed math environments to print the contents flush left (with an indentation) we have to redefine all of L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>'s displayed math environments.

`\mathindent` The amount of indentation of the equations is stored in a register.

```
425 \def\mathindent{\newskip\mathindent}
426 \newskip\mathindent
```

The setting of `\mathindent` has to be deferred until the class file has been processed, because `\leftmargini` is still 0pt wide at the moment `fleqn.clo` is read in.

```
427 \AtEndOfClass{\mathindent\leftmargini}
```

(End definition for `\mathindent`. This function is documented on page ??.)

`\[` Begin display math;

```
428 \IncludeInRelease{2015/01/01}{\[}{\Make \[ robust}%
429 \DeclareRobustCommand\[\relax
430 \ifmmode\@badmath
431 \else
432 \begin{trivlist}%
433 \beginparpenalty\predisplaypenalty
434 \endparpenalty\postdisplaypenalty
435 \item[]\leavevmode
436 \hbox{\linewidth\group $\mathdisplaystyle $\hspace{\mathindent}\group}
437 \fi}
438 \enddef
439 \EndIncludeInRelease
```

```

440 \IncludeInRelease{0000/00/00}{\[]}{Make \[ robust}%
441 \renewcommand\[]{\relax
442     \ifmmode\@badmath
443     \else
444     \begin{trivlist}%
445     \@beginparpenalty\predisplaypenalty
446     \@endparpenalty\postdisplaypenalty
447     \item[]\leavevmode
448     \hb@xt@\linewidth\bgroup $\m@th\displaystyle %$
449     \hskip\mathindent\bgroup
450     \fi}
451 \EndIncludeInRelease

```

(End definition for \[. This function is documented on page ??.)

\] end display math;

```

452 \IncludeInRelease{2015/01/01}{\[]}{Make \] robust}%
453 \DeclareRobustCommand\[]{\relax
454     \ifmmode
455     \egroup $\hfil% $
456     \egroup
457     \end{trivlist}%
458     \else \@badmath
459     \fi}
460 \EndIncludeInRelease
461 \IncludeInRelease{0000/00/00}{\[]}{Make \] robust}%
462 \renewcommand\[]{\relax
463     \ifmmode
464     \egroup $\hfil% $
465     \egroup
466     \end{trivlist}%
467     \else \@badmath
468     \fi}
469 \EndIncludeInRelease

```

(End definition for \]. This function is documented on page ??.)

**equation** The equation environment

```

470 \renewenvironment{equation}%
471 {\@beginparpenalty\predisplaypenalty
472 \@endparpenalty\postdisplaypenalty
473 \refstepcounter{equation}%
474 \trivlist \item[]\leavevmode
475 \hb@xt@\linewidth\bgroup $\m@th% $
476 \displaystyle
477 \hskip\mathindent}%

```

Ensure that there is at least a space between formula and equation number so that they don't bump in each other.

```

478 {\$ \hskip .3em minus.3em\hfil % $
479 \displaywidth\linewidth\hbox{\@eqnnum}%
480 \egroup
481 \endtrivlist}

```

eqnarray The eqnarray environment

```

482 \renewenvironment{eqnarray}{%
483   \stepcounter{equation}%
484   \def\@currentlabel{\p@equation\theequation}%
485   \global\@eqnswtrue\m@th
486   \global\@eqcnt\z@
487   \tabskip\mathindent
488   \let\=\@eqnocr
489   \setlength\abovedisplayskip{\topsep}%
490   \ifvmode
491     \addtolength\abovedisplayskip{\partopsep}%
492   \fi

```

When the documentclass uses a non-zero \parskip setting the \topsep might have a negative value to compensate for that. Therefore we add \parskip to \abovedisplayskip.

```

493   \addtolength\abovedisplayskip{\parskip}%
494   \setlength\belowdisplayskip{\abovedisplayskip}%
495   \setlength\belowdisplayshortskip{\abovedisplayskip}%
496   \setlength\abovedisplayshortskip{\abovedisplayskip}%
497   $$\everycr{}\halign to\linewidth% $$
498   \bgroup
499     \hskip\@centering
500     $\displaystyle\tabskip\z@skip{##}$\@eqnsele%
501     \global\@eqcnt\@ne \hskip \tw@arraycolsep \hfil${##}$\hfil%
502     \global\@eqcnt\tw@ \hskip \tw@arraycolsep
503     $\displaystyle{##}$\hfil \tabskip\@centering%
504     \global\@eqcnt\thr@@
505     \hb@xt@\z@\bgroup\hss##\egroup\tabskip\z@skip\cr}%
506     {\@eqnocr
507   \egroup
508   \global\advance\c@equation\m@ne$$$ $
509   \@ignoretrue
510 }
511 \fleqn

```

# File F

## ltlists.dtx

### 1 List, and related environments

The generic commands for creating an indented environment – `enumerate`, `itemize`, `quote`, etc – are:

```
\list{<LABEL>}{<COMMANDS>} ... \endlist
```

which can be invoked by the user as the list environment. The LABEL argument specifies item labeling. COMMANDS contains commands for changing the horizontal and vertical spacing parameters.

Each item of the environment is begun by the command `\item[ITEMLABEL]` which produces an item labeled by ITEMLABEL. If the argument is missing, then the LABEL argument of the `\list` command is used as the item label.

The label is formed by putting `\makelabel{<ITEMLABEL>}` in an hbox whose width is either its natural width or else `\labelwidth`, whichever is larger. The `\list` command defines `\makelabel` to have the default definition:

```
\makelabel{<ARG>} == BEGIN \hfil ARG END
```

which, for a label of width less than `\labelwidth`, puts the label flushright, `\labelsep` to the left of the item's text. However, `\makelabel` can be `\let` to another command by the `\list`'s COMMANDS argument.

A `\usecounter{<foo>}` command in the second argument causes the counter *foo* to be initialized to zero, and stepped by every `\item` command without an argument. (`\label` commands within the list refer to this counter.)

When you leave a list environment, returning either to an enclosing list or normal text mode, LaTeX begins a new paragraph if and only if you leave a blank line after the `\end` command. This is accomplished by the `\@endparenv` command.

Blank lines are ignored every other reasonable place–i.e.:

- Between the `\begin{list}` and the first `\item`,
- Between the `\item` and the text of that item.
- Between the end of the last item and the `\end{list}`.

For an environment like quotation, in which items are not labeled, the entire environment is a single item. It is defined by letting `\quotation == \list{}{...}\item\relax`. (Note the `\relax`, there in case the first character in the environment is a '['.) The spacing parameters provide a great deal of flexibility in designing the format, including the ability to let the indentation of the first paragraph be different from that of the subsequent ones.

The trivlist environment is equivalent to a list environment whose second argument sets the following parameter values:

`\leftmargin = 0`: causes no indentation of left margin

`\labelwidth = 0`: see below for precise effect this has.

`\itemindent = 0`: with a null label, makes first paragraph have no indentation. Succeeding paragraphs have `\parindent` indentation. To give first paragraph same indentation, set `\itemindent = \parindent` before the `\item[]`.

Every `\item` in a `trivlist` environment must have an argument—in many cases, this will be the null argument (`\item[]`). The `trivlist` environment is mainly used for paragraphing environments, like `verbatim`, in which there is no margin change. It provides the same vertical spacing as the `list` environment, and works reasonably well when it occurs immediately after an `\item` command in an enclosing list.

## 1.1 List and Trivlist

The following variables are used inside a list environment:

`\totalleftmargin` The distance that the prevailing left margin is indented from the outermost left margin,

`\linewidth` The width of the current line. Must be initialized to `\hsize`.

`\listdepth` A count for holding current list nesting depth.

`\makelabel` A macro with a single argument, used to generate the label from the argument (given or implied) of the `\item` command. Initialized to `\mklab` by the `\list` command. This command must produce some stretch—i.e., an `\hfil`.

`\inlabel` A switch that is false except between the time an `\item` is encountered and the time that `TeX` actually enters horizontal mode. Should be tested by commands that can be messed up by the list environment's use of `\everypar`.

`\box\@labels` When `\inlabel = true`, it holds the labels to be put out by `\everypar`.

`\noparitem` A switch set by `\list` when `\inlabel = true`. Handles the case of a `\list` being the first thing in an item.

`\noparlist` A switch set true for a list that begins an item. No `\topsep` space is added before or after `\item`'s such a list.

`\newlist` Set true by `\list`, set false by the first text (by `\everypar`).

`\noitemarg` Set true when executing an `\item` with no explicit argument. Used to save space. To save time, make two separate `\@item` commands.

`\nmbrlist` Set true by `\usecounter` command, causes list to be numbered.

`\listctr` `\def`'ed by `\usecounter` to name of counter.

`\noskipsec` A switch set true by a sectioning command when it is creating an in-text heading with `\everypar`.

Throughout a list environment, `\hsize` is the width of the current line, measured from the outermost left margin to the outermost right margin. Environments like `tabbing` should use `\linewidth` instead of `\hsize`.

Here are the parameters of a list that can be set by commands in the `\list's` COMMANDS argument. These parameters are all `TeX` skips or dimensions (defined by `\newskip` or `\newdimen`), so the usual `TeX` or `LATeX` commands can be used to set them. The commands will be executed in `vmode` if and only if the `\list` was preceded by a `\par` (or something like an `\end{list}`), so the spacing parameters can be set according to whether the list is inside a paragraph or is its own paragraph.

## 1.2 Vertical Spacing (skips)

`\topsep`: Space between first item and preceding paragraph.

`\partopsep`: Extra space added to `\topsep` when environment starts a new paragraph (is called in `vmode`).

`\itemsep`: Space between successive items.

`\parsep`: Space between paragraphs within an item – the `\parskip` for this environment.

## 1.3 Penalties

`\@beginparpenalty`: put at the beginning of a list

`\@endparpenalty`: put at end of list

`\@itempenalty`: put between items.

## 1.4 Horizontal Spacing (dimens)

`\leftmargin`: space between left margin of enclosing environment (or of page if top level list) and left margin of this list. Must be nonnegative.

`\rightmargin`: analogous.

`\listparindent`: extra indentation at beginning of every paragraph of a list except the one started by the `\item` command. May be negative! Usually, labeled lists have `\listparindent` equal to zero.

`\itemindent`: extra indentation added right BEFORE an item label.

`\labelwidth`: nominal width of box that contains the label. If the natural width of the label  $\leq$  `\labelwidth`, then the label is flushed right inside a box of width `\labelwidth` (with an `\hfil`). Otherwise, a box of the natural width is employed, which causes an indentation of the text on that line.

`\labelsep`: space between end of label box and text of first item.

## 1.5 Default Values

Defaults for the list environment are set as follows. First, `\rightmargin`, `\listparindent` and `\itemindent` are set to 0pt. Then, one of the commands `\@listi`, `\@listii`, ... , `\@listvi` is called, depending upon the current level of the list. The `\@list ...` commands should be defined by the document style. A convention that the document style should follow is to set `\leftmargin` to `\leftmargini`, ..., `\leftmarginvi` for the appropriate level. Items that aren't changed may be left alone, but everything that could possibly be changed must be reset. *Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more)*:

```
\list{LABEL}{COMMANDS} ==  
  BEGIN  
    if \@listdepth > 5  
      then LaTeX error: 'Too deeply nested'  
      else \@listdepth :=G \@listdepth + 1
```

```

fi
\rightmargin      := 0pt
\listparindent    := 0pt
\itemindent       := 0pt
\eval{@list \romannumeral\the\@listdepth} %% Set default values:
\itemlabel        :=L LABEL
\makelabel        == \@mklab
@nmbrlist         :=L false
COMMANDS

\@trivlist          % commands common to \list and \trivlist

\parskip           :=L \parsep
\parindent         :=L \listparindent
\linewidth         :=L \linewidth - \rightmargin - \leftmargin
\@totalleftmargin :=L \@totalleftmargin + \leftmargin
\parshape 1 \@totalleftmargin \linewidth
\ignorespaces      % gobble space up to \item
END

\endlist == BEGIN \@listdepth :=G \@listdepth -1
              \endtrivlist
              END

\@trivlist ==
BEGIN
  if @newlist = T then \@noitemerr fi
  %% This command removed for some forgotten reason.
  \@topsepadd :=L \topsep
  if @noskipsec then leave vertical mode fi %% Added 11 Jun 85
  if vertical mode
  then \@topsepadd :=L \@topsepadd + \partopsep
  else \unskip \par % remove glue from end of last line
  fi
  if @inlabel = true
  then @noparitem :=L true
       @noparlist :=L true
  else @noparlist :=L false
       \@topsep    :=L \@topsepadd
  fi
  \@topsep        :=L \@topsep + \parskip %% Change 4 Sep 85
  \leftskip       :=L 0pt % Restore paragraphing parameters
  \rightskip      :=L \@rightskip
  \parfillskip    :=L 0pt + 1fil

NOTE: \@setpar called on every \list in case \par has been
temporarily munged before the \list command.
\@setpar{if @newlist = false then {\@@par} fi}
\@newlist      :=G T
\@outerparskip :=L \parskip

```

```

END

\trivlist ==
BEGIN
  \parsep      := \parskip
  @nmbrlist := F
  \@trivlist
  \labelwidth := 0
  \leftmargin := 0
  \itemindent := \parindent
  \@itemlabel :=L "empty"      %% added 93/12/13
  \makelabel{LABEL} == LABEL
END

\endtrivlist ==
BEGIN
  if @inlabel = T then \indent fi
  if horizontal mode then \unskip \par fi
  if @noparlist = true
    else if \lastskip > 0
      then \@tempkipa := \lastskip
           \vskip - \lastskip
           \vskip \@tempkipa -\@outerparskip + \parskip
        fi
      \@endparenv
    fi
  END

\@endparenv ==
BEGIN
  \addpenalty{@endparpenalty}
  \addvspace{@topsepadd}
  \endgroup    %% ends the \begin command's \begingroup
  \par == BEGIN
    \@restorepar
    \everypar{}
    \par
  END
  \everypar == BEGIN remove \lastbox \everypar{} END
  \begingroup %% to match the \end commands \endgroup
END

\item == BEGIN if math mode then WARNING fi
          if next char = [
            then \@item
            else @noitemarg := true
                 \@item[@itemlabel]
          END

\@item[LAB] ==

```



```

BEGIN
if @noperitem = true
then @noperitem := false
    % NOTE: then clause hardly every taken,
    % so made a macro \@donoperitem
    \box\@labels :=G \hbox{\hskip -\leftmargin
                        \box\@labels
                        \hskip \leftmargin }

if @minipage = false then
    \@tempskipa := \lastskip
    \vskip -\lastskip
    \vskip \@tempskipa + \@outerparskip - \parskip
fi
else if @inlabel = true
then \indent \par % previous item empty.
fi
if hmode then 2 \unskip's
    % To remove any space at end of prev.
    % paragraph that could cause a blank line.
    \par
fi
if @newlist = T
then if @nobreak = T % Kludge if list follows \section
then \addvspace{\@outerparskip - \parskip}
else \addpenalty{\@beginparpenalty}
    \addvspace{\@topsep}
    \addvspace{-\parskip} %% added 4 Sep 85
fi
else \addpenalty{\@itempenalty}
    \addvspace{\itemsep}
fi
@inlabel :=G true
fi

\everypar{ @minipage :=G F
@newlist :=G F
if @inlabel = true
then @inlabel :=G false
    \hskip -\parindent
    \box\@labels
    \penalty 0
    %% 3 Oct 85 - allow line break here
    \box\@labels :=G null
fi
\everypar{} }

@nobreak :=G false
if @noitemarg = true
then @noitemarg := false
if @nmbrlist
then \refstepcounter{\@listctr}

```

```

fi      fi
\@tempboxa :=L \hbox{\makelabel{LAB}}
\box\@labels :=G \@labels \hskip \itemindent
               \hskip - (\labelwidth + \labelsep)
               if \wd \@tempboxa > \labelwidth
                   then \box\@tempboxa
                   else \hbox to \labelwidth {\unhbox\@tempboxa}
               fi
               \hskip\labelsep
\ignorespaces %gobble space up to text
END

```

```

\makelabel{LABEL} == ERROR %% default to catch lonely \item

```

```

\usecounter{CTR} == BEGIN @nmbrlist :=L true
                        \@listctr == CTR
                        \setcounter{CTR}{0}
                        END

```

DEFINE \dimen's and \count  
*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

```

\topskip
\partopsep 1 \*2kernel)
\itemsep    2 \newskip\topsep
\parsep     3 \newskip\partopsep
\@topsep    4 \newskip\itemsep
\@topsepadd 5 \newskip\parsep
\outerparskip 6 \newskip\@topsep
              7 \newskip\@topsepadd
              8 \newskip\@outerparskip

```

*(End definition for \topskip and others. These functions are documented on page ??.)*

```

\leftmargin
\rightmargin 9 \newdimen\leftmargin
\listparindent 10 \newdimen\rightmargin
\itemindent   11 \newdimen\listparindent
\labelwidth   12 \newdimen\itemindent
\labelsep     13 \newdimen\labelwidth
\@totalleftmargin 14 \newdimen\labelsep
               15 \newdimen\linewidth
               16 \newdimen\@totalleftmargin \@totalleftmargin=\z@

```

*(End definition for \leftmargin and others. These functions are documented on page ??.)*

```

\leftmargini
\leftmarginii 17 \newdimen\leftmargini
\leftmarginiii 18 \newdimen\leftmarginii
\leftmarginiv 19 \newdimen\leftmarginiii
\leftmarginv 20 \newdimen\leftmarginiv
\leftmarginvi 21 \newdimen\leftmarginv
22 \newdimen\leftmarginvi

```

(End definition for \leftmargini and others. These functions are documented on page ??.)

```

\@listdepth
\@itempenalty 23 \newcount\@listdepth \@listdepth=0
\@beginparpenalty 24 \newcount\@itempenalty
\@endparpenalty 25 \newcount\@beginparpenalty
26 \newcount\@endparpenalty

```

(End definition for \@listdepth and others. These functions are documented on page ??.)

```

\@labels
27 \newbox\@labels

```

(End definition for \@labels. This function is documented on page ??.)

```

\if@inlabel
\@inlabelfalse 28 \newif\if@inlabel \@inlabelfalse
\@inlabeltrue

```

(End definition for \if@inlabel, \@inlabelfalse, and \@inlabeltrue. These functions are documented on page ??.)

```

\if@newlist
\@newlistfalse 29 \newif\if@newlist \@newlistfalse
\@newlisttrue

```

(End definition for \if@newlist, \@newlistfalse, and \@newlisttrue. These functions are documented on page ??.)

```

\if@noparitem
\@noparitemfalse 30 \newif\if@noparitem \@noparitemfalse
\@noparitemtrue

```

(End definition for \if@noparitem, \@noparitemfalse, and \@noparitemtrue. These functions are documented on page ??.)

```

\if@noparlist
\@noparlistfalse 31 \newif\if@noparlist \@noparlistfalse
\@noparlisttrue

```

(End definition for \if@noparlist, \@noparlistfalse, and \@noparlisttrue. These functions are documented on page ??.)

```

\if@noitemarg
\@noitemargfalse 32 \newif\if@noitemarg \@noitemargfalse
\@noitemargtrue

```

(End definition for \if@noitemarg, \@noitemargfalse, and \@noitemargtrue. These functions are documented on page ??.)

```

\if@newlist
\@newlistfalse 33 \newif\if@nmbrlist \@nmbrlistfalse
\@newlisttrue

```

(End definition for `\ifnewlist`, `\@newlistfalse`, and `\@newlisttrue`. These functions are documented on page ??.)

`\list`

```

34 \def\list#1#2{%
35   \ifnum \@listdepth >5\relax
36     \@toodeep
37   \else
38     \global\advance\@listdepth\@ne
39   \fi
40   \rightmargin\z@
41   \listparindent\z@
42   \itemindent\z@
43   \csname @list\romannumeral\the\@listdepth\endcsname
44   \def\@itemlabel{#1}%
45   \let\makelabel\@mklab
46   \@nmbrlistfalse
47   #2\relax
48   \@trivlist
49   \parskip\parsep
50   \parindent\listparindent
51   \advance\linewidth -\rightmargin
52   \advance\linewidth -\leftmargin
53   \advance\@totalleftmargin \leftmargin
54   \parshape \@ne \@totalleftmargin \linewidth
55   \ignorespaces}

```

(End definition for `\list`. This function is documented on page ??.)

`\par@deathcycles`

```

56 \newcount\par@deathcycles

```

(End definition for `\par@deathcycles`. This function is documented on page ??.)

`\@trivlist` Because `\par` is sometimes made a no-op it is possible for a missing `\item` to produce a loop that does not fill memory and so never gets trapped by T<sub>E</sub>X. We thus need to trap this here by setting `\par` to count the number of times a paragraph is called with no progress being made started.

```

57 \def\@trivlist{%
58   \if@noskipsec \leavevmode \fi
59   \@topsepadd \topsep
60   \ifvmode
61     \advance\@topsepadd \partopsep
62   \else
63     \unskip \par
64   \fi
65   \if@inlabel
66     \@nparitemtrue
67     \@nparlisttrue
68   \else
69     \if@newlist \@noitemerr \fi
70     \@nparlistfalse
71     \@topsep \@topsepadd
72   \fi
73   \advance\@topsep \parskip

```

```

74 \leftskip \z@skip
75 \rightskip \@rightskip
76 \parfillskip \@flushglue
77 \par@deathcycles \z@
78 \@setpar{\if@newlist
79     \advance\par@deathcycles \@ne
80     \ifnum \par@deathcycles >\@m
81         \@noitemerr
82         {\@@par}%
83     \fi
84     \else
85         {\@@par}%
86     \fi}%
87 \global \@newlisttrue
88 \@outerparskip \parskip}

```

(End definition for \@trivlist. This function is documented on page ??.)

**\trivlist**

```

89 \def\trivlist{%
90     \parsep\parskip
91     \@nmbrlistfalse
92     \@trivlist
93     \labelwidth\z@
94     \leftmargin\z@
95     \itemindent\z@

```

We initialise \@itemlabel so that a `trivlist` with an `\item` not having an optional argument doesn't produce an error message.

```

96 \let\@itemlabel\@empty
97 \def\makelabel##1{##1}}

```

(End definition for \trivlist. This function is documented on page ??.)

**\endlist**

```

98 \def\endlist{%
99     \global\advance\@listdepth\m@ne
100     \endtrivlist}

```

(End definition for \endlist. This function is documented on page ??.)

The definition of `\trivlist` used to be in `ltspace.dtx` so that other commands could be 'let to it'. They now use `\def`.

**\endtrivlist**

```

101 \def\endtrivlist{%
102     \if@inlabel
103         \leavevmode
104         \global \@inlabelfalse
105     \fi
106     \if@newlist
107         \@noitemerr
108         \global \@newlistfalse
109     \fi
110     \ifhmode\unskip \par

```

We also check if we are in math mode and issue an error message if so (hoping that `\@currenvir` resolves suitably). Otherwise the usual “perhaps a missing item” error will get triggered later which is confusing.

```

111   \else
112     \@inmatherr{\end{\@currenvir}}%
113   \fi
114   \if@noparlist \else
115     \ifdim\lastskip >\z@
116       \@tempskipa\lastskip \vskip -\lastskip
117       \advance\@tempskipa\parskip \advance\@tempskipa -\@outerparskip
118       \vskip\@tempskipa
119     \fi
120     \@endparenv
121   \fi
122 }

```

(End definition for `\endtrivlist`. This function is documented on page ??.)

`\@endparenv` To suppress the paragraph indentation in text immediately following a paragraph-making environment, `\everypar` is changed to remove the space, and `\par` is redefined to restore `\everypar`. Instead of redefining `\par` and `\everypar`, `\@endparenv` was changed to set the `@endpe` switch, letting `\end` redefine `\par` and `\everypar`.

This allows paragraph-making environments to work right when called by other environments. (Changed 27 Oct 86)

```

123 \def\@endparenv{%
124   \addpenalty\@endparpenalty\addvspace\@topsepadd\@endpetrue}
125 <latexrelease>\IncludeInRelease{2015/01/01}{\@doendpe}{clubpenalty fix}%
126 \def\@doendpe{\@endpetrue
127   \def\par{\@restorepar

```

If a section heading changes `\clubpenalty` to keep lines after it together then this modification is restored via the `\everypar` mechanism at the start of the next paragraph. As we destroy the contents of this token here we explicitly set `\clubpenalty` back to its default.

```

128       \clubpenalty\@clubpenalty
129       \everypar{}\par\@endpefalse}\everypar

```

Use `\setbox0=\lastbox` instead of `\hskip -\parindent` so that a `\noindent` becomes a no-op when used before a line immediately following a list environment(23 Oct 86).

```

130       {\setbox\z@\lastbox}%
131       \everypar{}\@endpefalse}}
132 <latexrelease>\EndIncludeInRelease
133 <latexrelease>\IncludeInRelease{0000/00/00}{\@doendpe}{clubpenalty fix}%
134 <latexrelease>\def\@doendpe{\@endpetrue
135 <latexrelease>   \def\par{\@restorepar\everypar{}\par\@endpefalse}\everypar
136 <latexrelease>     {\setbox\z@\lastbox}\everypar{}\@endpefalse}}
137 <latexrelease>\EndIncludeInRelease

```

(End definition for `\@endparenv` and `\@doendpe`. These functions are documented on page ??.)

```

\if@endpe
\@endpefalse
\@endpeltrue
138 \newif\if@endpe
139 \@endpefalse

```

(End definition for \if@endpe, \@endpefalse, and \@endpeltrue. These functions are documented on page ??.)

\@mklab

```
140 \def\@mklab#1{\hfil #1}
```

(End definition for \@mklab. This function is documented on page ??.)

\item

```
141 \def\item{%
142   \@inmatherr\item
143   \@ifnextchar [\@item{\@noitemargtrue \@item[\@itemlabel]}}
```

(End definition for \item. This function is documented on page ??.)

\@donoparitem

```
144 \def\@donoparitem{%
145   \@noparitemfalse
146   \global\setbox\@labels\hbox{\hskip -\leftmargin
147                                   \unhbox\@labels
148                                   \hskip \leftmargin}%
149   \if@minipage\else
150     \@tempskipa\lastskip
151     \vskip -\lastskip
152     \advance\@tempskipa\@outerparskip
153     \advance\@tempskipa -\parskip
154     \vskip\@tempskipa
155   \fi}
```

(End definition for \@donoparitem. This function is documented on page ??.)

\@item

```
156 \def\@item[#1]{%
157   \if@noparitem
158     \@donoparitem
159   \else
160     \if@inlabel
161       \indent \par
162     \fi
163     \ifhmode
164       \unskip\unskip \par
165     \fi
166     \if@newlist
167       \if@nobreak
168         \@nbitem
169       \else
170         \addpenalty\@beginparpenalty
171         \addvspace\@topsep
172         \addvspace{-\parskip}%
173       \fi
174     \else
175       \addpenalty\@itempenalty
176       \addvspace\itemsep
177     \fi
178     \global\@inlabeltrue
```

```

179 \fi
180 \everypar{%
181   \@minipagefalse
182   \global\@newlistfalse

```

This `\if@inlabel` check is needed in case an item starts of inside a group so that `\everypar` does not become empty outside that group.

```

183   \if@inlabel
184     \global\@inlabelfalse

```

The paragraph indent is now removed by using `\setbox...` since this makes `\noindent` a no-op here, as it should be. Thus the following comment is redundant but is left here for the sake of future historians: this next command was changed from an `hskip` to a `kern` to avoid a break point after the `parindent` box: the skip could cause a line-break if a very long label occurs in `raggedright` setting. If `\noindent` was used after `\item` want to cancel the `\itemindent` skip. This case can be detected as the indentation box will be void.

```

185   {\setbox\z@\lastbox
186     \ifvoid\z@
187       \kern-\itemindent
188     \fi}%
189   \box\@labels
190   \penalty\z@
191 \fi

```

This code is intended to prevent a page break after the first line of an item that comes immediately after a section title. It may be sensible to always forbid a page break after one line of an item? As with all such settings of `\clubpenalty` it is local so will have no effect if the item starts in a group.

Only resetting `\@nobreak` when it is true is now essential since now it is sometimes set locally.

```

192   \if@nobreak
193     \@nobreakfalse
194     \clubpenalty \@M
195   \else
196     \clubpenalty \@clubpenalty
197     \everypar{}%
198   \fi}%
199 \if@noitemarg
200   \@noitemargfalse
201   \if@nmbrlist
202     \refstepcounter\@listctr
203   \fi
204 \fi

```

We use `\sbox` to support colour commands.

```

205   \sbox\@tempboxa{\makelabel{#1}}%
206   \global\setbox\@labels\hbox{%
207     \unhbox\@labels
208     \hskip \itemindent
209     \hskip -\labelwidth
210     \hskip -\labelsep

```



```

211 \ifdim \wd\@tempboxa >\labelwidth
212 \box\@tempboxa
213 \else
214 \hbox to\labelwidth {\unhbox\@tempboxa}%
215 \fi
216 \hskip \labelsep}%
217 \ignorespaces}

(End definition for \@item. This function is documented on page ??.)

```

`\makelabel`

```

218 \def\makelabel#1{%
219 \latex@error{Lonely \string\item--perhaps a missing
220 list environment}\@ehc}

(End definition for \makelabel. This function is documented on page ??.)

```

`\@nbitem`

```

221 \def\@nbitem{%
222 \@tempskipa\@outerparskip
223 \advance\@tempskipa -\parskip
224 \addvspace\@tempskipa}

(End definition for \@nbitem. This function is documented on page ??.)

```

`\usecounter`

```

225 \def\usecounter#1{\@nmblisttrue\def\@listctr{#1}\setcounter{#1}\z@}

(End definition for \usecounter. This function is documented on page ??.)

```

## 1.6 Itemize and Enumerate

Enumeration is done with four counters: `enumi`, `enumii`, `enumiii` and `enumiv`, where `enumN` controls the numbering of the Nth level enumeration. The label is generated by the commands `\labelenumi` ... `\labelenumiv`, which should be defined by the document style. Note that `\p@enumN\theenumN` defines the output of a `\ref` command. A typical definition might be:

```

\def\theenumii{\alph{enumii}}
\def\p@enumii{\theenumi}
\def\labelenumii{(\theenumii)}

```

which will print the labels as ‘(a)’, ‘(b)’, ... and print a `\ref` as ‘3a’.

The item numbers are moved to the right of the label box, so they are always a distance of `\labelsep` from the item.

`\@enumdepth` holds the current enumeration nesting depth.

Itemization is controlled by four commands: `\labelitemi`, `\labelitemii`, `\labelitemiii`, and `\labelitemiv`. To cause the second-level list to be bulleted, you just define `\labelitemii` to be `•`. `\@itemspacing` and `\@itemdepth` are the analogs of `\@enumspacing` and `\@enumdepth`.

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```

\enumerate ==
BEGIN

```

```

        if \@enumdepth > 3
        then errormessage: "Too deeply nested".
        else \@enumdepth :=L \@enumdepth + 1
            \@enumctr :=L eval(enum@\romannumeral\the\@enumdepth)
            \list{\label{\@enumctr}}
                {\usecounter{\@enumctr}
                 \makelabel{LABEL} == \hss \llap{LABEL}}
        fi
    END

\endenumerate == \endlist
End of historical LATEX 2.09 comments.

\@enumdepth
226 \newcount\@enumdepth \@enumdepth = 0
(End definition for \@enumdepth. This function is documented on page ??.)

\c@enumi
\c@enumii 227 \@definecounter{enumi}
\c@enumii 228 \@definecounter{enumii}
\c@enumiv 229 \@definecounter{enumiii}
230 \@definecounter{enumiv}

(End definition for \c@enumi and others. These functions are documented on page ??.)

enumerate
231 \def\enumerate{%
232   \ifnum \@enumdepth >\thr@@\toodeep\else
233     \advance\@enumdepth\@ne
234     \edef\@enumctr{enum\romannumeral\the\@enumdepth}%
235     \expandafter
236     \list
237       \csname label\@enumctr\endcsname
238       {\usecounter{\@enumctr}\def\makelabel##1{\hss\llap{##1}}}%
239   \fi}
240 \let\endenumerate =\endlist

Historical LATEX 2.09 comments (not necessarily accurate any more):
\itemize ==
BEGIN
    if \@itemdepth > 3
    then errormessage: 'Too deeply nested'.
    else \@itemdepth :=L \@itemdepth + 1
        \@itemitem == eval(labelitem\romannumeral\the\@itemdepth)
        \list{\@nameuse{\@itemitem}}
            {\makelabel{LABEL} == \hss \llap{LABEL}}
    fi
END

\enditemize == \endlist

End of historical LATEX 2.09 comments.

```

`\@itemdepth`

```
241 \newcount\@itemdepth \@itemdepth = 0
```

*(End definition for \@itemdepth. This function is documented on page ??.)*

`itemize`

```
242 \def\itemize{%
243   \ifnum \@itemdepth >\thr@@\toodeep\else
244     \advance\@itemdepth\@ne
245     \edef\@itemitem{labelitem\romannumeral\the\@itemdepth}%
246     \expandafter
247     \list
248       \csname\@itemitem\endcsname
249     {\def\makelabel##1{\hss\llap{##1}}}%
250   \fi}
251 \let\enditemize =\endlist
252 \endkernel
```

# File G

## ltboxes.dtx

### 1 L<sup>A</sup>T<sub>E</sub>X Box commands

<code>\makebox</code>	<code>\makebox[⟨wid⟩][⟨pos⟩]{⟨obj⟩}</code> Puts <code>⟨obj⟩</code> in an <code>\hbox</code> of width <code>⟨wid⟩</code> , positioned by <code>⟨pos⟩</code> . The possible <code>⟨pos⟩</code> are: s stretched, l flushleft, r flushright, c (default) centred. If <code>⟨wid⟩</code> is missing, then <code>⟨pos⟩</code> is also missing and <code>⟨obj⟩</code> is put in an <code>\hbox</code> of its natural width. <code>\makebox(⟨x⟩,⟨y⟩)[⟨pos⟩]{⟨obj⟩}</code> Puts <code>⟨obj⟩</code> in an <code>\hbox</code> of width <code>x * \unitlength</code> and height <code>y * \unitlength</code> . <code>⟨pos⟩</code> arguments are s, l, r or c (default) for stretched, flushleft, flushright or centred, and t or b for top, bottom – or combinations like tr or rb. Default for horizontal and vertical are centered. Note that in this picture mode version of <code>\makebox</code> a [b] aligns on the <i>bottom</i> of the text as documented. If you want to align on the <i>baseline</i> use <code>\makebox( , ) [b]{\raisebox{0pt}{\height}[0pt]{xyz}}</code> or <code>\makebox( , ) [b]{\smash{xyz}}</code>
<code>\mbox</code>	<code>\mbox{⟨obj⟩}</code> The same as <code>\makebox{⟨obj⟩}</code> , but is more efficient as no checking for optional arguments is done.
<code>\newsavebox</code>	<code>\newsavebox{⟨cmd⟩}</code> : If <code>⟨cmd⟩</code> is undefined, then defines it to be a T <sub>E</sub> X box register.
<code>\savebox</code>	<code>\savebox{⟨cmd⟩} ...</code> : <code>⟨cmd⟩</code> is defined to be a T <sub>E</sub> X box register, and the ‘...’ are any <code>\makebox</code> arguments. It is like <code>\makebox</code> , except it doesn’t produce text but saves the value in <code>\box ⟨cmd⟩</code> .
<code>\sbox</code>	<code>\sbox{⟨cmd⟩}{⟨obj⟩}</code> is an efficient abbreviation for <code>\savebox{⟨cmd⟩}{⟨obj⟩}</code> .
<code>lrbox</code>	<code>\begin{lrbox}{⟨cmd⟩}⟨text⟩\end{lrbox}</code> is equivalent to <code>\sbox{⟨cmd⟩}{⟨text⟩}</code> except that any white space at the beginning and end of <code>⟨text⟩</code> is ignored.
<code>\framebox</code>	<code>\framebox ...</code> : like <code>\makebox</code> , except it puts a ‘frame’ around the box. The frame is made of lines of thickness <code>\fboxrule</code> , separated by space <code>\fboxsep</code> from the text – except for <code>\framebox(X,Y) ...</code> , where the thickness of the lines is as for the picture environment, and there is no separation added.
<code>\fbox</code>	<code>\fbox{⟨obj⟩}</code> is an abbreviation for <code>\framebox{⟨obj⟩}</code> .
<code>\parbox</code>	<code>\parbox[⟨pos⟩][⟨height⟩][⟨inner-pos⟩]{⟨width⟩}{⟨text⟩}</code> : Makes a box with <code>\hsize</code> <code>⟨width⟩</code> , positioned by <code>⟨pos⟩</code> as follows: c : <code>\vcenter</code> (placed in <code>\$...\$</code> if not in math mode) b : <code>\vbox</code> t : <code>\vtop</code> default value is c. Sets <code>\hsize := ⟨width⟩</code> and calls <code>\@parboxrestore</code> , which does the following: Restores the original definitions of: <code>\par</code> <code>\</code> <code>\-</code> <code>\,</code> <code>\‘</code> <code>\=</code>

Resets the following parameters:

<code>\parindent</code>	<code>= 0pt</code>	
<code>\parskip</code>	<code>= 0pt</code>	added 20 Jan 87
<code>\linewidth</code>	<code>= \hsize</code>	
<code>\@totalleftmargin</code>	<code>= 0pt</code>	
<code>\leftskip</code>	<code>= 0pt</code>	
<code>\rightskip</code>	<code>= 0pt</code>	
<code>\@rightskip</code>	<code>= 0pt</code>	
<code>\parfillskip</code>	<code>= 0pt plus 1fil</code>	
<code>\lineskip</code>	<code>= \normallineskip</code>	
<code>\baselineskip</code>	<code>= \normalbaselineskip</code>	

Calls `\sloppy`

Note: `\@arrayparboxrestore` same as `\@parboxrestore` but it doesn't restore `\@minipage` : Similar to `\parbox`, except it also makes this look like a page by setting `\textwidth == \columnwidth == box width`

`minipage` changes footnotes by redefining:

```

\@mpfn == mpfootnote
\thempfn == \thempfootnote
\@footnotetext == \@mpfootnotetext
  resets the following list environment parameters:
\@listdepth == \@mplistdepth
where \@mplistdepth is initialized to zero,
  and executes \@minipagerestore to allow the document style to reset any other
parameters it desires. It sets \@minipage true, and resets \everypar to set it false. This
switch keeps \addvspace from putting space at the top of a minipage.
  Change added 24 May 89: \minipage sets \@minipage globally; \endminipage resets
it false.

```

<code>\rule</code>	<code>\rule[\langle raised \rangle]{\langle width \rangle}{\langle height \rangle}</code> : Makes a $\langle width \rangle * \langle height \rangle$ rule, raised $\langle raised \rangle$ .
<code>\underline</code>	<code>\underline{\langle text \rangle}</code> : Makes an underlined hbox with $\langle text \rangle$ in it.
<code>\raisebox</code>	<code>\raisebox{\langle distance \rangle}{\langle height \rangle}{\langle depth \rangle}{\langle box \rangle}</code> : Raises $\langle box \rangle$ up by $\langle distance \rangle$ length (down if $\langle distance \rangle$ negative). Makes T <sub>E</sub> X think that the new box extends $\langle height \rangle$ above the line and $\langle depth \rangle$ below, for a total vertical length of $\langle height \rangle + \langle depth \rangle$ . Default values of $\langle height \rangle$ & $\langle depth \rangle$ = actual height and depth of box in new position.

```

1 \langle *2ekernel \rangle
2 \message{boxes,}

```

`\makebox` `\makebox` User level command just looks for optional [ or (.

```

3 \langle /2ekernel \rangle
4 \langle latexrelease \rangle \IncludeInRelease{2015/01/01}%
5 \langle latexrelease \rangle \langle \makebox \rangle {Make \makebox robust}%
6 \langle *2ekernel | latexrelease \rangle
7 \DeclareRobustCommand\makebox{%
8   \leavevmode
9   \@ifnextchar(%)
10    \@makepicbox
11    {\@ifnextchar[\@makebox\mbox}}}%
12 \langle /2ekernel | latexrelease \rangle
13 \langle latexrelease \rangle \EndIncludeInRelease
14 \langle latexrelease \rangle \IncludeInRelease{0000/00/00}%
15 \langle latexrelease \rangle \langle \makebox \rangle {Make \makebox robust}%

```

```

16 <latexrelease>\def\makebox{%
17 <latexrelease> \leavevmode
18 <latexrelease> \@ifnextchar(%)
19 <latexrelease> \@makepicbox
20 <latexrelease> {\@ifnextchar[\@makebox\mbox}}%
21 <latexrelease>\expandafter\let\csname makebox \endcsname\undefined
22 <latexrelease>\EndIncludeInRelease
23 <*2ekernel>

```

(End definition for \makebox. This function is documented on page ??.)

**\mbox** The basic horizontal box command for L<sup>A</sup>T<sub>E</sub>X.

```

24 \DeclareRobustCommand\mbox[1]{\leavevmode\hbox{#1}}

```

(End definition for \mbox. This function is documented on page ??.)

**\@makebox** Look for a possible second optional argument (defaults to c).

```

25 \def\@makebox[#1]{%
26 \@ifnextchar [{\@imakebox[#1]}{\@imakebox[#1][c]}}

```

(End definition for \@makebox. This function is documented on page ??.)

**\@begin@tempboxa** Helper macro for supporting \height, \width etc. Grab #1 into \@tempboxa and measure it.

```

27 \long\def\@begin@tempboxa#1#2{%
28 \begingroup
29 \setbox\@tempboxa#1{\color@begingroup#2\color@endgroup}%
30 \def\width{\wd\@tempboxa}%
31 \def\height{\ht\@tempboxa}%
32 \def\depth{\dp\@tempboxa}%
33 \let\totalheight\@ovri
34 \totalheight\height
35 \advance\totalheight\depth}

```

(End definition for \@begin@tempboxa. This function is documented on page ??.)

**\@end@tempboxa** End the group started by \@begin@tempboxa, so that the scope of \height only includes the ‘length’ argument to the user-command.

```

36 \let\@end@tempboxa\endgroup

```

(End definition for \@end@tempboxa. This function is documented on page ??.)

**\bm@c** Set up spacing.

```

\bm@l 37 \def\bm@c{\hss\unhbox\@tempboxa\hss}
\bm@r 38 \def\bm@l{\unhbox\@tempboxa\hss}\let\bm@t\bm@l
\bm@s 39 \def\bm@r{\hss\unhbox\@tempboxa}\let\bm@b\bm@r
\bm@t 40 \def\bm@s{\unhbox\@tempboxa}
\bm@b

```

(End definition for \bm@c and others. These functions are documented on page ??.)

**\@imakebox** Internal form of \makebox.

```

41 \long\def\@imakebox[#1][#2]#3{%
42 \@begin@tempboxa\hbox{#3}%
43 \setlength\@tempdima{#1}% support calc
44 \hb@xt@\@tempdima{\csname bm@#2\endcsname}%
45 \@end@tempboxa}

```

(End definition for \imakebox. This function is documented on page ??.)

\@makepicbox Picture mode form of \makebox.

```
46 \def\@makepicbox(#1,#2){%
47   \ifnextchar[{\@makepicbox(#1,#2)}{\@makepicbox(#1,#2) []}}
```

(End definition for \@makepicbox. This function is documented on page ??.)

\@imakepicbox picture mode version

```
48 </2ekernel>
49 < *2ekernel | latexrelease>
50 < latexrelease> \IncludeInRelease{2020/10/01}%
51 < latexrelease>           {\@imakepicbox}{default units}%
52 \long\def\@imakepicbox(#1,#2)[#3]#4{%
53   \@defaultunitsset\@tempdimc{#2}\unitlength
54   \vbox to\@tempdimc
55     {\let\mb@b\vss \let\mb@l\hss \let\mb@r\hss
56      \let\mb@t\vss
57      \@tfor\reserved@a :=#3\do{%
58        \if s\reserved@a
59          \let\mb@l\relax \let\mb@r\relax
60        \else
61          \expandafter\let\csname mb@\reserved@a\endcsname\relax
62        \fi}%
63      \mb@t
64      \@defaultunitsset\@tempdimc{#1}\unitlength
65      \hb@xt@\@tempdimc{\mb@l #4\mb@r}%
66      \mb@b
```

This kern ensures that a b option aligns on the bottom of the text rather than the baseline. this is the documented behaviour in the L<sup>A</sup>T<sub>E</sub>X Book. The kern is removed in compatibility mode.

```
67   \kern\z@}}
68 </2ekernel | latexrelease>
69 < latexrelease> \EndIncludeInRelease
70 < latexrelease> \IncludeInRelease{0000/00/00}%
71 < latexrelease>           {\@imakepicbox}{default units}%
72 < latexrelease> \long\def\@imakepicbox(#1,#2)[#3]#4{%
73 < latexrelease>   \vbox to#2\unitlength
74 < latexrelease>   {\let\mb@b\vss \let\mb@l\hss \let\mb@r\hss
75 < latexrelease>   \let\mb@t\vss
76 < latexrelease>   \@tfor\reserved@a :=#3\do{%
77 < latexrelease>   \if s\reserved@a
78 < latexrelease>   \let\mb@l\relax \let\mb@r\relax
79 < latexrelease>   \else
80 < latexrelease>   \expandafter\let\csname mb@\reserved@a\endcsname\relax
81 < latexrelease>   \fi}%
82 < latexrelease>   \mb@t
83 < latexrelease>   \hb@xt@ #1\unitlength{\mb@l #4\mb@r}%
84 < latexrelease>   \mb@b
85 < latexrelease>   \kern\z@}}
86 < latexrelease> \EndIncludeInRelease
87 < *2ekernel>
```

(End definition for \imakepicbox. This function is documented on page ??.)

`\set@color` This macro is initially a no-op, but the colour package will redefine it to insert a `\special`.  
88 `\let\set@color\relax`

(End definition for \set@color. This function is documented on page ??.)

`\color@begingroup` These macros are initially a no-op, but the colour package will redefine them to be  
`\color@endgroup` `\begingroup`, `\endgroup`, `\begingroup\set@color`,  
`\color@setgroup` `\hbox\bgroup\color@begingroup`, `\color@endgroup\egroup`. and `\set to main document`  
`\normalcolor` `colour` respectively.  
`\color@hbox` 89 `\let\color@begingroup\relax`  
`\color@vbox` 90 `\let\color@endgroup\relax`  
`\color@endbox` 91 `\let\color@setgroup\relax`  
92 `\let\normalcolor\relax`  
93 `\let\color@hbox\relax`  
94 `\let\color@vbox\relax`  
95 `\let\color@endbox\relax`

(End definition for \color@begingroup and others. These functions are documented on page ??.)

`\newsavebox` Allocate a new ‘savebox’.  
96 `\def\newsavebox#1{\@ifdefinable{#1}{\newbox#1}}`

(End definition for \newsavebox. This function is documented on page ??.)

`\savebox` Save #1 in a box register.  
97 `\</2kernel>`  
98 `\<latexrelease>\IncludeInRelease{2015/01/01}%`  
99 `\<latexrelease> \savebox}{Make \savebox robust}%`  
100 `\<*2kernel | latexrelease>`  
101 `\DeclareRobustCommand\savebox[1]{%`  
102 `\@ifnextchar{%`  
103 `\{\@savepicbox#1}{\@ifnextchar[\{\@savebox#1}{\sbox#1}}}%`  
104 `\</2kernel | latexrelease>`  
105 `\<latexrelease>\EndIncludeInRelease`  
106 `\<latexrelease>\IncludeInRelease{0000/00/00}%`  
107 `\<latexrelease> \savebox}{Make \savebox robust}%`  
108 `\<latexrelease>\def\savebox#1{%`  
109 `\<latexrelease> \@ifnextchar{%`  
110 `\<latexrelease> \{\@savepicbox#1}{\@ifnextchar[\{\@savebox#1}{\sbox#1}}}%`  
111 `\<latexrelease>\expandafter\let\csname savebox \endcsname\@undefined`  
112 `\<latexrelease>\EndIncludeInRelease`  
113 `\<*2kernel>`

(End definition for \savebox. This function is documented on page ??.)

`\sbox` Save #1 in a box register.  
114 `\DeclareRobustCommand\sbox[2]{\setbox#1\hbox{%`  
115 `\color@setgroup#2\color@endgroup}}`

(End definition for \sbox. This function is documented on page ??.)



`\@savebox` Look for second optional argument.

```

116 \def\@savebox#1[#2]{%
117   \ifnextchar [{\@isavebox#1[#2]}\@isavebox#1[#2][c]}}

```

(End definition for `\@savebox`. This function is documented on page ??.)

`\@isavebox`

```

118 \long\def\@isavebox#1[#2][#3]#4{%
119   \sbox#1{\@makebox[#2][#3]{#4}}

```

(End definition for `\@isavebox`. This function is documented on page ??.)

`\@savepicbox` Picture mode version of `\savebox`.

```

120 \def\@savepicbox#1(#2,#3){%
121   \ifnextchar [%]
122     {\@isavepicbox#1(#2,#3)}{\@isavepicbox#1(#2,#3) []}}

```

(End definition for `\@savepicbox`. This function is documented on page ??.)

`\@isavepicbox` Picture mode version of `\savebox`.

```

123 \long\def\@isavepicbox#1(#2,#3)[#4]#5{%
124   \sbox#1{\@makepicbox(#2,#3)[#4]{#5}}

```

(End definition for `\@isavepicbox`. This function is documented on page ??.)

`\lrbox` `lrbox`: the new environment form of `\sbox`. Use `\aftergroup` tricks to enable a *local* assignment to be made to the box, in a way that it still has an effect *outside* the `lrbox` environment.

```

125 \def\lrbox#1{%
126   \edef\reserved@a{%
127     \endgroup
128     \setbox#1\hbox{%
129       \begingroup\aftergroup}%
130     \def\noexpand\@currenvir{\@currenvir}%
131     \def\noexpand\@currenvline{\on@line}}%
132   \reserved@a
133   \@endpefalse
134   \color@setgroup
135   \ignorespaces

```

(End definition for `\lrbox`. This function is documented on page ??.)

`\endlrbox` End the `lrbox` environment.

```

136 \def\endlrbox{\unskip\color@endgroup}

```

(End definition for `\endlrbox`. This function is documented on page ??.)

`\usebox` unchanged

```

137 \DeclareRobustCommand\usebox[1]{\leavevmode\copy #1\relax}

```

(End definition for `\usebox`. This function is documented on page ??.)

`\frame` The following definition of `\frame` was written by Pavel Curtis (Extra space removed 14 Jan 88) RmS 92/08/24: Replaced occurrence of `\@halfwidth` by `\@wholewidth`

```

138 \DeclareRobustCommand\frame[1]{%
139   \leavevmode
140   \hbox{%
141     \hskip-\@wholewidth
142     \vbox{%
143       \vskip-\@wholewidth
144       \hrule \@height\@wholewidth
145       \hbox{%
146         \vrule\@width\@wholewidth
147         #1%
148         \vrule\@width\@wholewidth}%
149       \hrule \@height\@wholewidth
150       \vskip-\@wholewidth}%
151     \hskip-\@wholewidth}}

```

(End definition for `\frame`. This function is documented on page ??.)

`\fboxrule` user level parameters,

```

\fbxsep 152 \newdimen\fboxrule
153 \newdimen\fbxsep

```

(End definition for `\fboxrule` and `\fbxsep`. These functions are documented on page ??.)

`\fbox` Abbreviated framed box command.

```

154 \DeclareRobustCommand\fbox[1]{%
155   \leavevmode
156   \setbox\@tempboxa\hbox{%
157     \color@begingroup
158     \kern\fbxsep{#1}\kern\fbxsep
159     \color@endgroup}%
160   \@framebox\relax}

```

(End definition for `\fbox`. This function is documented on page ??.)

`\framebox` Framed version of `\makebox`.

```

161 </2ekernel>
162 <latexrelease>\IncludeInRelease{2015/01/01}%
163 <latexrelease>          {\framebox}{Make \framebox robust}%
164 <*2ekernel | latexrelease>
165 \DeclareRobustCommand\framebox{%
166   \@ifnextchar(%)
167     \@framepicbox{\@ifnextchar[\@framebox\fbox}}}%
168 </2ekernel | latexrelease>
169 <latexrelease>\EndIncludeInRelease
170 <latexrelease>\IncludeInRelease{0000/00/00}%
171 <latexrelease>          {\framebox}{Make \framebox robust}%
172 <latexrelease>\def\framebox{%
173 <latexrelease>  \@ifnextchar(%)
174 <latexrelease>    \@framepicbox{\@ifnextchar[\@framebox\fbox}}}%
175 <latexrelease>\expandafter\let\csname framebox \endcsname\@undefined
176 <latexrelease>\EndIncludeInRelease
177 <*2ekernel>

```

(End definition for \framebox. This function is documented on page ??.)

\@framebox Deal with optional arguments.

```
178 \def\@framebox[#1]{%
179   \@ifnextchar[%
180     {\@framebox[#1]}%
181     {\@framebox[#1][c]}}
```

(End definition for \@framebox. This function is documented on page ??.)

\@ifframebox The handling the optional arguments. In order to set the whole box, including the frame to the specified dimension, we first determine that dimension from the natural size of the text, #3. calculated width.

```
182 \long\def\@ifframebox[#1][#2]#3{%
183   \leavevmode
184   \@begin@tempboxa\hbox{#3}%
185   \setlength\@tempdima{#1}%
186   \setbox\@tempboxa\hb@xt@\@tempdima
187     {\kern\fbboxsep\csname bm@#2\endcsname\kern\fbboxsep}%
188   \@frameb@x{\kern-\fbboxrule}%
189   \@end@tempboxa}
```

(End definition for \@ifframebox. This function is documented on page ??.)

\@frameb@x Common part of \framebox and \fbbox. #1 is a negative kern in the \framebox case so that the vertical rules do not add to the width of the box.

```
190 \def\@frameb@x#1{%
191   \@tempdima\fbboxrule
192   \advance\@tempdima\fbboxsep
193   \advance\@tempdima\dp\@tempboxa
194   \hbox{%
195     \lower\@tempdima\hbox{%
196       \vbox{%
197         \hrule\@height\fbboxrule
198         \hbox{%
199           \vrule\@width\fbboxrule
200           #1%
201           \vbox{%
202             \vskip\fbboxsep
203             \box\@tempboxa
204             \vskip\fbboxsep}%
205           #1%
206           \vrule\@width\fbboxrule}%
207         \hrule\@height\fbboxrule}%
208       }%
209     }%
210 }
```

(End definition for \@frameb@x. This function is documented on page ??.)

\@framepicbox Picture mode version.

```
211 \def\@framepicbox(#1,#2){%
212   \@ifnextchar[{\@framepicbox(#1,#2)}{\@framepicbox(#1,#2) []}}
```

(End definition for \@framepicbox. This function is documented on page ??.)

`\@iframepicbox` Picture mode version.

```
213 \long\def\@iframepicbox(#1,#2)[#3]#4{%  
214   \frame{\@imakepicbox(#1,#2)[#3]{#4}}}
```

*(End definition for \@iframepicbox. This function is documented on page ??.)*

`\parbox` The main vertical-box command for L<sup>A</sup>T<sub>E</sub>X.

```
215 \</2ekernel>  
216 \<latexrelease>\IncludeInRelease{2015/01/01}%  
217 \<latexrelease>          {\parbox}{Make \parbox robust}%  
218 \<*2ekernel | latexrelease>  
219 \DeclareRobustCommand\parbox{%  
220   \@ifnextchar[%]  
221     \@iparbox  
222     {\@iiiparbox c\relax[s]}}%  
223 \</2ekernel | latexrelease>  
224 \<latexrelease>\EndIncludeInRelease  
225 \<latexrelease>\IncludeInRelease{0000/00/00}%  
226 \<latexrelease>          {\parbox}{Make \parbox robust}%  
227 \<latexrelease>\def\parbox{%  
228 \<latexrelease>   \@ifnextchar[%]  
229 \<latexrelease>     \@iparbox  
230 \<latexrelease>     {\@iiiparbox c\relax[s]}}%  
231 \<latexrelease>\expandafter\let\csname parbox \endcsname\@undefined  
232 \<latexrelease>\EndIncludeInRelease  
233 \<*2ekernel>
```

*(End definition for \parbox. This function is documented on page ??.)*

`\@iparbox` Optional argument handling.

```
234 \def\@iparbox[#1]{%  
235   \@ifnextchar[%]  
236     {\@iparbox{#1}}%  
237     {\@iiiparbox{#1}\relax[s]}}
```

*(End definition for \@iparbox. This function is documented on page ??.)*

`\@iiiparbox` Optional argument handling.

```
238 \def\@iiiparbox#1[#2]{%  
239   \@ifnextchar[%]  
240     {\@iiiparbox{#1}{#2}}%  
241     {\@iiiparbox{#1}{#2}[#1]}}
```

*(End definition for \@iiiparbox. This function is documented on page ??.)*

`\@iiiparbox` The internal version of `\parbox`.

`\@parboxto`

```
242 \let\@parboxto\@empty  
243 \long\def\@iiiparbox#1#2[#3]#4#5{%  
244   \leavevmode  
245   \@pboxswfalse  
246   \setlength\@tempdima{#4}%  
247   \@begin@tempboxa\vbox{\hsize\@tempdima\@parboxrestore#5\@@par}%  
248   \ifx\relax#2\else  
249     \setlength\@tempdimb{#2}%  
250     \edef\@parboxto{\to\the\@tempdimb}%
```

```

251 \fi
252 \if#1b\vbox
253 \else\if #1t\vtop
254 \else\ifmode\vcenter
255 \else\@pboxswtrue $\vcenter
256 \fi\fi\fi
257 \@parboxto{\let\hss\vss\let\unhbox\unvbox
258 \csname bm@#3\endcsname}%
259 \if@pboxsw \m@th$\fi
260 \@end@tempboxa}

```

(End definition for \iiiparbox and \parboxto. These functions are documented on page ??.)

**\@arrayparboxrestore** Restore various paragraph parameters.

The rationale for allowing two normally global flags to be set locally here was stated originally by Donald Arsenau and extended by Chris Rowley. It is because these flags are only set globally to true by section commands, and these should never appear within boxes or, indeed, in any group; and they are only ever set globally to false when they are definitely true.

If anyone is unhappy with this argument then both flags should be treated as in \set@nbreak; otherwise this command will be redundant.

```

261 </2ekernel>
262 <latexrelease>\IncludeInRelease{2017-04-15}%
263 <latexrelease> \normallineskiplimit}
264 <latexrelease> {reset \lineskiplimit}%
265 <*2ekernel | latexrelease>
266 \def\@arrayparboxrestore{%
267 \let\if@nbreak\iffalse
268 \let\if@noskipsec\iffalse
269 \let\par\@par
270 \let\-\@dischyph
271 \let\'@acci\let\'@accii\let\=@acciii
272 \parindent\z@ \parskip\z@skip
273 \everypar{}%
274 \linewidth\hsize
275 \@totalleftmargin\z@
276 \leftskip\z@skip \rightskip\z@skip \@rightskip\z@skip
277 \parfillskip\@flushglue
278 \lineskip\normallineskip
279 \lineskiplimit\normallineskiplimit
280 \baselineskip\normalbaselineskip
281 \sloppy}
282 </2ekernel | latexrelease>
283 <latexrelease>\EndIncludeInRelease
284 <latexrelease>\IncludeInRelease{0000-00-00}%
285 <latexrelease> \normallineskiplimit}
286 <latexrelease> {reset \lineskiplimit}%
287 <latexrelease>\def\@arrayparboxrestore{%
288 <latexrelease> \let\if@nbreak\iffalse
289 <latexrelease> \let\if@noskipsec\iffalse

```

```

290 <latexrelease> \let\par\@@par
291 <latexrelease> \let\-\@dischph
292 <latexrelease> \let\'\'@acci\let\'\'@accii\let\=\@acciii
293 <latexrelease> \parindent\z@ \parskip\z@skip
294 <latexrelease> \everypar{}%
295 <latexrelease> \linewidth\hsize
296 <latexrelease> \@totalleftmargin\z@
297 <latexrelease> \leftskip\z@skip \rightskip\z@skip \@rightskip\z@skip
298 <latexrelease> \parfillskip\@flushglue \lineskip\normallineskip
299 <latexrelease> \baselineskip\normalbaselineskip
300 <latexrelease> \sloppy}
301 <latexrelease>\EndIncludeInRelease
302 <*2ekernel>

```

*(End definition for \@arrayparboxrestore. This function is documented on page ??.)*

**\parboxrestore** Restore various paragraph parameters, and also \.

```

303 \def\@parboxrestore{\@arrayparboxrestore\let\\\@normalcr}

```

*(End definition for \parboxrestore. This function is documented on page ??.)*

**\if@minipage** Switch that is true at the start of a minipage.

```

304 \def\@minipagefalse{\global\let\if@minipage\iffalse}
305 \def\@minipagetrue {\global\let\if@minipage\iftrue}
306 \@minipagefalse

```

*(End definition for \if@minipage. This function is documented on page ??.)*

**\minipage** Essentially an environment form of \parbox.

```

307 \def\minipage{%
308   \@ifnextchar[%]
309     \@iminipage
310     {\@iiiminipage c\relax[s]}}

```

*(End definition for \minipage. This function is documented on page ??.)*

**\@iminipage** Optional argument handling.

```

311 \def\@iminipage[#1]{%
312   \@ifnextchar[%]
313     {\@iiiminipage{#1}}%
314     {\@iiiminipage{#1}\relax[s]}}

```

*(End definition for \@iminipage. This function is documented on page ??.)*

**\@iiiminipage** Optional argument handling.

```

315 \def\@iiiminipage#1[#2]{%
316   \@ifnextchar[%]
317     {\@iiiminipage{#1}{#2}}%
318     {\@iiiminipage{#1}{#2}[#1]}}

```

*(End definition for \@iiiminipage. This function is documented on page ??.)*

`\@iiiminipage` Internal form of minipage.

```

319 \def\@iiiminipage#1#2[#3]#4{%
320   \leavevmode
321   \@pboxswfalse
322   \setlength\@tempdima{#4}%
323   \def\@mpargs{#1}{#2}[#3]{#4}}%
324   \setbox\@tempboxa\vbox\bgroup
325     \color@begingroup
326     \hsize\@tempdima
327     \textwidth\hsize \columnwidth\hsize
328     \@parboxrestore
329     \def\@mpfn{\mpfootnote}\def\thempfn{\thempfootnote}\c@mpfootnote\z@
330     \let\@footnotetext\@mpfootnotetext
331     \let\@listdepth\@mplistdepth \@mplistdepth\z@
332     \@minipagerestore
333     \@setminipage}

```

*(End definition for \@iiiminipage. This function is documented on page ??.)*

`\@minipagerestore` Hook so that other styles can reset other commands in a minipage.

```

334 \let\@minipagerestore=\relax

```

*(End definition for \@minipagerestore. This function is documented on page ??.)*

`\endminipage`

```

335 \def\endminipage{%
336   \par
337   \unskip
338   \ifvoid\@mpfootins\else
339     \vskip\skip\@mpfootins
340     \normalcolor
341     \footnoterule
342     \unvbox\@mpfootins
343   \fi
344   \@minipagefalse   %% added 24 May 89
345   \color@endgroup
346   \egroup
347   \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}

```

*(End definition for \endminipage. This function is documented on page ??.)*

`\@mplistdepth` Versions of `\@listdepth` and `\footins` local to minipage.

```

\@mpfootins
348 \newcount\@mplistdepth
349 \newinsert\@mpfootins

```

*(End definition for \@mplistdepth and \@mpfootins. These functions are documented on page ??.)*

`\@mpfootnotetext` Minipage version of `\@footnotetext`.

Final `\strut` added 27 Mar 89, on suggestion by Don Hosek

```

350 \long\def\@mpfootnotetext#1{%
351   \global\setbox\@mpfootins\vbox{%
352     \unvbox\@mpfootins
353     \reset@font\footnotesize
354     \hsize\columnwidth
355     \@parboxrestore

```

```

356 \protected@edef\@currentlabel
357     {\csname p@mpfootnote\endcsname\@thefnmark}%
358 \color@begingroup
359     \@makefnmark{%
360         \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
361     \color@endgroup}}

(End definition for \mpfootnotetext. This function is documented on page ??.)

362 \newif\if@pboxsw

\rule Draw a rule of the specified size.

363 </2ekernel>
364 <latexrelease>\IncludeInRelease{2015/01/01}%
365 <latexrelease>           {\rule}{Make \rule robust}%
366 <*2ekernel | latexrelease>
367 \DeclareRobustCommand\rule{\@ifnextchar[\@rule{\@rule[\z@]}}%
368 </2ekernel | latexrelease>
369 <latexrelease>\EndIncludeInRelease
370 <latexrelease>\IncludeInRelease{0000/00/00}%
371 <latexrelease>           {\rule}{Make \rule robust}%
372 <latexrelease>\def\rule{\@ifnextchar[\@rule{\@rule[\z@]}}%
373 <latexrelease>\expandafter\let\csname rule \endcsname\@undefined
374 <latexrelease>\EndIncludeInRelease
375 <*2ekernel>

(End definition for \rule. This function is documented on page ??.)

\@rule Internal form of \rule.

376 \def\@rule[#1]#2#3{%
377     \leavevmode
378     \hbox{%
379         \setlength\@tempdima{#1}%
380         \setlength\@tempdimb{#2}%
381         \setlength\@tempdimc{#3}%
382         \advance\@tempdimc\@tempdima
383         \vrule\@width\@tempdimb\@height\@tempdimc\@depth-\@tempdima}}

(End definition for \@rule. This function is documented on page ??.)

@@underline Saved primitive \underline.

384 \let@@underline\underline

(End definition for @@underline. This function is documented on page ??.)

\underline LATEX version works outside math.

385 \DeclareRobustCommand\underline[1]{%
386     \relax
387     \ifmmode@@underline{#1}%
388     \else $\@underline{\hbox{#1}}\m@th$\relax\fi}

(End definition for \underline. This function is documented on page ??.)

```



`\raisebox` Raise a box, and change its vertical dimensions.

```

389 </2ekernel>
390 <latexrelease>\IncludeInRelease{2015/01/01}%
391 <latexrelease>          {\raisebox}{Make \raisebox robust}%
392 <*2ekernel | latexrelease>
393 \DeclareRobustCommand\raisebox[1]{%
394   \leavevmode
395   \ifnextchar[{\@rsbox{#1}}{\@irsbox{#1}[]}}
396 </2ekernel | latexrelease>
397 <latexrelease>\EndIncludeInRelease
398 <latexrelease>\IncludeInRelease{0000/00/00}%
399 <latexrelease>          {\raisebox}{Make \raisebox robust}%
400 <latexrelease>\def\raisebox#1{%
401 <latexrelease>  \leavevmode
402 <latexrelease>  \ifnextchar[{\@rsbox{#1}}{\@irsbox{#1}[]}}
403 <latexrelease>\expandafter\let\csname raisebox \endcsname\undefined
404 <latexrelease>\EndIncludeInRelease
405 <*2ekernel>

```

*(End definition for \raisebox. This function is documented on page ??.)*

`\@rsbox` Optional argument handling.

```

406 \def\@rsbox#1[#2]{%
407   \ifnextchar[{\@iirsbox{#1}[#2]}{\@irsbox{#1}[#2]}}

```

*(End definition for \@rsbox. This function is documented on page ??.)*

`\@argsbox` ...

*(End definition for \@argsbox. This function is documented on page ??.)*

`\@irsbox` Internal version of `\raisebox` (less than two optional args).

```

408 \long\def\@irsbox#1[#2]#3{%
409   \@begin@tempboxa\hbox{#3}%
410   \setlength\@tempdima{#1}%
411   \ifx\#2\\\else\setlength\@tempdimb{#2}\fi
412   \setbox\@tempboxa\hbox{\raise\@tempdima\box\@tempboxa}%
413   \ifx\#2\\\else\ht\@tempboxa\@tempdimb\fi
414   \box\@tempboxa
415   \@end@tempboxa}

```

*(End definition for \@irsbox. This function is documented on page ??.)*

`\@iirsbox` Internal version of `\raisebox` (two optional args).

```

416 \long\def\@iirsbox#1[#2][#3]#4{%
417   \@begin@tempboxa\hbox{#4}%
418   \setlength\@tempdima{#1}%
419   \setlength\@tempdimb{#2}%
420   \setlength\dimen@{#3}%
421   \setbox\@tempboxa\hbox{\raise\@tempdima\box\@tempboxa}%
422   \ht\@tempboxa\@tempdimb
423   \dp\@tempboxa\dimen@
424   \box\@tempboxa
425   \@end@tempboxa}

```

(End definition for `\@iirsbox`. This function is documented on page ??.)

`\@finalstrut` This macro adds a special strut the *depth* of the box given as #1, and height and width 0pt. It is used for ensuring that the last line of a paragraph has the correct depth in ‘p’ columns of tables and in footnotes. In vertical mode nothing is done, as adding the strut (as done in 2.09) would start a new paragraph. It would be possible to inspect `\prevdepth` to check the depth of the just-completed paragraph, but we do not do that here. Actually we do even less now, skip the vmode test as it broke tabular ‘p’ columns.

The `\nobreak` was added (1995/10/31) to allow hyphenation of the final word of the paragraph.

```
426 \def\@finalstrut#1{%
427   \unskip\ifhmode\nobreak\fi\vrule\@width\z@\@height\z@\@depth\dp#1}
```

(End definition for `\@finalstrut`. This function is documented on page ??.)

## 1.1 Some low-level constructs

The following commands are basically inherited from plain T<sub>E</sub>X.

`\leftline` These macros place text on a full line either centred or left or right adjusted.

```
\rightline 428 \def\@@line{\hb@xt@\hsize}
\centerline 429 \DeclareRobustCommand\leftline[1]{\@@line{#1\hss}}
\@@line      430 \DeclareRobustCommand\rightline[1]{\@@line{\hss#1}}
              431 \DeclareRobustCommand\centerline[1]{\@@line{\hss#1\hss}}
```

(End definition for `\leftline` and others. These functions are documented on page ??.)

`\rlap` These macros place text to the left or right of the current reference point without taking  
`\llap` up space.

```
\clap      432 \DeclareRobustCommand\rlap[1]{\hb@xt@\z@{#1\hss}}
              433 \DeclareRobustCommand\llap[1]{\hb@xt@\z@{\hss#1}}
```

And here is the version that centers, it was initially introduced by `mathtools`.

```
434 \DeclareRobustCommand\clap[1]{\hb@xt@\z@{\hss#1\hss}}
```

(End definition for `\rlap`, `\llap`, and `\clap`. These functions are documented on page ??.)

```
435 \</2ekernel>
```

# File H

## lfttab.dtx

### 1 Tabbing, Tabular and Array Environments

This section deals with ‘Lining It Up in Columns’. First the `tabbing` environment is defined, and then in second part, `tabular` together with its variants, `tabular*` and `array`.

Note that the `tabular` defined here is essentially the original L<sup>A</sup>T<sub>E</sub>X 2.09 version, not the extended version described in *The L<sup>A</sup>T<sub>E</sub>X Companion*. Use the `array` package to obtain the extended version.

#### 1.1 tabbing

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

`\dimen\@firsttab + i` = distance of tab stop `i` from left margin  
0 <= `i` <= 15 (?).

`\dimen\@firsttab` is initialized to `\@totalleftmargin`, so it starts at the prevailing left margin.

`\@maxtab` = number of highest defined tab register  
probably = `\@firsttab + 12`

`\@nxttabmar` = tab stop number of next line’s left margin

`\@curtabmar` = tab stop number of current line’s left margin

`\@curtab` = number of the current tab. At start of line,  
it equals `\@curtabmar`

`\@hightab` = largest tab number currently defined.

`\@tabpush` = depth of `\pushtab`’s

`\box\@curline` = contents of current line, excluding left margin  
skip, and excluding contents of current field

`\box\@curfield` = contents of current field

`@rjfield` = switch: T iff the last field of the line should  
be right-justified at the right margin.

`\tabbingsep` = distance left by the `\’` command between the  
current position and the field that is  
“left-shifted”.

#### UTILITY MACROS

`\@stopfield` : closes the current field

`\@addfield` : adds the current field to the current line.

`\@contfield` : continues the current field

`\@startfield` : begins the next field

`\@stopline` : closes the current line and outputs it

```

\@startline : starts the next line
\@ifatmargin : an \if that is true iff the current line.
                has width zero

\@startline ==
BEGIN
  \@curtabmar :=G \@nxttabmar
  \@curtab :=G \@curtabmar
  \box\@curline :=G null
  \@startfield
  \strut
END

\@stopline ==
BEGIN
  \unskip
  \@stopfield
  if @rjfield = T
    then @rjfield :=G F
      \@tempdima := \@totalleftmargin + \linewidth
      \hb@xt@ \@tempdima{\@itemfudge
                          \hskip \dimen\@curtabmar
                          \box\@curline
                          \hfil
                          \box\@curfield}
    else \@addfield
      \hbox {\@itemfudge
            \hskip \dimen\@curtabmar
            \box\@curline}
    fi
  END

\@startfield ==
BEGIN
  \box\@curfield :=G \hbox {
END

\@stopfield ==
BEGIN
  }
END

\@contfield ==
BEGIN
  \box\@curfield :=G \hbox { \unhbox\@currfield %%} brace matching
END

\@addfield ==
BEGIN
  \box\@curline :=G \unbox\@curline * \unbox\@curfield
END

```

```

\@ifatmargin ==
BEGIN
  if dim of box\@curline = 0pt then
  END

\tabbing ==
BEGIN
  \lineskip :=L 0pt
  \> == \@rtab
  \< == \@ltab
  \= == \@settab
  \+ == \@tabplus
  \- == \@tabminus
  \‘ == \@tabrj
  \’ == \@tablab
  \\\ == BEGIN \@stopline \@startline END
  \\[DIST] == BEGIN
    \@stopline \vskip DIST \@startline\ignorespaces END
  \[* == BEGIN \@stopline \penalty 10000 \@startline END
  \\[DIST] == BEGIN \@stopline \penalty 10000 \vskip DIST
    \@startline\ignorespaces END
  \@hightab := \@nxttabmar :=G \@firsttab
  \@tabpush :=G 0
  \dimen\@firsttab := \@totalleftmargin
  @rjfield :=G F
  \trivlist \item\relax
  if @minipage = F then \vskip \parskip fi
  \box\@tabfbox = \rlap{\indent\the\everypar}
    % note: \the\everypar sets @inlabel :=G F
  \@itemfudge == BEGIN \box\@tabfbox END
  \@startline
  \ignorespaces
END

\@endtabbing ==
BEGIN
  \@stopline
  if \@tabpush > 0 then error message: "unmatched \poptabs" fi
  \endtrivlist
END

\@rtab ==
BEGIN
  \@stopfield
  \@addfield
  if \@curtab < \@hightab
    then \@curtab :=G \@curtab + 1
    else error message "Undefined Tab" fi

```

```

\@tempdima := \dimen\@curtab - \dimen\@curtabmar
              - width of box \@curline
\box\@curline :=G \hbox{\unhbox\@curline + \hskip\@tempdima}
\@startfield
END

\@settab ==
BEGIN
  \@stopfield
  \@addfield
  if \@curtab < \@maxtab
    then \@curtab :=G \@curtab+1
    else error message: "Too many tabs"      fi
  if \@curtab > \@hightab
    then \@hightab :=L \@curtab      fi
  \dimen\@curtab :=L \dimen\@curtabmar + width of \box\@curline
  \@startfield
END

\@ltab ==
BEGIN
  \@ifatmargin
  then if \@curtabmar > \@firsttab
    then \@curtab :=G \@curtab - 1
        \@curtabmar :=G \@curtabmar - 1
    else error message "Too many untab"      fi
  else error message "Left tab in middle of line"
  fi
END

\@tabplus ==
BEGIN
  if \@nxxtabmar < \@hightab
    then \@nxxtabmar :=G \@nxxtabmar+1
    else error message "Undefined tab"
  fi
END

\@tabminus ==
BEGIN
  if \@nxxtabmar > \@firsttab
    then \@nxxtabmar :=G \@nxxtabmar-1
    else error message "Too many untab"
  fi
END

\@tabrj ==
BEGIN \@stopfield
  \@addfield
  @rjfield :=G T

```

```

        \@startfield
    END

\@tablab ==
    BEGIN \@stopfield
        \box\@curline G:= \hbox{\box\@curline %% 'G' added 17 Jun 86
                                \hskip - width of \box\@curfield
                                \hskip -\tabbingsep
                                \box\@curfield
                                \hskip \tabbingsep }

        \@startfield
    END

\pushtabs ==
    BEGIN
        \@stopfield
        \@tabpush :=G \@tabpush + 1
        \begingroup
        \@contfield
    END

\poptabs ==
    BEGIN
        \@stopfield
        if \@tabpush > 0
            then \endgroup
                \@tabpush :=G \@tabpush - 1
            else error message: "Too many \poptabs"
            fi
        \@contfield
    END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

\a The accents \‘, \’ , and \= that have been redefined inside a tabbing environment can be called by typing \a‘, \a’ , and \a=. The macro \a is defined in `ltoutenc.dtx`.

(End definition for \a. This function is documented on page ??.)

The ‘2ekernel’ code ensures that a `\usepackage{autotabg}` is essentially ignored if a ‘full’ format is being used that has picture mode already in the format.

```

1 <2ekernel>\expandafter\let\csname ver@autotabg.sty\endcsname\fmtversion

\@firsttab
\@maxtab
2 <*2ekernel>
3 \newdimen\@gtempa
4 \chardef\@firsttab=\the\allocationnumber
5 \newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa
6 \newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa
7 \newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa
8 \newdimen\@gtempa
9 \chardef\@maxtab=\the\allocationnumber
10 \dimen\@firsttab=0pt

```

(End definition for \@firsttab and \@maxtab. These functions are documented on page ??.)

```
\@nxttabmar
\@curtabmar 11 \newcount\@nxttabmar
  \@curtab 12 \newcount\@curtabmar
  \@hightab 13 \newcount\@curtab
  \@tabpush 14 \newcount\@hightab
            15 \newcount\@tabpush
```

(End definition for \@nxttabmar and others. These functions are documented on page ??.)

```
\@curline
\@curfield 16 \newbox\@curline
\@tabfbox 17 \newbox\@curfield
            18 \newbox\@tabfbox
```

(End definition for \@curline, \@curfield, and \@tabfbox. These functions are documented on page ??.)

```
\if@rjfield
            19 \newif\if@rjfield
```

(End definition for \if@rjfield. This function is documented on page ??.)

**\@startline** It is, in some sense, an error if the current margin tab setting is higher than the value of \@hightab (which is a local variable). That this is allowed is a fundamental design flaw which is not going to be corrected now.

```
20 \def\@startline{%
21   \ifnum \@nxttabmar >\@hightab
22     \@badtab
23     \global\@nxttabmar \@hightab
24   \fi
25   \global\@curtabmar \@nxttabmar
26   \global\@curtab \@curtabmar
27   \global\setbox\@curline \hbox {}%
28   \@startfield
29   \strut}
```

(End definition for \@startline. This function is documented on page ??.)

```
\@stopline
30 \def\@stopline{%
31   \unskip
32   \@stopfield
33   \if@rjfield
34     \global\@rjfieldfalse
35     \@tempdima\@totalleftmargin
36     \advance\@tempdima\linewidth
37     \hb@xt@\@tempdima{%
38       \@itemfudge\hskip\dimen\@curtabmar
39       \box\@curline
40       \hfil
41       \box\@curfield}%
42   \else
43     \@addfield
44     \hbox{\@itemfudge\hskip\dimen\@curtabmar\box\@curline}%
45   \fi}
```



(End definition for \@stopline. This function is documented on page ??.)

\@startfield

```
46 \def\@startfield{%  
47   \global\setbox\@curfield\hbox\bgroup\color@begingroup}
```

(End definition for \@startfield. This function is documented on page ??.)

\@stopfield

```
48 \def\@stopfield{%  
49   \color@endgroup\egroup}
```

(End definition for \@stopfield. This function is documented on page ??.)

\@contfield

```
50 \def\@contfield{%  
51   \global\setbox\@curfield\hbox\bgroup\color@begingroup  
52   \unhbox\@curfield}
```

(End definition for \@contfield. This function is documented on page ??.)

\@addfield

```
53 \def\@addfield{\global\setbox\@curline\hbox{\unhbox  
54   \@curline\unhbox\@curfield}}
```

(End definition for \@addfield. This function is documented on page ??.)

\@ifatmargin

```
55 \def\@ifatmargin{\ifdim \wd\@curline =\z@}
```

(End definition for \@ifatmargin. This function is documented on page ??.)

\@tabcr

```
56 \def\@tabcr{\@stopline \@ifstar{\penalty \@M \@xtabcr}\@xtabcr}
```

(End definition for \@tabcr. This function is documented on page ??.)

\@xtabcr

```
57 \def\@xtabcr{\@ifnextchar[\@itabcr{\@startline\ignorespaces}}
```

(End definition for \@xtabcr. This function is documented on page ??.)

\@itabcr

```
58 \</2ekernel>  
59 \< *2ekernel | latexrelease>  
60 \< latexrelease>\IncludeInRelease{2020/10/01}%  
61 \< latexrelease>{\@itabcr}{Tabbing calc syntax}%  
62 \def\@itabcr[#1]{\@vspace@calcify{#1}\@startline\ignorespaces}  
63 \< /2ekernel | latexrelease>  
64 \< latexrelease>\EndIncludeInRelease  
65 \< latexrelease>\IncludeInRelease{0000/00/00}%  
66 \< latexrelease>{\@itabcr}{Tabbing calc syntax}%  
67 \< latexrelease>  
68 \< latexrelease>\def\@itabcr[#1]{\vskip #1\@startline\ignorespaces}  
69 \< latexrelease>\EndIncludeInRelease  
70 \< *2ekernel>
```

```

tabbing We use \relax to prevent \item from scanning too far.
\begin{tabbing}
71 \def\tabbing{\lineskip \z@skip\let\>\@rtab\let\<\@ltab\let\=\@settab
72 \let\+\@tabplus\let\-\@tabminus\let\'\@tabrj\let\'\@tablab
73 \let\=\@tabcr
74 \@hightab\@firsttab
75 \global\@nxttabmar\@firsttab
76 \dimen\@firsttab\@totalleftmargin
77 \global\@tabpush\z@ \global\@rjfieldfalse
78 \trivlist \item\relax
79 \if@minipage\else\vskip\parskip\fi

80 \setbox\@tabfbox\hbox{%
81 \rlap{\hskip\@totalleftmargin\indent\the\everypar}}%
82 \def\@itemfudge{\box\@tabfbox}%
83 \@startline\ignorespaces}

\end{tabbing}
84 \def\endtabbing{%
85 \@stopline\ifnum\@tabpush >\z@ \@badpoptabs \fi\endtrivlist}

Omitted \global added to \@rtab 17 Jun 86
\@rtab
86 \def\@rtab{\@stopfield\@addfield\ifnum \@curtab<\@hightab
87 \global\advance\@curtab \@ne \else\@badtab\fi
88 \@tempdima\dimen\@curtab
89 \advance\@tempdima -\dimen\@curtabmar
90 \advance\@tempdima -\wd\@curline
91 \global\setbox\@curline\hbox{\unhbox\@curline\hskip\@tempdima}%
92 \@startfield\ignorespaces}

\@settab
93 \def\@settab{\@stopfield\@addfield
94 \ifnum \@curtab <\@maxtab
95 \ifnum\@curtab =\@hightab
96 \advance\@hightab \@ne
97 \fi
98 \global\advance\@curtab \@ne
99 \else
100 \@latexerror{Tab overflow}\@ehd
101 \fi
102 \dimen\@curtab \dimen\@curtabmar
103 \advance\dimen\@curtab \wd\@curline
104 \@startfield
105 \ignorespaces}

\@ltab
106 \def\@ltab{\@ifatmargin\ifnum\@curtabmar >\@firsttab
107 \global\advance\@curtab \m@ne \global\advance\@curtabmar\m@ne\else
108 \@badtab\fi\else
109 \@latexerror{\string\<\space in mid line}\@ehd\fi\ignorespaces}

\@tabplus
110 \def\@tabplus{%
111 \ifnum\@nxttabmar<\@hightab

```

```

112     \global\advance\@nxttabmar\@ne
113 \else
114     \@badtab
115 \fi
116 \ignorespaces}

\@tabminus 117 \def\@tabminus{%
118     \ifnum\@nxttabmar>\@firsttab
119         \global\advance\@nxttabmar\m@ne
120     \else
121         \@badtab
122     \fi
123     \ignorespaces}

\@tabrj 124 \def\@tabrj{%
125     \@stopfield\@addfield\global\@rjfieldtrue\@startfield\ignorespaces}

\setbox\@curline made \global in \@tablab. 17 Jun 86

\@tablab 126 \def\@tablab{%
127     \@stopfield
128     \global\setbox\@curline\hbox{%
129         \box\@curline
130         \hskip-\wd\@curfield \hskip-\tabbingsep
131         \box\@curfield
132         \hskip\tabbingsep}%
133     \@startfield
134     \ignorespaces}

135 \</2kernel>
136 \<*2kernel | latexrelease>
137 \<latexrelease>\IncludeInRelease{2019/10/01}%
138 \<latexrelease>                {\pushtabs}{Make commands robust}%

\pushtabs 139 \DeclareRobustCommand\pushtabs{%
140     \@stopfield\@addfield\global\advance\@tabpush \@ne \begingroup
141         \@contfield}

\poptabs It is, in some sense, an error if, after the endgroup, the current tab setting is higher
than the new value of \@hightab (which is a local variable). That this is allowed is a
fundamental design flaw which is not going to be corrected now.

142 \DeclareRobustCommand\poptabs{\@stopfield\@addfield
143     \ifnum \@tabpush >\z@
144         \endgroup
145         \global\advance\@tabpush \m@ne
146         \ifnum \@curtab >\@hightab
147             \global \@curtab \@hightab
148             \@badtab
149         \fi
150     \else
151         \@badpoptabs
152     \fi
153     \@contfield}

```

```

154 \DeclareRobustCommand\kill{\@stopfield\@startline\ignorespaces}

(End definition for \@itabcr and others. These functions are documented on page ??.)

155 </2ekernel | latexrelease>
156 <latexrelease>\EndIncludeInRelease
157 <latexrelease>\IncludeInRelease{0000/00/00}%
158 <latexrelease>          {\pushtabs}{Make commands robust}%
159 <latexrelease>
160 <latexrelease>\kernel@make@fragile\pushtabs
161 <latexrelease>\kernel@make@fragile\poptabs
162 <latexrelease>\kernel@make@fragile\kill
163 <latexrelease>
164 <latexrelease>\EndIncludeInRelease
165 <*2ekernel>

```

`\tabbingsep`

```

166 \newdimen\tabbingsep

(End definition for \tabbingsep. This function is documented on page ??.)

```

## 1.2 array and tabular environments

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

### ARRAY PARAMETERS:

`\arraycolsep`  
     : half the width separating columns in an array environment  
`\tabcolsep`  
     : half the width separating columns in a tabular environment  
`\arrayrulewidth`  
     : width of rules  
`\doublerulesep`  
     : space between adjacent rules in array or tabular  
`\arraystretch`  
     : line spacing in array and tabular environments is done by  
       placing a strut in every row of height and depth  
       `\arraystretch` times the height and depth of the strut  
       produced by an ordinary `\strut` command.

### PREAMBLE:

The PREAMBLE argument of an array or tabular environment can  
 contain the following:

- `l,r,c` : indicate where entry is to be placed.
- `|` : for vertical rule
- `@{EXP}` : inserts the text EXP in every column.
- `\arraycolsep` or `\tabcolsep` spacing is suppressed.
- `*{N}{PRE}` : equivalent to writing N copies of PRE in the preamble.  
             PRE may contain `*{N'}{EXP'}` expressions.
- `p{LEN}` : makes entry in parbox of width LEN.

### SPECIAL ARRAY COMMANDS:

`\multicolumn{N}{FORMAT}{ITEM}` : replaces the next N column items by ITEM, formatted according to FORMAT. FORMAT should contain at most one l,r or c. If it contains none, then ITEM is ignored.

`\vline` : draws a vertical line the height of the current row. May appear in an array element entry.

`\hline` : draws a horizontal line between rows. Must appear either before the first entry (to appear above the first row) or right after a `\\` command. If followed by another `\hline`, then adds a `\vskip` of `\doublerulesep`.

`\cline{i-j}` : draws horizontal lines between rows covering columns i through j, inclusive. Multiple commands may follow one another to provide lines covering several disjoint columns

`\extracolsep{WIDTH}` : for use inside an @ in the preamble. Causes a WIDTH space to be added between columns for the rest of the columns. This is in addition to the ordinary intercolumn space.

```

\array ==
  BEGIN
    \@acol    == \@arrayacol
    \@classz  == \@arrayclassz
    \@classiv == \@arrayclassiv
    \\        == \@arraycr
    \@halignto == NULL
    \@tabarray
  END

\endarray{NAME} == BEGIN \crrc }} END

\tabular ==
  BEGIN
    \@halignto == NULL
    \@tabular
  END

\tabular*{WIDTH} ==
  BEGIN
    \@halignto == to WIDTH
    \@tabular
  END

\@tabular ==
  BEGIN
    \leavevmode
    \hbox { $
      \@acol    == \@tabacol

```

```

\@classz == \@tabclassz
\@classiv == \@tabclassiv
\\ == \@tabularcr
\@tabarray
END

\endtabular == BEGIN \crrc}} $} END

\@tabarray == if next char = [ then \@array else \@array[c] fi

\@array[POS]{PREAMBLE} ==
BEGIN
  define \@arstrutbox to make \@arstrut produce strut of height
    and depth \arraystretch times the height and
    depth of a normal strut.
  \@mkpream{PREAMBLE}
  \@preamble == \halign \@halignto {\tabskip=0pt\@arstrut
    eval{\@preamble}\tabskip = 0pt\cr %%}
  \@startpbox == \@@startpbox
  \@endpbox == \@@endpbox
  if POS = t then \vtop
    else if POS = b then \vbox
      else \vcenter
        fi
      fi
    {
      \par ==L {} % changed 92/09/18
      \@sharp == #
      \protect == \relax
      \lineskip :=L 0pt
      \baselineskip :=L 0pt
      \@preamble
    }
  END

\@arraycr ==
BEGIN
  $ %% Prevents extra space at end of row's last entry.
  if next char = [
    then \@argarraycr
    else $ \cr %% Needed to balance $
  END

\@argarraycr[LENGTH] ==
BEGIN
  $ %% Needed to balance $ of \@arraycr
  if LENGTH > 0
    then \@tempdima := depth of \@arstrutbox + LENGTH
      \vrule height 0pt width 0pt depth \@tempdima
      \cr
    else \cr \noalign{\vskip LENGTH}
  END

```

END

`\@tabularcr` and `\@argtabularcr` same as `\@arraycr` and `\@argarraycr`  
except without the extra `$`'s.

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

`\extracolsep` This command needs to expand during the tabular preamble construction so can't be robust.

```
167 \def\extracolsep#1{\tabskip #1\relax}
```

*(End definition for \extracolsep. This function is documented on page ??.)*

`\array`

```
168 \def\array{\let\@acol\@arrayacol \let\@classz\@arrayclassz
```

```
169 \let\@classiv\@arrayclassiv
```

```
170 \let\\\@arraycr\let\@halignto\@empty\@tabarray}
```

*(End definition for \array. This function is documented on page ??.)*

`\endarray`

```
\endtabular 171 \def\endarray{\crrcr\egroup\egroup}
```

```
\endtabular* 172 \def\endtabular{\crrcr\egroup\egroup $\egroup}
```

```
173 \expandafter \let \csname endtabular*\endcsname = \endtabular
```

*(End definition for \endarray, \endtabular, and \endtabular\*. These functions are documented on page ??.)*

`\tabular`

```
174 \def\tabular{\let\@halignto\@empty\@tabular}
```

*(End definition for \tabular. This function is documented on page ??.)*

`\tabular*` Note that the change to use `\setlength` slightly alters the timing of the expansion and use of the length in #1 but this is very unlikely to have any practical effect.

```
175 \@namedef{tabular*}#1{%
```

```
176 \setlength\dimen@{#1}%
```

```
177 \edef\@halignto{to\the\dimen@}\@tabular}
```

*(End definition for \tabular\*. This function is documented on page ??.)*

`\@tabular`

```
178 \def\@tabular{\leavevmode \hbox \bgroup $\let\@acol\@tabacol
```

```
179 \let\@classz\@tabclassz
```

```
180 \let\@classiv\@tabclassiv \let\\\@tabularcr\@tabarray}
```

*(End definition for \@tabular. This function is documented on page ??.)*

`\@tabarray` RmS 91/11/04 added `\m@th`.

```
181 \def\@tabarray{\m@th\ifnextchar[\@array{\@array[c]}}
```

*(End definition for \@tabarray. This function is documented on page ??.)*

RmS 1993/11/03 changed `\halign` to `\ialign` and removed superfluous `\tabskip` assignment

`\@array`

```

182 \def\@array[#1]#2{%
183   \if #1t\vtop \else \if#1b\vbox \else \vcenter \fi\fi

184   \bgroup

```

This next bit of code sets up the strut and then builds the `halign` and its preamble according to the specification in the second argument.

This code has been moved inside the box. A side effect of this has been to expose what was a buglet in the previous version: since the `\@arstrut` below is expanded and contains an `\ifmmode` then it could produce an unnecessary extra box in every row, thus wasting ‘lots of’ main memory.

```

185   \setbox\@arstrutbox\hbox{%
186     \vrule \@height\arraystretch\ht\strutbox
187     \@depth\arraystretch \dp\strutbox
188     \@width\z@}%
189   \@mkpream{#2}%
190   \edef\@preamble{%
191     \ialign \noexpand\@halignto
192     \bgroup \@arstrut \@preamble \tabskip\z@skip \cr}%

```

That is the end of setting up the preamble; now we reset things before executing the `halign` built-up in `\@preamble`. The restorations could be done by introducing an extra group, thus saving tokens.

```

193   \let\@startpbox\@startpbox \let\@endpbox\@endpbox
194   \let\@tabularnewline\%
195   \let\par\@empty
196   \let\@sharp##%
197   \set@typeset@protect
198   \lineskip\z@skip\baselineskip\z@skip

```

If the parsing of the preamble goes wrong there may be some characters left which `TeX` then tries to typeset, i.e., we would be in horizontal mode. That would produce an endless loop because the `\halign` expects vertical mode thus issues a `\par` but that is a no-op at this point. So we better test this case issue some error message and make a crude recovery by ending that horizontal mode with force. A better fix would be to ensure that we never pick up more than a single character token (not done).

```

199   \ifhmode \@preamerr\z@ \@@par\fi
200   \@preamble}

```

*(End definition for \@array. This function is documented on page ??.)*

`\@arraycr` Array version of `\@array`.

```

201 \def\@arraycr{%
202   ${\ifnum0=}\fi\@ifstar\@xarraycr\@xarraycr}

```

*(End definition for \@arraycr. This function is documented on page ??.)*

`\@arraycr`

```

203 \def\@xarraycr{\@ifnextchar[\@argarraycr{\ifnum0=‘{\fi}$}\cr}}

```

*(End definition for \@arraycr. This function is documented on page ??.)*



```

\@argarraycr
204 \def\@argarraycr[#1]{%
205   \ifnum0='{ \fi}$ {} \ifdim #1>\z@ \@xargarraycr{#1}\else
206     \@yargarraycr{#1}\fi}

(End definition for \@argarraycr. This function is documented on page ??.)

\tabularnewline Tabular version of \\.
207 \let\tabularnewline\relax

(End definition for \tabularnewline. This function is documented on page ??.)

\@tabularcr
208 \def\@tabularcr{%
209   {\ifnum0='{ \fi}\ifstar\@xtabularcr\@xtabularcr}

(End definition for \@tabularcr. This function is documented on page ??.)

\@xtabularcr
210 \def\@xtabularcr{\@ifnextchar[\@argtabularcr{\ifnum0='{ \fi}\cr}}

(End definition for \@xtabularcr. This function is documented on page ??.)

\@argtabularcr
211 \def\@argtabularcr[#1]{%
212   \ifnum0='{ \fi}%
213   \ifdim #1>\z@
214     \unskip\@xargarraycr{#1}%
215   \else
216     \@yargarraycr{#1}%
217   \fi}

(End definition for \@argtabularcr. This function is documented on page ??.)

\@xargarraycr
218 \def\@xargarraycr#1{\@tempdima #1\advance\@tempdima \dp \@arstrutbox
219   \vrule \@height\z@ \@depth\@tempdima \@width\z@ \cr}

(End definition for \@xargarraycr. This function is documented on page ??.)

\@yargarraycr
220 \</2ekernel>
221 \< *2ekernel | latexrelease>
222 \< latexrelease>\IncludeInRelease{2020/10/01}%
223 \< latexrelease> \< \@yargarraycr>\{tabular support calc syntax}%
224 \def\@yargarraycr#1{\cr\noalign{\@vspace@calcify{#1}}\cr}
225 \< /2ekernel | latexrelease>
226 \< latexrelease>\EndIncludeInRelease
227 \< latexrelease>\IncludeInRelease{0000/00/00}%
228 \< latexrelease> \< \@yargarraycr>\{tabular support calc syntax}%
229 \< latexrelease>
230 \< latexrelease>\def\@yargarraycr#1{\cr\noalign{\vskip #1}}
231 \< latexrelease>\EndIncludeInRelease
232 \< *2ekernel>

```

(End definition for \@yargarraycr. This function is documented on page ??.)

`\multicolumn` *Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```

\multicolumn{NUMBER}{FORMAT}{ITEM} ==
BEGIN
  \multispan{NUMBER}
  \begingroup
  \@addamp == null
  \@mkpream{FORMAT}
  \@sharp == ITEM
  \protect == \relax
  \@startpbox == \@@startpbox
  \@endpbox == \@@endpbox
  \@arstrut
  \@preamble
  \endgroup
END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

The command `\def\@addamp{}` was removed from `\multicolumn` on 6 Dec 86 because it caused embedded array environments not to work. I think that it was included originally to prevent an error message if the 2nd argument to the `\multicolumn` command had two column specifiers.

8 Feb 89 — `\hbox{}` added after `\@preamble` to correct bug that occurred if `\multicolumn` preceded `\\[D]` with  $D > 0$ , caused by `\\[]` command doing an `\unskip`, which removed `\tabcolsep` glue inserted by `\multicolumn`.

This has been made long so that, for example, a `p`-column can contain multiple paragraphs; maybe the arguments of `@`-expressions should also be able to contain multiple paragraphs.

```

233 \long\def\multicolumn#1#2#3{\multispan{#1}\begingroup
234   \mkpream{#2}%
235   \def\@sharp{#3}\set@typeset@protect
236   \let\@startpbox\@@startpbox\let\@endpbox\@@endpbox
237   \@arstrut \@preamble\hbox{}\endgroup\ignorespaces}

```

(End definition for `\multicolumn`. This function is documented on page ??.)

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

Codes for classes and character numbers of array, tabular and multicolumn arguments.

Character	Class	Number
c	0	0
l	0	1
r	0	2
	1	-
@	2	-
p	3	-
{@-exp}	4	-
{p-arg}	5	-

`\@testpach \foo` : expands `\foo`, which should be an array parameter token, and sets `\@chclass` and `\@chnum` to its class and number. Uses `\@lastchclass` to distinguish 4 and 5

Preamble error codes

0: 'illegal character'  
 1: 'Missing @-exp'  
 2: 'Missing p-arg'

```
\@addamp ==
  BEGIN if \@firstamp = true then \@firstamp := false
        else &                                fi
  END
```

```
\@mkpream TOKENLIST ==
  BEGIN
    \@firstamp      := T
    \@lastchclass   := 6
    \@preamble      == null
    \@sharp         == \relax
    \@protect       == BEGIN \noexpand\protect\noexpand END
    \@startpbox     == \relax
    \@endpbox       == \relax
    \@expast{TOKENLIST}
    for \@nextchar := expand(\reserved@a)
      do \@testpach{\@nextchar}
        case of \@chclass
          0 -> \@classz
          1 -> \@classi
          ...
          5 -> \@classv
        end case
        \@lastchclass := \@chclass
      od
    case of \@lastchclass
      0 -> \hskip \arraycolsep           % lrc
      1 ->                                % l
      2 -> \@preamerr1 % 'Missing @-exp' % @
      3 -> \@preamerr2 % 'Missing p-arg' % p
      4 ->                                % @-exp
      5 -> \hskip \arraycolsep           % p-exp
    end case
  END
```

```
\@arrayclassz ==
  BEGIN
    \@preamble := \@preamble *
    case of \@lastchclass
      0 -> \hskip \arraycolsep \@addamp \hskip \arraycolsep
```

```

        1 -> \@addamp \hskip \arraycolsep
        2 -> % impossible
        3 -> % impossible
        4 -> \@addamp
        5 -> \hskip \arraycolsep \@addamp \hskip \arraycolsep
        6 -> \@addamp \hskip \arraycolsep
    end case
* case of \@chnum
    0 -> \hfil$\relax\@sharp$\hfil
    1 -> $\relax\@sharp$\hfil
    2 -> \hfil$\relax\@sharp$
end case

END

\@tabclassz == similar to \@arrayclassz

\@classi ==
BEGIN
    \@preamble := \@preamble *
    case of \@lastchclass
        0 -> \hskip \arraycolsep \@arrayrule
        1 -> \hskip \doublerulesep \@arrayrule
        2 -> % impossible
        3 -> % impossible
        4 -> \@arrayrule
        5 -> \hskip \arraycolsep \@arrayrule
        6 -> \@arrayrule
    end case
END

\@classii ==
BEGIN
    \@preamble := \@preamble *
    case of \@lastchclass
        0 ->
        1 -> \hskip .5\arrayrulewidth
        2 -> % impossible
        else ->
    end case
END

\@classiii ==
BEGIN
    \@preamble := \@preamble *
    case of \@lastchclass
        0 -> \hskip \arraycolsep \@addamp \hskip \arraycolsep
        1 -> \@addamp \hskip \arraycolsep
        2 -> % impossible
        3 -> % impossible
        4 -> \@addamp

```

```

5 -> \hskip \arraycolsep \@addamp \hskip \arraycolsep
6 -> \@addamp \hskip \arraycolsep
end case

END

\@arrayclassiv ==
  BEGIN \@preamble := \@preamble * $ \@nextchar$ END

\@tabclassiv == same as \@arrayclassv except without the $ ... $

\@classv ==
  BEGIN
    \@preamble :=
      \@preamble * \@startpbox{\@nextchar}\ignorespaces\@sharp
      \@endpbox
  END

\@expast{S}:
  Sets \reserved@a := S with all instances of *{N}{STRING}
  replaced by N copies of STRING, where N > 0. An *
  appearing inside braces is ignored, but *-expressions
  inside STRING are expanded, so nested *-expressions are
  handled properly.

\@expast{S} == BEGIN \@expast S *0x\@@ END

\@expast S1 *{N}{S2} S3 \@@ ==
  BEGIN
    \reserved@a := S1
    \@tempcnta := N
    if \@tempcnta > 0
      then while \@tempcnta > 0 do \reserved@a := \reserved@a S2
        \@tempcnta := \@tempcnta - 1 od
        \reserved@b == \@expast
      else \reserved@b == \@exnoop
    fi
    \expandafter \reserved@b \reserved@a S3 \@@
  END
End of historical LATEX 2.09 comments.

\@exnoop
238 \def\@exnoop #1\@@{}

(End definition for \@exnoop. This function is documented on page ??.)

\@expast
239 \def\@expast#1{\@expast #1*0x\@@}

(End definition for \@expast. This function is documented on page ??.)

```

```

\@xexpast
240 \def\@xexpast#1*#2#3#4\@{\%
241 \edef\reserved@a{#1}%
242 \@tempcnta#2\relax
243 \ifnum\@tempcnta>\z@
244 \@whilenum\@tempcnta>\z@\do
245 {\edef\reserved@a{\reserved@a#3}\advance\@tempcnta \m@ne}%
246 \let\reserved@b\@xexpast
247 \else
248 \let\reserved@b\@xexnoop
249 \fi
250 \expandafter\reserved@b\reserved@a #4\@@}

(End definition for \@xexpast. This function is documented on page ??.)

\if@firstamp
\@addamp 251 \newif\if@firstamp
252 \def\@addamp{%
253 \if@firstamp
254 \@firstampfalse
255 \else
256 \edef\@preamble{\@preamble &}%
257 \fi}

(End definition for \if@firstamp and \@addamp. These functions are documented on page ??.)

\@arrayacol
\@tabacol 258 \def\@arrayacol{\edef\@preamble{\@preamble \hskip \arraycolsep}}
\@ampacol 259 \def\@tabacol{\edef\@preamble{\@preamble \hskip \tabcolsep}}
\@acolampacol 260 \def\@ampacol{\@addamp \@acol}
261 \def\@acolampacol{\@acol\@addamp\@acol}

(End definition for \@arrayacol and others. These functions are documented on page ??.)

\@mkpream
262 \def\@mkpream#1{\@firstamptrue\@lastchclass6
263 \let\@preamble\@empty
264 \let\protect\@unexpandable@protect
265 \let\@sharp\relax
266 \let\@startpbox\relax\let\@endpbox\relax
267 \@expast{#1}%
268 \expandafter\@tfor \expandafter
269 \@nextchar \expandafter:\expandafter=\reserved@a\do
270 {\@testpach\@nextchar
271 \ifcase \@chclass \@classz \or \@classi \or \@classii \or \@classiii
272 \or \@classiv \or \@classv \fi\@lastchclass\@chclass}%
273 \ifcase \@lastchclass \@acol
274 \or \or \@preamerr \@one\or \@preamerr \tw@\or \or \@acol \fi}

(End definition for \@mkpream. This function is documented on page ??.)

```

`\@arrayclassz`

```
275 \def\@arrayclassz{\ifcase \@lastchclass \@acolampacol \or \@ampacol \or
276 \or \or \@addamp \or
277 \@acolampacol \or \@firstampfalse \@acol \fi
278 \edef\@preamble{\@preamble
279 \ifcase \@chnum
280 \hfil$\relax\@sharp$\hfil \or $\relax\@sharp$\hfil
281 \or \hfil$\relax\@sharp$\fi}}
```

*(End definition for \@arrayclassz. This function is documented on page ??.)*

`\@tabclassz` RmS 91/08/14 inserted extra braces around entry for NFSS

```
282 \def\@tabclassz{%
283 \ifcase\@lastchclass
284 \@acolampacol
285 \or
286 \@ampacol
287 \or
288 \or
289 \or
290 \@addamp
291 \or
292 \@acolampacol
293 \or
294 \@firstampfalse\@acol
295 \fi
296 \edef\@preamble{%
297 \@preamble{%
298 \ifcase\@chnum
299 \hfil
300 \hskip1sp%
301 \ignorespaces\@sharp\unskip\hfil
302 \or
303 \hskip1sp\ignorespaces\@sharp\unskip\hfil
304 \or
305 \hfil\hskip1sp\ignorespaces\@sharp\unskip
306 \fi}}}
```

*(End definition for \@tabclassz. This function is documented on page ??.)*

`\@classi`

```
307 \def\@classi{%
308 \ifcase\@lastchclass
309 \@acol\@arrayrule
310 \or
311 \@addtopreamble{\hskip \doublerulesep}\@arrayrule
312 \or
313 \or
314 \or
315 \@arrayrule
316 \or
317 \@acol\@arrayrule
318 \or
```

```

319     \@arrayrule
320     \fi}

```

*(End definition for \@classi. This function is documented on page ??.)*

**\@classii**

```

321 \def\@classii{%
322   \ifcase\@lastchclass
323   \or
324   \@addtopreamble{\hskip .5\arrayrulewidth}%
325   \fi}

```

*(End definition for \@classii. This function is documented on page ??.)*

**\@classiii**

```

326 \def\@classiii{\ifcase \@lastchclass \@acolampacol \or
327   \@addamp\@acol \or
328   \or \or \@addamp \or
329   \@acolampacol \or \@ampacol \fi}

```

*(End definition for \@classiii. This function is documented on page ??.)*

**\@tabclassiv**

```

330 \def\@tabclassiv{\@addtopreamble\@nextchar}

```

*(End definition for \@tabclassiv. This function is documented on page ??.)*

**\@arrayclassiv**

```

331 \def\@arrayclassiv{\@addtopreamble{\@nextchar$}}

```

*(End definition for \@arrayclassiv. This function is documented on page ??.)*

**\@classv**

```

332 \def\@classv{\@addtopreamble{\@startpbox{\@nextchar}\ignorespaces
333   \@sharp\@endpbox}}

```

*(End definition for \@classv. This function is documented on page ??.)*

**\@addtopreamble**

```

334 \def\@addtopreamble#1{\edef\@preamble{\@preamble #1}}

```

*(End definition for \@addtopreamble. This function is documented on page ??.)*

**\@chclass**

**\@lastchclass**

**\@chnum**

```

335 \newcount\@chclass
336 \newcount\@lastchclass
337 \newcount\@chnum

```

*(End definition for \@chclass, \@lastchclass, and \@chnum. These functions are documented on page ??.)*

**\arraycolsep**

**\tabcolsep**

**\arrayrulewidth**

**\doublerulesep**

```

338 \newdimen\arraycolsep
339 \newdimen\tabcolsep
340 \newdimen\arrayrulewidth
341 \newdimen\doublerulesep

```



(End definition for `\arraycolsep` and others. These functions are documented on page ??.)

`\arraystretch`

```
342 \def\arraystretch{1} % Default value.
```

(End definition for `\arraystretch`. This function is documented on page ??.)

`\@arstrutbox`

`\@arstrut`

```
343 \newbox\@arstrutbox
```

```
344 \def\@arstrut{%
```

```
345 \relax\ifmmode\copy\@arstrutbox\else\unhcopy\@arstrutbox\fi}
```

(End definition for `\@arstrutbox` and `\@arstrut`. These functions are documented on page ??.)

`\@arrayrule`

```
346 \def\@arrayrule{\@addtopreamble{\hskip -.5\arrayrulewidth
```

```
347 \vrule \@width \arrayrulewidth\hskip -.5\arrayrulewidth}}
```

(End definition for `\@arrayrule`. This function is documented on page ??.)

`\@testpatch`

```
348 \def\@testpach#1{\@chclass \ifnum \@lastchclass=\tw@ 4 \else
```

```
349 \ifnum \@lastchclass=3 5 \else
```

```
350 \z@ \if #1c\@chnum \z@ \else
```

```
351 \if #1l\@chnum \@ne \else
```

```
352 \if #1r\@chnum \tw@ \else
```

```
353 \@chclass \if #1|\@ne \else
```

```
354 \if #1@\tw@ \else
```

```
355 \if #1p3 \else \z@ \@preamerr 0\fi
```

```
356 \fi \fi \fi \fi \fi \fi
```

```
357 \fi}
```

(End definition for `\@testpatch`. This function is documented on page ??.)

`\hline`

```
358 \def\hline{%
```

```
359 \noalign{\ifnum0='}\fi\hrule \@height \arrayrulewidth \futurelet
```

```
360 \reserved@a\@xhline}
```

(End definition for `\hline`. This function is documented on page ??.)

`\@xhline`

```
361 \def\@xhline{\ifx\reserved@a\hline
```

```
362 \vskip\doublerulesep
```

Measure from the middle of the rules.

```
363 \vskip-\arrayrulewidth
```

```
364 \fi
```

```
365 \ifnum0='{ \fi}}
```

(End definition for `\@xhline`. This function is documented on page ??.)

`\vline`

```
366 \def\vline{\vrule \@width \arrayrulewidth}
```

(End definition for `\vline`. This function is documented on page ??.)

`\cline` The old L<sup>A</sup>T<sub>E</sub>X2.09 implementation of `\cline` used up quite a lot of memory and two precious count registers. This new (1995/09/14) implementation does not use any count registers. It is coded in a way that depends heavily on the definition of `\multispan` so that command has been moved here from the file `ltplain.dtx`.

These counters are no longer declared.

```
\newcount\@cla
```

```
\newcount\@clb
```

```
367 \def\cline#1{\@cline#1\@nil}
```

```
368 \def\@cline#1-#2\@nil{%
```

```
369 \omit
```

Use the counter from `\multispan`.

```
370 \@multicnt#1%
```

```
371 \advance\@multispan\m@ne
```

```
372 \ifnum\@multicnt=\@ne\@firstofone{&\omit}\fi
```

```
373 \@multicnt#2%
```

```
374 \advance\@multicnt-#1%
```

```
375 \advance\@multispan\@ne
```

The original had `\unskip` at this point, but how could a skip get here ???

```
376 \leaders\hrule\@height\arrayrulewidth\hfill
```

```
377 \cr
```

This is back spacing is fairly horrible, but it is what happened in the old version... An alternative would be to make `\cline` look ahead for a following `\cline` as does `\hline`. This would alter the spacing in existing documents so keep the old version in the kernel. Perhaps a package should do this differently.

```
378 \noalign{\vskip-\arrayrulewidth}}
```

*(End definition for `\cline` and `\@cline`. These functions are documented on page ??.)*

`\mscount` The `\mscount` counter is no longer declared, saving a csname and a register. It is declared in compatibility mode.

*(End definition for `\mscount`. This function is documented on page ??.)*

`\multispan` Modify `\multispan` slightly from its plain T<sub>E</sub>X definition to allow more efficient code sharing with `\multicolumn`. Also share a count register with `\multipt`.

```
\@multispan \sp@n 379 \def\multispan{\omit\@multispan}
```

```
380 \def\@multispan#1{%
```

```
381 \@multicnt#1\relax
```

```
382 \loop\ifnum\@multicnt>\@ne \sp@n\repeat}
```

```
383 \def\sp@n{\span\omit\advance\@multicnt\m@ne}
```

*(End definition for `\multispan`, `\@multispan`, and `\sp@n`. These functions are documented on page ??.)*

`\@startpbox` Helper macros for ‘p’ columns.

```
\@endpbox \@startpbox{<width>} text \egroup is essentially \parbox{<width>}{<text>}
```

`\@endpbox` is essentially `\unskip \strut \par \egroup\hfil` (Changed 14 Jan 89) (changed again 1994/05/13)

```
384 \def\@startpbox#1{\vtop\bgroup \setlength\hsize{#1}\@arrayparboxrestore}
```

```
385 \def\@endpbox{\@finalstrut\@arstrutbox\par\egroup\hfil}
```

14 Jan 89: Def of \@endpbox changed from  
`\def\@endpbox{\par\vskip\dp\@arstrutbox\egroup\hfil}`  
so vertical spacing works out right if the last line of a ‘p’ entry has a descender.

*(End definition for \@startpbox and \@endpbox. These functions are documented on page ??.)*

```
\@@startpbox
```

```
\@@endpbox
```

```
386 \let\@@startpbox=\@startpbox
```

```
387 \let\@@endpbox=\@endpbox
```

*(End definition for \@@startpbox and \@@endpbox. These functions are documented on page ??.)*

```
388 </2ekernel>
```

# File I

## ltpictur.dtx

### 1 Picture Mode

Picture mode commands. In addition to the commands available in L<sup>A</sup>T<sub>E</sub>X2.09, This section adds the new `\qbezier` command for drawing curves.

`\qbezier` `\qbezier[ $N$ ]( $\langle AX,AY \rangle$ )( $\langle BX,BY \rangle$ )( $\langle CX,CY \rangle$ )` plots a quadratic Bezier curve from ( $\langle AX,AY \rangle$ ) to ( $\langle CX,CY \rangle$ ), with ( $\langle BX,BY \rangle$ ) as the third Bezier point, using  $N+1$  points equally spaced parametrically. If  $N = 0$  (the default value), then a sufficient number of points are used to draw a connected curve—except that at most `\qbeziermax+1` points are drawn. A “point” is a square of side `\@wholewidth`.

`\bezier` In addition, to be compatible with the old `bezier` package, a variant of this command, `\bezier`, is defined, in which the first argument is not optional.

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

<code>\unitlength</code>	= value of dimension argument
<code>\@wholewidth</code>	= current line width
<code>\@halfwidth</code>	= half of current line width
<code>\@linefnt</code>	= font for drawing lines
<code>\@circlefnt</code>	= font for drawing circles

`\linethickness{DIM}` : Sets the width of horizontal and vertical lines in a picture to DIM. Does not change width of slanted lines or circles. Width of all lines reset by `\thinlines` and `\thicklines`

```

\picture(XSIZE,YSIZE)(XORG,YORG)
  BEGIN
    \@picht :=L YSIZE * \unitlength
    box \@picbox :=
      \hb@xt@ XSIZE * \unitlength
      {\hskip -XORG * \unitlength
       \lower YORG * \unitlength
       \hbox{
         \ignorespaces      %% added 13 June 89
       }
      }
  END

\endpicture ==
  BEGIN
    } \hss }
    height of \@picbox := \@picht
    depth of \@picbox := 0
    \mbox{\box\@picbox}    %% change 26 Aug 91
  END

```

```

\put(X, Y){OBJ} ==
  BEGIN

```

```

\@killglue
\raise Y * \unitlength \hb@xt@ 0pt { \hskip X * \unitlength
                                OBJ \hss      }

\ignorespaces
END

\multiput(X,Y)(DELX,DELY){N}{OBJ} ==
BEGIN
\@killglue
\@multicnt := N
\@xdim := X * \unitlength
\@ydim := Y * \unitlength
while \@multicnt > 0
do \raise \@ydim \hb@xt@ 0pt { \hskip \@xdim
                                OBJ \hss      }

\@multicnt := \@multicnt - 1
\@xdim := \@xdim + DELX * \unitlength
\@ydim := \@ydim + DELY * \unitlength
od
\ignorespaces
END

```

`\shortstack[POS]{TEXT}` : Makes a `\vbox` containing TEXT stacked as a one-column array, positioned l, r or c as indicated by POS.

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

The ‘2ekernel’ code ensures that a `\usepackage{autopict}` is essentially ignored if a ‘full’ format is being used that has picture mode already in the format.

```
1 \<2ekernel>\expandafter\let\csname ver@autopict.sty\endcsname\fmtversion
```

```

\@wholewidth
\@halfwidth 2 \<*2ekernel>
3 \newdimen\@wholewidth
4 \newdimen\@halfwidth

```

*(End definition for \@wholewidth and \@halfwidth. These functions are documented on page ??.)*

```

\unitlength
5 \newdimen\unitlength \unitlength =1pt

```

*(End definition for \unitlength. This function is documented on page ??.)*

```

\@picbox
\@picht 6 \newbox\@picbox
7 \newdimen\@picht

```

*(End definition for \@picbox and \@picht. These functions are documented on page ??.)*

`\@defaultunitsset` Set a length register, #1, accepting number or an etex length expression, #2, with default unit, #3.

The register name in #1 can be prefixed by `\advance` so that the register is incremented by the supplied value.

`\@defaultunitsset{\advance\@vxx}{\textwidth-15pt}\unitlength`

#3 can be a literal unit such as `cm` or a length register such as `\unitlength`.

This is used in all `picture` commands that take picture coordinates. So `\put(2,2)` as previously but now `\put(\textwidth-5cm,0.4\textheight)` Note that you can only use expressions with lengths, `\put(1+2,0)` is not supported.

```

8 </2ekernel>
9 <*2ekernel | latexrelease>
10 <latexrelease>\IncludeInRelease{2020/10/01}%
11 <latexrelease>          {\@defaultunitsset}{default units}%
12 \def\@defaultunitsset#1#2#3{%
13   \@defaultunits#1\dimexpr#2#3\relax\relax\@nnil}
14 </2ekernel | latexrelease>

15 <latexrelease>\EndIncludeInRelease
16 <latexrelease>\IncludeInRelease{0000/00/00}%
17 <latexrelease>          {\@defaultunitsset}{default units}%
18 <latexrelease>\let\@defaultunitsset\undefined
19 <latexrelease>\EndIncludeInRelease
20 <*2ekernel>

```

*(End definition for \@defaultunitsset. This function is documented on page ??.)*

`\picture` #1 should be white space.

#1 should be a ( (eating any white space before the bracket),

```

\pictur@
21 \long\def\picture#1{\pictur@#1}
22 \def\pictur@(#1){%
23   \ifnextchar({\@picture(#1)}{\@picture(#1)(0,0)}}

```

*(End definition for \picture and \pictur@. These functions are documented on page ??.)*

`\@picture`

```

24 </2ekernel>
25 <*2ekernel | latexrelease>
26 <latexrelease>\IncludeInRelease{2020/10/01}%
27 <latexrelease>          {\@picture}{default units}%
28 \def\@picture(#1,#2)(#3,#4){%
29   \@defaultunitsset\@picht{#2}\unitlength
30   \@defaultunitsset\@tempdimc{#1}\unitlength
31   \setbox\@picbox\hbext@\@tempdimc\bgroup
32     \@defaultunitsset\@tempdimc{#3}\unitlength
33     \hskip -\@tempdimc
34     \@defaultunitsset\@tempdimc{#4}\unitlength
35     \lower\@tempdimc\hbox\bgroup
36     \ignorespaces}
37 </2ekernel | latexrelease>

```

```

38 <latexrelease>\EndIncludeInRelease
39 <latexrelease>\IncludeInRelease{0000/00/00}%
40 <latexrelease>          {\@picture}{default units}%
41 <latexrelease>\def\@picture(#1,#2)(#3,#4){%
42 <latexrelease>  \@picht#2\unitlength
43 <latexrelease>  \setbox\@picbox\hb@xt@#1\unitlength\bgroup
44 <latexrelease>    \hskip -#3\unitlength
45 <latexrelease>    \lower #4\unitlength\hbox\bgroup
46 <latexrelease>      \ignorespaces}
47 <latexrelease>\EndIncludeInRelease
48 <*2ekernel>

```

(End definition for \@picture. This function is documented on page ??.)

\endpicture

```

49 \def\endpicture{%
50   \egroup\hss\egroup
51   \ht\@picbox\@picht\dp\@picbox\z@
52   \mbox{\box\@picbox}}

```

(End definition for \endpicture. This function is documented on page ??.)

In the definitions of \put and \multiput, \hskip was replaced by \kern just in case arg #3 = “plus”. (Bug detected by Don Knuth. changed 20 Jul 87).

```

53 </2ekernel>
54 <*2ekernel | latexrelease>
55 <latexrelease>\IncludeInRelease{2020/10/01}%
56 <latexrelease>          {\put}{default units}%
57 <latexrelease>\expandafter\let\csname put \endcsname \@undefined
58 \long\def\put(#1,#2)#3{%
59   \@killglue
60   \@defaultunitsset\@tempdimc{#2}\unitlength
61   \raise\@tempdimc
62   \hb@xt@\z@{%
63     \@defaultunitsset\@tempdimc{#1}\unitlength
64     \kern\@tempdimc
65     #3\hss}%
66   \ignorespaces}
67 </2ekernel | latexrelease>
68 <latexrelease>\EndIncludeInRelease
69 <latexrelease>\IncludeInRelease{0000/00/00}%
70 <latexrelease>          {\put}{default units}%
71 <latexrelease>\expandafter\let\csname put \endcsname \@undefined
72 <latexrelease>\long\def\put(#1,#2)#3{%
73 <latexrelease>  \@killglue\raise#2\unitlength
74 <latexrelease>  \hb@xt@\z@{\kern#1\unitlength #3\hss}%
75 <latexrelease>  \ignorespaces}
76 <latexrelease>\EndIncludeInRelease
77 <*2ekernel>

```

\multiput #3 had better be a (.

```

78 </2ekernel>
79 <*2ekernel | latexrelease>
80 <latexrelease>\IncludeInRelease{2020/10/01}%

```

```

81 <latexrelease>                {\multiput}{default units}%
82 <latexrelease>\expandafter\let\csname multiput \endcsname \@undefined
83 \def\multiput(#1,#2)#3{%
84   \@defaultunitsset\@xdim{#1}\unitlength
85   \@defaultunitsset\@ydim{#2}\unitlength
86   \@multiput{ }
87 </2ekernel | latexrelease>

88 <latexrelease>\EndIncludeInRelease
89 <latexrelease>\IncludeInRelease{0000/00/00}%
90 <latexrelease>                {\multiput}{default units}%
91 <latexrelease>\expandafter\let\csname multiput \endcsname \@undefined
92 <latexrelease>\def\multiput(#1,#2)#3{%
93 <latexrelease>   \@xdim #1\unitlength
94 <latexrelease>   \@ydim #2\unitlength
95 <latexrelease>   \@multiput{ }
96 <latexrelease>\EndIncludeInRelease
97 <*2ekernel>

```

(End definition for \multiput. This function is documented on page ??.)

\@multiput

```

98 </2ekernel>
99 <*2ekernel | latexrelease>
100 <latexrelease>\IncludeInRelease{2020/10/01}%
101 <latexrelease>                {\@multiput}{default units}%
102 \long\def\@multiput(#1,#2)#3#4{%
103   \@killglue\@multicnt #3\relax
104   \@whilenum \@multicnt >\z@ \do
105     {\raise\@ydim\hb@xt@{\z@{\kern\@xdim #4\hss}}%
106      \advance\@multicnt\m@ne
107      \@defaultunitsset{\advance\@xdim}{#1}\unitlength
108      \@defaultunitsset{\advance\@ydim}{#2}\unitlength}%
109   \ignorespaces}
110 </2ekernel | latexrelease>

111 <latexrelease>\EndIncludeInRelease
112 <latexrelease>\IncludeInRelease{0000/00/00}%
113 <latexrelease>                {\@multiput}{default units}%
114 <latexrelease>\long\def\@multiput(#1,#2)#3#4{%
115 <latexrelease>   \@killglue\@multicnt #3\relax
116 <latexrelease>   \@whilenum \@multicnt >\z@ \do
117 <latexrelease>     {\raise\@ydim\hb@xt@{\z@{\kern\@xdim #4\hss}}%
118 <latexrelease>      \advance\@multicnt\m@ne
119 <latexrelease>      \advance\@xdim#1\unitlength\advance\@ydim#2\unitlength}%
120 <latexrelease>   \ignorespaces}
121 <latexrelease>\EndIncludeInRelease
122 <*2ekernel>

```

(End definition for \@multiput. This function is documented on page ??.)

\@killglue

```

123 \def\@killglue{\unskip\@whiledim \lastskip >\z@ \do{\unskip}}

```

(End definition for \@killglue. This function is documented on page ??.)



```

\thinlines
\thicklines
124 \DeclareRobustCommand\thinlines{\let\@linefnt\tenln
125 \let\@circlefnt\tencirc
126 \@wholewidth\fontdimen8\tenln \@halfwidth .5\@wholewidth}
127 \DeclareRobustCommand\thicklines{\let\@linefnt\tenlnw
128 \let\@circlefnt\tencircw
129 \@wholewidth\fontdimen8\tenlnw \@halfwidth .5\@wholewidth}

(End definition for \thinlines and \thicklines. These functions are documented on page ??.)

\linethickness

130 \DeclareRobustCommand*\linethickness[1]
131 {\@wholewidth #1\relax \@halfwidth .5\@wholewidth \ignorespaces}

(End definition for \linethickness. This function is documented on page ??.)

\ishortstack

132 \def\shortstack{\@ifnextchar[\@shortstack{\@shortstack[c]}}

(End definition for \ishortstack. This function is documented on page ??.)

\@ishortstack

133 \def\@shortstack[#1]{%
134 \leavevmode
135 \vbox\bgroup
136 \baselineskip-\p@\lineskip 3\p@
137 \let\mb@l\hss\let\mb@r\hss
138 \expandafter\let\csname mb@#1\endcsname\relax
139 \let\\\@stackcr
140 \@ishortstack}

(End definition for \@ishortstack. This function is documented on page ??.)

\@ishortstack

141 \def\@ishortstack#1{\ialign{\mb@l {##}\unskip\mb@r\cr #1\cr}\egroup}

(End definition for \@ishortstack. This function is documented on page ??.)

\@stackcr
\@ixstackcr
142 \def\@stackcr{\@ifstar\@ixstackcr\@ixstackcr}
143 \def\@ixstackcr{\@ifnextchar[\@istackcr{\cr\ignorespaces}}

(End definition for \@stackcr and \@ixstackcr. These functions are documented on page ??.)

\@istackcr

144 </2ekernel>
145 <*2ekernel | latexrelease>
146 <latexrelease>\IncludeInRelease{2020/10/01}%
147 <latexrelease> {\@istackcr}{\shortstack calc support}%
148 \def\@istackcr[#1]{\cr\noalign{\@vspace@calcify{#1}}\ignorespaces}
149 </2ekernel | latexrelease>

```

```

150 <latexrelease>\EndIncludeInRelease
151 <latexrelease>\IncludeInRelease{0000/00/00}%
152 <latexrelease>                {\@istackcr}{\shortstack calc support}%
153 <latexrelease>
154 <latexrelease>\def\@istackcr[#1]{\cr\noalign{\vskip #1}\ignorespaces}
155 <latexrelease>\EndIncludeInRelease
156 <*2ekernel>

```

(End definition for \@istackcr. This function is documented on page ??.)

Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):

```

\line(X,Y){LEN} ==
BEGIN
  \@xarg      := X
  \@yarg      := Y
  \@linelen := LEN * \unitlength
  if \@xarg = 0
    then \vline
  else if \@yarg = 0
    then \hline
  else \sline
    if
      if
        END

\sline ==
BEGIN
  if \@xarg < 0
    then @negarg := T
        \@xarg  := -\@xarg
        \@yyarg := -\@yarg
    else @negarg := F
        \@yyarg := \@yarg
  fi
  \@tempcnta := |\@yyarg|
  if \@tempcnta > 6
    then error: 'LATEX ERROR: Illegal \line or \vector argument.'
        \@tempcnta := 0
  fi
  \box\@linechar := \hbox{\@linefnt \@getlinechar(\@xarg,\@yyarg) }
  if \@yarg > 0 then \@upordown = \raise
    \@clnht := 0
  else \@upordown = \lower
    \@clnht := height of \box\@linechar
  fi
  \@clnwd := width of \box\@linechar
  if @negarg
    then \hskip - width of \box\@linechar
        \reserved@a == \hskip - 2* width of box \@linechar
    else \reserved@a == \relax
  fi
  %% Put out integral number of line segments

```

```

while \@clnwd < \@linelen
do
  \@upordown \@clnht \copy\@linechar
  \reserved@a
  \@clnht := \@clnht + ht of \box\@linechar
  \@clnwd := \@clnwd + width of \box\@linechar
od

%% Put out last segment
\@clnht := \@clnht - height of \box\@linechar
\@clnwd := \@clnwd - width of \box\@linechar
\@tempdima := \@linelen - \@clnwd
\@tempdimb := \@tempdima - width of \box\@linechar
if @negarg then \hskip -\@tempdimb
else \hskip \@tempdimb
fi
\@tempdima := 1000 * \@tempdima
\@tempcnta := \@tempdima / width of \box\@linechar
\@tempdima := (\@tempcnta * ht of \box\@linechar)/1000
\@clnht := \@clnht + \@tempdima
if \@linelen < width of \box\@linechar
then \hskip width of \box\@linechar
else \hbox{\@upordown \@clnht \copy\@linechar}
fi
END

\@hline ==
BEGIN
if \@xarg < 0 then \hskip -\@linelen \fi
\vrule height \@halfwidth depth \@halfwidth width \@linelen
if \@xarg < 0 then \hskip -\@linelen \fi
END

\@vline == if \@yarg < 0 \@downline else \@upline fi

\@getlinechar(X,Y) ==
BEGIN
\@tempcnta := 8*X - 9
if Y > 0
then \@tempcnta := \@tempcnta + Y
else \@tempcnta := \@tempcnta - Y + 64
fi
\char\@tempcnta
END

\vector(X,Y){LEN} ==
BEGIN
\@xarg := X
\@yarg := Y
\@linelen := LEN * \unitlength

```

```

if \@xarg = 0
  then \@vvector
  else if \@yarg = 0
    then \@hvector
    else \@svector
  if
if
END

\@hvector ==
BEGIN
  \@hline
  {\@linefmt if \@xarg < 0 then \@getlarrow(1,0)
    else \@getrarrow(1,0)
  fi}
END

\@vvector == if \@yarg < 0 \@downvector else \@upvector fi

\@svector ==
BEGIN
  \@sline
  \@tempcnta := | \@yarg |
  if \@tempcnta < 5
    then \hskip - width of \box\@linechar
      \@upordown \@clnht \hbox
        {\@linefmt
          if @negarg then \@getlarrow(\@xarg,\@yyarg)
            else \@getrarrow(\@xarg,\@yyarg)
          fi }
    else error: 'LATEX ERROR: Illegal \line or \vector argument.'
  fi
END

\@getlarrow(X,Y) ==
BEGIN
  if Y = 0
    then \@tempcnta := '33
  else \@tempcnta := 16 * X - 9
    \@tempcntb := 2 * Y
    if \@tempcntb > 0
      then \@tempcnta := \@tempcnta + \@tempcntb
      else \@tempcnta := \@tempcnta - \@tempcntb + 64
    fi
  fi
  \char\@tempcnta
END

\@getrarrow(X,Y) ==
BEGIN

```

```

\@tempcntb := |Y|
case of \@tempcntb
  0 : \@tempcnta := '55
  1 : if X < 3
      then \@tempcnta := 24*X - 6
      else if X = 3
          then \@tempcnta := 49
          else \@tempcnta := 58 fi
      fi
  2 : if X < 3
      then \@tempcnta := 24*X - 3
      else \@tempcnta := 51 % X must = 3
      fi
  3 : \@tempcnta := 16*X - 2
  4 : \@tempcnta := 16*X + 7
endcase
if Y < 0
  then \@tempcnta := \@tempcnta + 64
  fi
\char\@tempcnta
END
End of historical LATEX 2.09 comments.

```

\if@negarg

```
157 \newif\if@negarg
```

(End definition for \if@negarg. This function is documented on page ??.)

\line

```

158 </2ekernel>
159 <*2ekernel | latexrelease>
160 <latexrelease>\IncludeInRelease{2020/10/01}%
161 <latexrelease>          {\line}{default units}%
162 <latexrelease>\expandafter\let\csname line \endcsname\@undefined
163 \def\line(#1,#2)#3{\@xarg #1\relax \@yarg #2\relax
164   \@defaultunitsset\@linelen{#3}\unitlength
165   \ifdim\@linelen<\z@\@badlinearg\else
166     \ifnum\@xarg =\z@ \@vline
167     \else \ifnum\@yarg =\z@ \@hline \else \@sline\fi
168   \fi
169   \fi}
170 </2ekernel | latexrelease>

171 <latexrelease>\EndIncludeInRelease
172 <latexrelease>\IncludeInRelease{0000/00/00}%
173 <latexrelease>          {\line}{default units}%
174 <latexrelease>\expandafter\let\csname line \endcsname\@undefined
175 <latexrelease>\def\line(#1,#2)#3{\@xarg #1\relax \@yarg #2\relax
176 <latexrelease>  \@linelen #3\unitlength
177 <latexrelease>  \ifdim\@linelen<\z@\@badlinearg\else
178 <latexrelease>    \ifnum\@xarg =\z@ \@vline
179 <latexrelease>    \else \ifnum\@yarg =\z@ \@hline \else \@sline\fi
180 <latexrelease>    \fi

```

```

181 <latexrelease> \fi}
182 <latexrelease>\EndIncludeInRelease
183 <*2ekernel>

```

(End definition for \line. This function is documented on page ??.)

\@sline

```

184 \def\@sline{%
185   \ifnum\@xarg<\z@ \@negargtrue \@xarg -\@xarg \@yyarg -\@yarg
186   \else \@negargfalse \@yyarg \@yarg \fi
187   \ifnum \@yyarg >\z@ \@tempcnta\@yyarg \else \@tempcnta -\@yyarg \fi
188   \ifnum\@tempcnta>6 \@badlinearg\@tempcnta\z@ \fi
189   \ifnum\@xarg>6 \@badlinearg\@xarg \@ne \fi
190   \setbox\@linechar\hbox{\@linefnt\@getlinechar(\@xarg,\@yyarg)}%

```

If we have something like \line(5,5){30} the \@linechar will not contain a char and later on we will end in an infinite loop. So we check the width of the box and put in something as an emergency fix if necessary.

```

191   \ifdim\wd\@linechar=\z@
192     \setbox\@linechar\hbox{.}%
193     \@badlinearg
194   \fi
195   \ifnum \@yarg >\z@ \let\@upordown\raise \@clnht\z@
196   \else\let\@upordown\lower \@clnht \ht\@linechar\fi
197   \@clnwd \wd\@linechar
198   \if@negarg
199     \hskip -\wd\@linechar \def\reserved@a{\hskip -2\wd\@linechar}%
200   \else
201     \let\reserved@a\relax
202   \fi
203   \@whiledim \@clnwd <\@linelen \do
204   {\@upordown\@clnht\copy\@linechar
205     \reserved@a
206     \advance\@clnht \ht\@linechar
207     \advance\@clnwd \wd\@linechar}%
208   \advance\@clnht -\ht\@linechar
209   \advance\@clnwd -\wd\@linechar
210   \@tempdima\@linelen\advance\@tempdima -\@clnwd
211   \@tempdimb\@tempdima\advance\@tempdimb -\wd\@linechar
212   \if@negarg \hskip -\@tempdimb \else \hskip \@tempdimb \fi
213   \multiply\@tempdima \@m
214   \@tempcnta \@tempdima
215   \@tempdima \wd\@linechar \divide\@tempcnta \@tempdima
216   \@tempdima \ht\@linechar \multiply\@tempdima \@tempcnta
217   \divide\@tempdima \@m
218   \advance\@clnht \@tempdima
219   \ifdim \@linelen <\wd\@linechar
220     \hskip \wd\@linechar

```

Warn if line gets so short that it can't be printed. But don't warn if it is exactly zero since that was probably deliberate (e.g., to get a vector head only).

```

221   \ifdim \@linelen = \z@
222   \else
223     \@picture@warn
224   \fi

```

```
225 \else\@upordown\@clnht\copy\@linechar\fi}
```

(End definition for \sline. This function is documented on page ??.)

\@hline

```
226 \def\@hline{\ifnum \@xarg <\z@ \hskip -\@linelen \fi
227 \vrule \@height \@halfwidth \@depth \@halfwidth \@width \@linelen
228 \ifnum \@xarg <\z@ \hskip -\@linelen \fi}
```

(End definition for \@hline. This function is documented on page ??.)

\@getlinechar

```
229 \def\@getlinechar(#1,#2){\@tempcnta#1\relax\multiply\@tempcnta 8%
230 \advance\@tempcnta -9\ifnum #2>\z@ \advance\@tempcnta #2\relax\else
231 \advance\@tempcnta -#2\relax\advance\@tempcnta 64 \fi
232 \char\@tempcnta}
```

(End definition for \@getlinechar. This function is documented on page ??.)

\vector

```
233 \</2ekernel>
234 \*2ekernel | latexrelease>
235 \<latexrelease>\IncludeInRelease{2020/10/01}%
236 \<latexrelease> \{\vector\}{default units}%
237 \<latexrelease>\expandafter\let\csname vector \endcsname\@undefind
238 \def\vector(#1,#2)#3{\@xarg #1\relax \@yarg #2\relax
239 \@tempcnta \ifnum\@xarg<\z@ -\@xarg\else\@xarg\fi
240 \ifnum\@tempcnta<5\relax
241 \@defaultunitsset\@linelen{#3}\unitlength
242 \ifdim\@linelen<\z@\@badlinearg\else
243 \ifnum\@xarg =\z@ \@vvector
244 \else \ifnum\@yarg =\z@ \@hvector \else \@svector\fi
245 \fi
246 \fi
247 \else\@badlinearg\fi}
248 \</2ekernel | latexrelease>
249 \<latexrelease>\EndIncludeInRelease
250 \<latexrelease>\IncludeInRelease{0000/00/00}%
251 \<latexrelease> \{\vector\}{default units}%
252 \<latexrelease>\expandafter\let\csname vector \endcsname\@undefind
253 \<latexrelease>\def\vector(#1,#2)#3{\@xarg #1\relax \@yarg #2\relax
254 \<latexrelease> \@tempcnta \ifnum\@xarg<\z@ -\@xarg\else\@xarg\fi
255 \<latexrelease> \ifnum\@tempcnta<5\relax
256 \<latexrelease> \@linelen #3\unitlength
257 \<latexrelease> \ifdim\@linelen<\z@\@badlinearg\else
258 \<latexrelease> \ifnum\@xarg =\z@ \@vvector
259 \<latexrelease> \else \ifnum\@yarg =\z@ \@hvector \else \@svector\fi
260 \<latexrelease> \fi
261 \<latexrelease> \fi
262 \<latexrelease> \else\@badlinearg\fi}
263 \<latexrelease>\EndIncludeInRelease
264 \*2ekernel>
```

(End definition for \vector. This function is documented on page ??.)

`\@hvector`

```
265 \def\@hvector{\@hline\hb@xt@{z@{\@linefnt
266 \ifnum \@xarg <z@ \@getlarrow(1,0)\hss\else
267 \hss\@getrarrow(1,0)\fi}}
```

(End definition for \@hvector. This function is documented on page ??.)

`\@vvector`

```
268 \def\@vvector{\ifnum \@yarg <z@ \@downvector \else \@upvector \fi}
```

(End definition for \@vvector. This function is documented on page ??.)

`\@svector`

```
269 \def\@svector{\@sline
270 \@tempcnta\@yarg \ifnum\@tempcnta <z@ \@tempcnta -\@tempcnta\fi
271 \ifnum\@tempcnta <5%
272 \hskip -\wd\@linechar
273 \@upordown\@clnht \hbox{\@linefnt \if@negarg
274 \@getlarrow(\@xarg,\@yyarg)\else \@getrarrow(\@xarg,\@yyarg)\fi}%
275 \else\@badlinearg\fi}
```

(End definition for \@svector. This function is documented on page ??.)

`\@getlarrow`

```
276 \def\@getlarrow(#1,#2){\ifnum #2=z@ \@tempcnta 27 % '33
277 \else
278 \@tempcnta #1\relax\multiply\@tempcnta \sixt@@n
279 \advance\@tempcnta -9 \@tempcntb #2\relax\multiply\@tempcntb \tw@
280 \ifnum \@tempcntb >z@ \advance\@tempcnta \@tempcntb
281 \else\advance\@tempcnta -\@tempcntb\advance\@tempcnta 64
282 \fi\fi\char\@tempcnta}
```

(End definition for \@getlarrow. This function is documented on page ??.)

`\@getrarrow`

```
283 \def\@getrarrow(#1,#2){\@tempcntb #2\relax
284 \ifnum\@tempcntb <z@ \@tempcntb -\@tempcntb\relax\fi
285 \ifcase \@tempcntb\relax \@tempcnta 45 % '55
286 \or
287 \ifnum #1<\thr@@ \@tempcnta #1\relax\multiply\@tempcnta
288 24\advance\@tempcnta -6 \else \ifnum #1=\thr@@ \@tempcnta 49
289 \else\@tempcnta 58 \fi\fi\or
290 \ifnum #1<\thr@@ \@tempcnta=#1\relax\multiply\@tempcnta
291 24\advance\@tempcnta -\thr@@ \else \@tempcnta 51 \fi\or
292 \@tempcnta #1\relax\multiply\@tempcnta
293 \sixt@@n \advance\@tempcnta -\tw@ \else
294 \@tempcnta #1\relax\multiply\@tempcnta
295 \sixt@@n \advance\@tempcnta 7 \fi\ifnum #2<z@ \advance\@tempcnta 64 \fi
296 \char\@tempcnta}
```

(End definition for \@getrarrow. This function is documented on page ??.)

`\@vline`

```
297 \def\@vline{\ifnum \@yarg <z@ \@downline \else \@upline\fi}
```



(End definition for \vline. This function is documented on page ??.)

\@upline

```
298 \def\@upline{%
299   \hb@xt@ \z@{\hskip -\@halfwidth \vrule \@width \@wholewidth
300   \@height \@linelen \@depth \z@\hss}}
```

(End definition for \@upline. This function is documented on page ??.)

\@downline

```
301 \def\@downline{%
302   \hb@xt@ \z@{\hskip -\@halfwidth \vrule \@width \@wholewidth
303   \@height \z@ \@depth \@linelen \hss}}
```

(End definition for \@downline. This function is documented on page ??.)

\@upvector

```
304 \def\@upvector{\@upline\setbox\@tempboxa\hbox{\@linefnt\char 54}% '66
305   \raise \@linelen \hb@xt@ \z@{\lower \ht\@tempboxa\box\@tempboxa\hss}}
```

(End definition for \@upvector. This function is documented on page ??.)

\@downvector

```
306 \def\@downvector{\@downline\lower \@linelen
307   \hb@xt@ \z@{\@linefnt\char 63 % '77
308   \hss}}
```

(End definition for \@downvector. This function is documented on page ??.)

Historical *TEX* 2.09 comments (not necessarily accurate any more):

```
\dashbox{D}(X,Y) ==
BEGIN
  leave vertical mode
  \hb@xt@ 0pt {
    \baselineskip := 0pt
    \lineskip      := 0pt
    %% HORIZONTAL DASHES
    \@dashdim := X * \unitlength
    \@dashcnt := \@dashdim + 200 % to prevent roundoff error
    \@dashdim := D * \unitlength
    \@dashcnt := \@dashcnt / \@dashdim
    if \@dashcnt is odd
    then \@dashdim := 0pt
        \@dashcnt := (\@dashcnt + 1) / 2
    else \@dashdim := \@dashdim / 2
        \@dashcnt := \@dashcnt / 2 - 1
        \box\@dashbox := \hbox{\vrule height \@halfwidth
                                depth \@halfwidth width \@dashdim}
        \put(0,0){\copy\@dashbox}
        \put(0,Y){\copy\@dashbox}
        \put(X,0){\hskip -\@dashdim\copy\@dashbox}
        \put(X,Y){\hskip -\@dashdim\box\@dashbox}
    \@dashdim := 3 * \@dashdim
  fi
```

```

\box\@dashbox := \hbox{\vrule height \@halfwidth
                        depth \@halfwidth width D * \unitlength
                        \hskip D * \unitlength}

\@tempcnta := 0
\put(0,0){\hskip \@dashdim
          while \@tempcnta < \@dashcnt
            do \copy\@dashbox
              \@tempcnta := \@tempcnta + 1
            od
          }
\@tempcnta := 0
\put(0,Y){\hskip \@dashdim
          while \@tempcnta < \@dashcnt
            do \copy\@dashbox
              \@tempcnta := \@tempcnta + 1
            od
          }

%% vertical dashes
\@dashdim := Y * \unitlength
\@dashcnt := \@dashdim + 200 % to prevent roundoff error
\@dashdim := D * \unitlength
\@dashcnt := \@dashcnt / \@dashdim
if \@dashcnt is odd
then \@dashdim := 0pt
    \@dashcnt := (\@dashcnt + 1) / 2
else \@dashdim := \@dashdim / 2
    \@dashcnt := \@dashcnt / 2 - 1
    \box\@dashbox := \hbox{\hskip -\@halfwidth
                          \vrule width \@wholewidth
                          height \@dashdim }

    \put(0,0){\copy\@dashbox}
    \put(X,0){\copy\@dashbox}
    \put(0,Y){\lower\@dashdim\copy\@dashbox}
    \put(X,Y){\lower\@dashdim\copy\@dashbox}
    \@dashdim := 3 * \@dashdim
fi
\box\@dashbox := \hbox{\vrule width \@wholewidth
                        height D * \unitlength      }

\@tempcnta := 0
\put(0,0){\hskip -\halfwidth
          \vbox{while \@tempcnta < \@dashcnt
                do \vskip D*\unitlength
                  \copy\@dashbox
                  \@tempcnta := \@tempcnta + 1
                od
                \vskip \@dashdim
              } }
\@tempcnta := 0
\put(X,0){\hskip -\halfwidth

```

```

\ vbox{while \@tempcnta < \@dashcnt
do \vskip D*\unitlength
\copy\@dashbox
\@tempcnta := \@tempcnta + 1
od
\vskip \@dashdim
}
}
} % END DASHES

```

\@makepicbox(X,Y)

END

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

\dashbox

```

309 \if2kernel
310 \if*2kernel | latexrelease
311 \if latexrelease \IncludeInRelease{2020/10/01}%
312 \if latexrelease {\dashbox}{default units}%
313 \if latexrelease \expandafter \let \csname dashbox \endcsname \undefined
314 \def \dashbox#1(#2,#3){\leavevmode \hb@xt@ \z@ {\baselineskip \z@ skip
315 \lineskip \z@ skip
316 \@defaultunitsset \@dashdim{#2}\unitlength
317 \@dashcnt \@dashdim \advance \@dashcnt 200
318 \@defaultunitsset \@dashdim{#1}\unitlength
319 \divide \@dashcnt \@dashdim
320 \ifodd \@dashcnt \@dashdim \z@
321 \advance \@dashcnt \one \divide \@dashcnt \tw@
322 \else \divide \@dashdim \tw@ \divide \@dashcnt \tw@
323 \advance \@dashcnt \m@ne
324 \setbox \dashbox \hbox {\vrule \@height \@halfwidth \@depth \@halfwidth
325 \@width \@dashdim} \put (0,0) {\copy \dashbox}%
326 \put (0,#3) {\copy \dashbox}%
327 \put (#2,0) {\hskip -\@dashdim \copy \dashbox}%
328 \put (#2,#3) {\hskip -\@dashdim \box \dashbox}%
329 \multiply \@dashdim \thr@@
330 \fi
331 \setbox \dashbox \hbox {%
332 \@defaultunitsset \@tempdimc{#1}\unitlength
333 \vrule \@height \@halfwidth \@depth \@halfwidth \@width \@tempdimc
334 \hskip \@tempdimc}%
335 \@tempcnta \z@
336 \put (0,0) {\hskip \@dashdim \@whilenum \@tempcnta < \@dashcnt
337 \do {\copy \dashbox \advance \@tempcnta \one }} \@tempcnta \z@
338 \put (0,#3) {\hskip \@dashdim \@whilenum \@tempcnta < \@dashcnt
339 \do {\copy \dashbox \advance \@tempcnta \one }}%
340 \@defaultunitsset \@dashdim{#3}\unitlength
341 \@dashcnt \@dashdim \advance \@dashcnt 200
342 \@defaultunitsset \@dashdim{#1}\unitlength
343 \divide \@dashcnt \@dashdim
344 \ifodd \@dashcnt \@dashdim \z@
345 \advance \@dashcnt \one \divide \@dashcnt \tw@
346 \else

```

```

347 \divide\@dashdim \tw@ \divide\@dashcnt \tw@
348 \advance\@dashcnt \m@ne
349 \setbox\@dashbox\hbox{\hskip -\@halfwidth
350 \vrule \@width \@wholewidth
351 \@height \@dashdim}\put(0,0){\copy\@dashbox}%
352 \put(#2,0){\copy\@dashbox}%
353 \put(0,#3){\lower\@dashdim\copy\@dashbox}%
354 \put(#2,#3){\lower\@dashdim\copy\@dashbox}%
355 \multiply\@dashdim \thr@@
356 \fi
357 \@defaultunitsset\@tempdimb{#1}\unitlength
358 \setbox\@dashbox\hbox{%
359 \vrule \@width \@wholewidth \@height\@tempdimb}%
360 \@tempcnta\z@
361 \put(0,0){\hskip -\@halfwidth \vbox{\@whilenum \@tempcnta <\@dashcnt
362 \do{\vskip\@tempdimb\copy\@dashbox\advance\@tempcnta \@ne }%
363 \vskip\@dashdim}}\@tempcnta\z@
364 \put(#2,0){\hskip -\@halfwidth \vbox{\@whilenum \@tempcnta<\@dashcnt
365 \do{\vskip\@tempdimb\copy\@dashbox\advance\@tempcnta \@ne }%
366 \vskip\@dashdim}}}\@makepicbox(#2,#3)}
367 /2kernel | latexrelease)

368 \latexrelease\EndIncludeInRelease
369 \latexrelease\IncludeInRelease{0000/00/00}%
370 \latexrelease \dashbox{default units}%
371 \latexrelease\expandafter\let\csname dashbox \endcsname\@undefined
372 \latexrelease\def\dashbox#1(#2,#3){%
373 \latexrelease\leavevmode\hbext@z@{\baselineskip \z@skip
374 \latexrelease\lineskip \z@skip
375 \latexrelease\@dashdim #2\unitlength
376 \latexrelease\@dashcnt \dashdim \advance\@dashcnt 200
377 \latexrelease\@dashdim #1\unitlength\divide\@dashcnt \dashdim
378 \latexrelease\ifodd\@dashcnt\@dashdim \z@
379 \latexrelease\advance\@dashcnt \@ne \divide\@dashcnt \tw@
380 \latexrelease\else \divide\@dashdim \tw@ \divide\@dashcnt \tw@
381 \latexrelease\advance\@dashcnt \m@ne
382 \latexrelease\setbox\@dashbox \hbox{%
383 \latexrelease \vrule \@height \@halfwidth \@depth \@halfwidth
384 \latexrelease \@width \dashdim}\put(0,0){\copy\@dashbox}%
385 \latexrelease\put(0,#3){\copy\@dashbox}%
386 \latexrelease\put(#2,0){\hskip-\dashdim\copy\@dashbox}%
387 \latexrelease\put(#2,#3){\hskip-\dashdim\box\@dashbox}%
388 \latexrelease\multiply\@dashdim \thr@@
389 \latexrelease\fi
390 \latexrelease\setbox\@dashbox \hbox{%
391 \latexrelease \vrule \@height \@halfwidth \@depth \@halfwidth
392 \latexrelease \@width #1\unitlength\hskip #1\unitlength}\@tempcnta\z@
393 \latexrelease\put(0,0){\hskip\@dashdim \@whilenum \@tempcnta <\@dashcnt
394 \latexrelease\do{\copy\@dashbox\advance\@tempcnta \@ne }}\@tempcnta\z@
395 \latexrelease\put(0,#3){\hskip\@dashdim \@whilenum \@tempcnta <\@dashcnt
396 \latexrelease\do{\copy\@dashbox\advance\@tempcnta \@ne }}%
397 \latexrelease\@dashdim #3\unitlength
398 \latexrelease\@dashcnt \dashdim \advance\@dashcnt 200
399 \latexrelease\@dashdim #1\unitlength\divide\@dashcnt \dashdim
400 \latexrelease\ifodd\@dashcnt \dashdim \z@

```

```

401 <latexrelease>\advance\@dashcnt \@ne \divide\@dashcnt \tw@
402 <latexrelease>\else
403 <latexrelease>\divide\@dashdim \tw@ \divide\@dashcnt \tw@
404 <latexrelease>\advance\@dashcnt \m@ne
405 <latexrelease>\setbox\@dashbox\hbox{\hskip -\@halfwidth
406 <latexrelease>\vrule \@width \@wholewidth
407 <latexrelease>\@height \@dashdim}\put(0,0){\copy\@dashbox}%
408 <latexrelease>\put(#2,0){\copy\@dashbox}%
409 <latexrelease>\put(0,#3){\lower\@dashdim\copy\@dashbox}%
410 <latexrelease>\put(#2,#3){\lower\@dashdim\copy\@dashbox}%
411 <latexrelease>\multiply\@dashdim \thr@@
412 <latexrelease>\fi
413 <latexrelease>\setbox\@dashbox\hbox{\vrule \@width \@wholewidth
414 <latexrelease>\@height #1\unitlength}\@tempcnta\z@
415 <latexrelease>\put(0,0){%
416 <latexrelease> \hskip -\@halfwidth \vbox{\@whilenum \@tempcnta <\@dashcnt
417 <latexrelease> \do{\vskip #1\unitlength\copy\@dashbox
418 <latexrelease> \advance\@tempcnta\@ne }%
419 <latexrelease> \vskip\@dashdim}}\@tempcnta\z@
420 <latexrelease>\put(#2,0){%
421 <latexrelease> \hskip -\@halfwidth \vbox{\@whilenum \@tempcnta<\@dashcnt
422 <latexrelease> \do{\vskip #1\unitlength\copy\@dashbox
423 <latexrelease> \advance\@tempcnta \@ne }%
424 <latexrelease> \vskip\@dashdim}}\@makepicbox(#2,#3)}
425 <latexrelease>\EndIncludeInRelease
426 <*2kernel>

```

(End definition for `\dashbox`. This function is documented on page ??.)

Historical *L<sup>A</sup>T<sub>E</sub>X* 2.09 comments (not necessarily accurate any more):

## CIRCLES AND OVALS

### USER COMMANDS:

`\circle{D}` : Produces the circle with the diameter as close as possible to  $D * \text{\unitlength}$ . `\put(X,Y){\circle{D}}` puts the circle with its center at (X,Y).

`\oval(X,Y)` : Makes an oval as round as possible that fits in the rectangle of width  $X * \text{\unitlength}$  and height  $Y * \text{\unitlength}$ . The reference point is the center.

`\oval(X,Y)[POS]` : Save as `\oval(X,Y)` except it draws only the half or quadrant of the oval indicated by POS. E.G., `\oval(X,Y)[t]` draws just the top half and `\oval(X,Y)[br]` draws just the bottom right quadrant. In all cases, the reference point is the same as the unqualified `\oval(X,Y)` command.

`\@ovvert {DELTA1} {DELTA2}` : Makes a vbox containing either the left side or the right side of the oval being constructed. The baseline will coincide with the outside bottom edge of the oval; the left side of the box will coincide with the left edge of the vertical

rule. The width of the box will be `\@tempdima`.  
`DELTA1` and `DELTA2` are added to the character number in `\@tempcnta`  
to get the characters for the top and bottom quarter circle pieces.

`\@ovhorz` : Makes an hbox containing the straight rule for either the  
top or the bottom of the oval being constructed. The baseline  
will coincide with bottom edge of the rule; the left side of  
the box will coincide with the left side of the oval.  
The width of the box will be `\@ovxx`.

`\@getcirc {DIAM}` : Sets `\@tempcnta` to the character number  
of the top-right quarter circle with the largest  
diameter less than or equal to `DIAM`.  
Sets `\@tempboxa` to an hbox containing that character.  
Sets `\@tempdima` to `\wd \@tempboxa`, which is the distance  
from the circle's left outside edge to its right  
inside edge.  
(These characters are like those described in the  
TeXbook, pp. 389-90.)

```
\@getcirc {DIAM} ==
BEGIN
  \@tempcnta      := integer coercion of (DIAM + 2pt)
                                     + 2pt added 1 Nov 88
  \@tempcnta      := \@tempcnta / integer coercion of 4pt
  if \@tempcnta > 10
    then \@tempcnta := 10 fi
  if \@tempcnta > 0
    then \@tempcnta := \@tempcnta-1
    else LaTeX Warning: Oval too small.
  fi
  \@tempcnta      := 4 * \@tempcnta
  \@tempboxa      := \hbox{\@circlefont \char \@tempcnta}
  \@tempdima      := \wd \@tempboxa
END
```

```
\@put{X}{Y}{OBJ} ==
BEGIN
  \raise Y \hb@xt@ 0pt{\hskip X OBJ \hss}
END
```

```
\@oval(X,Y)[POS] ==
BEGIN
  \begingroup
  \boxmaxdepth := \maxdimen
  @ovt := @ovb := @ovl := @ovr := true
  for all E in POS
    do @ovE := false od
  \@ovxx      := X * \unitlength
  \@ovyy      := Y * \unitlength
```

```

\@tempdimb := min(\@ovxx,\@ovyy)
\@getcirc{\@tempdimb-2pt} %% "-2pt" added 7 Dec 89
\@ovro      := \ht \@tempboxa
\@ovri      := \dp \@tempboxa
\@ovdx      := \@ovxx - \@tempdima
\@ovdx      := \@ovdx/2
\@ovdy      := \@ovyy - \@tempdima
\@ovdy      := \@ovdy/2
\@circlefnt
\@tempboxa :=
  \hbox{
    if \@ovr
      then \@ovvert{3}{2} \kern -\@tempdima
    fi
    if \@ovl
      then \kern \@ovxx \@ovvert{0}{1} \kern -\@tempdima
        \kern -\@ovxx
      fi
    if \@ovt
      then \@ovhorz \kern -\@ovxx
    fi
    if \@ovb
      then \raise \@ovyy \@ovhorz
    fi
  }
\@ovdx      := \@ovdx + \@ovro
\@ovdy      := \@ovdy + \@ovro
\ht\@tempboxa := \dp\@tempboxa := 0
\@put{-\@ovdx}{-\@ovdy}{\box\@tempboxa}
\endgroup
END

\@ovvert {DELTA1} {DELTA2} ==
BEGIN
  \vbox to \@ovyy {
    if \@ovb
      then \@tempcntb := \@tempcnta + DELTA1
        \kern -\@ovro
        \hbox { \char \@tempcntb }
        \nointerlineskip
      else \kern \@ovri \kern \@ovdy
    fi
    \leaders \vrule width \@wholewidth \vfil
    \nointerlineskip
    if \@ovt
      then \@tempcntb := \@tempcnta + DELTA2
        \hbox { \char \@tempcntb }
      else \kern \@ovdy \kern \@ovro
    fi
  }

```

```

END

\@ovhorz ==
BEGIN
  \hb@xt@ \ovxxx{
    \kern \@ovro
    if @ovr
      then
        else \kern \@ovdx
      fi
    \leaders \hrule height \@wholewidth \hfil
    if @ovl
      then
        else \kern \@ovdx
      fi
    \kern \@ovri
  }
END

\circle{DIAM} ==
BEGIN
  \begingroup
  \boxmaxdepth := maxdimen
  \@tempdimb := DIAM *\unitlength
  if \@tempdimb > 15.5pt
    then \@getcirc{\@tempdimb}
      \@ovro := \ht \@tempboxa
      \@tempboxa := \hbox{
        \@circlefnt
        \@tempcnta := \@tempcnta + 2
        \char \@tempcnta
        \@tempcnta := \@tempcnta - 1
        \char \@tempcnta
        \kern -2\@tempdima
        \@tempcnta := \@tempcnta + 2
        \raise \@tempdima \hbox { \char \@tempcnta }
        \raise \@tempdima \box\@tempboxa
      }
      \ht\@tempboxa := \dp\@tempboxa := 0
      \@put{-\@ovro}{-\@ovro}{\@tempboxa}
    else
      \@circ{\@tempdimb}{96}
    fi
  \endgroup
END

\circle*{DIAM} == \@dot{DIAM} == \@circ{DIAM*\unitlength}{112}

\@circ{DIAM}{CHAR} ==
BEGIN

```



```

\@tempcnta := integer coercion of (DIAM + .5pt)/1pt.
if \@tempcnta > 15 then \@tempcnta := 15 fi
if \@tempcnta > 1 then \@tempcnta := \@tempcnta - 1 fi
\@tempcnta := \@tempcnta + CHAR
\@circlefnt
\char \@tempcnta
END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

`\if@ovt` If producing the Top Bottom Left or Right of an oval.

```

\if@ovb 427 \newif\if@ovt
\if@ovl 428 \newif\if@ovb
\if@ovr 429 \newif\if@ovl
430 \newif\if@ovr

```

*(End definition for \if@ovt and others. These functions are documented on page ??.)*

```

\@ovxx
\@ovyy 431 \newdimen\@ovxx
\@ovdx 432 \newdimen\@ovyy
\@ovdy 433 \newdimen\@ovdx
\@ovro 434 \newdimen\@ovdy
\@ovri 435 \newdimen\@ovro
436 \newdimen\@ovri

```

*(End definition for \@ovxx and others. These functions are documented on page ??.)*

`\advance\@tempdima 2pt\relax` added 1 Nov 88 to fix bug in which size of drawn circle not monotonic function of argument of `\circle`, caused by different rounding for dimensions of large and small circles.

`\@getcirc`

```

437 \def\@getcirc#1{\@tempdima #1\relax \advance\@tempdima 2\p@
438 \@tempcnta\@tempdima
439 \@tempdima 4\p@ \divide\@tempcnta\@tempdima
440 \ifnum \@tempcnta >10\relax
441 \picture@warn
442 \@tempcnta 10\relax
443 \fi
444 \ifnum \@tempcnta >\z@ \advance\@tempcnta\m@ne
Warn if requirements for oval or circle can't be met.
445 \else \picture@warn \fi
446 \multiply\@tempcnta 4\relax
447 \setbox \@tempboxa \hbox{\@circlefnt
448 \char \@tempcnta}\@tempdima \wd \@tempboxa}

```

*(End definition for \@getcirc. This function is documented on page ??.)*

`\@picture@warn` Generic warning for lines, vectors (used in `\@sline`) and oval or circle (used in `\@getcirc`) are not available at right size.

```

449 \def\@picture@warn{\@latex@warning{%
450 \string\oval, \string\circle, or \string\line\space
451 size unavailable}}

```

(End definition for \@picture@warn. This function is documented on page ??.)

\@put

```
452 \def\@put#1#2#3{\raise #2\hb@xt@{z@{\hskip #1#3\hss}}
```

(End definition for \@put. This function is documented on page ??.)

\oval

```
453 \def\oval(#1,#2){\@ifnextchar[{\@oval(#1,#2)}{\@oval(#1,#2)[]}}
```

(End definition for \oval. This function is documented on page ??.)

```
454 \</2ekernel>
455 \<latexrelease>\IncludeInRelease{2016/03/31}%
456 \<latexrelease>{\@ovhlinetrue}%
457 \<latexrelease>{Avoid almost zero length leaders}%
458 \<*2ekernel | latexrelease>
```

\if@ovvline Tests whether horizontal or vertical lines are needed.

\if@ovhline

```
459 \newif\if@ovvline \@ovvlinetrue
460 \newif\if@ovhline \@ovhlinetrue
461 % \begin{macrocode}
462 \</2ekernel | latexrelease>
463 \<latexrelease>\EndIncludeInRelease
464 \<latexrelease>\IncludeInRelease{0000/00/00}%
465 \<latexrelease>{\@ovhlinetrue}%
466 \<latexrelease>{Avoid almost zero length leaders}%
467 \<latexrelease>\let\if@ovvline\@undefined
468 \<latexrelease>\let\if@ovhline\@undefined
469 \<latexrelease>\EndIncludeInRelease
470 \<*2ekernel>
```

(End definition for \if@ovvline and \if@ovhline. These functions are documented on page ??.)

\@oval

```
471 \</2ekernel>
472 \<*2ekernel | latexrelease>
473 \<latexrelease>\IncludeInRelease{2020/10/01}%
474 \<latexrelease>{\@oval}{default units}%
475 \def\@oval(#1,#2)[#3]{\begingroup\boxmaxdepth \maxdimen
476   \@ovttrue \@ovbtrue \@ovltrue \@ovrtrue
477   \@ovvlinefalse \@ovhlinefalse
478   \@tfor\reserved@a :=#3\do{%
479     \csname @ov\reserved@a false\endcsname}%
480   \@defaultunitsset\@ovxx{#1}\unitlength
481   \@defaultunitsset\@ovyy{#2}\unitlength
482   \@tempdimb \ifdim \@ovyy >\@ovxx \@ovxx \@ovvlinetrue
483   \else \@ovyy \ifdim \@ovyy =\@ovxx \else \@ovhlinetrue \fi\fi
484   \advance \@tempdimb -2\p@
485   \@getcirc \@tempdimb
486   \@ovro \ht\@tempboxa \@ovri \dp\@tempboxa
487   \@ovdx\@ovxx \advance\@ovdx -\@tempdima \divide\@ovdx \tw@
488   \@ovdy\@ovyy \advance\@ovdy -\@tempdima \divide\@ovdy \tw@
```

```

489 \ifdim \@ovdx >\z@ \@ovhlinetrue \fi
490 \ifdim \@ovdy >\z@ \@ovvlinetrue \fi

491 \@circlefnt \setbox\@tempboxa
492 \hbox{\if@ovr \@ovvert32\kern -\@tempdima \fi
493 \if@ovl \kern \@ovxx \@ovvert01\kern -\@tempdima \kern -\@ovxx \fi
494 \if@ovt \@ovhorz \kern -\@ovxx \fi
495 \if@ovb \raise \@ovyy \@ovhorz \fi}\advance\@ovdx\@ovro
496 \advance\@ovdy\@ovro \ht\@tempboxa\z@ \dp\@tempboxa\z@
497 \put{-\@ovdx}{-\@ovdy}{\box\@tempboxa}%
498 \endgroup}
499 </2ekernel | latexrelease>

500 <latexrelease>\EndIncludeInRelease
501 <latexrelease>\IncludeInRelease{2016/03/31}%
502 <latexrelease> \{\@oval\}{default units}%
503 <latexrelease>\def\@oval(#1,#2)[#3]{\begingroup\boxmaxdepth \maxdimen
504 <latexrelease> \@ovttrue \@ovbtrue \@ovltrue \@ovrtrue
505 <latexrelease> \@ovvlinefalse \@ovhlinefalse
506 <latexrelease> \@tfor\reserved@a :=#3\do{%
507 <latexrelease> \csname @ov\reserved@a false\endcsname}%
508 <latexrelease> \@ovxx #1\unitlength
509 <latexrelease> \@ovyy #2\unitlength
510 <latexrelease> \@tempdimb \ifdim \@ovyy >\@ovxx \@ovxx \@ovvlinetrue
511 <latexrelease> \else \@ovyy \ifdim \@ovyy =\@ovxx \else \@ovhlinetrue
512 <latexrelease> \fi\fi
513 <latexrelease> \advance \@tempdimb -2\p@
514 <latexrelease> \@getcirc \@tempdimb
515 <latexrelease> \@ovro \ht\@tempboxa \@ovri \dp\@tempboxa
516 <latexrelease> \@ovdx\@ovxx \advance\@ovdx -\@tempdima \divide\@ovdx \tw@
517 <latexrelease> \@ovdy\@ovyy \advance\@ovdy -\@tempdima \divide\@ovdy \tw@
518 <latexrelease> \ifdim \@ovdx >\z@ \@ovhlinetrue \fi
519 <latexrelease> \ifdim \@ovdy >\z@ \@ovvlinetrue \fi
520 <latexrelease> \@circlefnt \setbox\@tempboxa
521 <latexrelease> \hbox{\if@ovr \@ovvert32\kern -\@tempdima \fi
522 <latexrelease> \if@ovl
523 <latexrelease> \kern \@ovxx \@ovvert01\kern -\@tempdima \kern -\@ovxx
524 <latexrelease> \fi
525 <latexrelease> \if@ovt \@ovhorz \kern -\@ovxx \fi
526 <latexrelease> \if@ovb \raise \@ovyy \@ovhorz \fi}\advance\@ovdx\@ovro
527 <latexrelease> \advance\@ovdy\@ovro \ht\@tempboxa\z@ \dp\@tempboxa\z@
528 <latexrelease> \put{-\@ovdx}{-\@ovdy}{\box\@tempboxa}%
529 <latexrelease> \endgroup}
530 <latexrelease>\EndIncludeInRelease

531 <latexrelease>\IncludeInRelease{0000/00/00}%
532 <latexrelease> \{\@oval\}{default units}%
533 <latexrelease>\def\@oval(#1,#2)[#3]{\begingroup\boxmaxdepth \maxdimen
534 <latexrelease> \@ovttrue \@ovbtrue \@ovltrue \@ovrtrue
535 <latexrelease> \@tfor\reserved@a :=#3\do
536 <latexrelease> {\csname @ov\reserved@a false\endcsname}%
537 <latexrelease> \@ovxx #1\unitlength
538 <latexrelease> \@ovyy #2\unitlength
539 <latexrelease> \@tempdimb \ifdim \@ovyy >\@ovxx \@ovxx\else \@ovyy \fi
540 <latexrelease> \advance \@tempdimb -2\p@
541 <latexrelease> \@getcirc \@tempdimb

```

```

542 <latexrelease> \ovro \ht\@tempboxa \ovri \dp\@tempboxa
543 <latexrelease> \ovdx\@ovxx \advance\ovdx -\@tempdima \divide\ovdx \tw@
544 <latexrelease> \ovdy\@ovyy \advance\ovdy -\@tempdima \divide\ovdy \tw@
545 <latexrelease> \circlefnt \setbox\@tempboxa
546 <latexrelease> \hbox{\if@ovr \ovvert32\kern -\@tempdima \fi
547 <latexrelease> \if@ovl
548 <latexrelease> \kern \ovxx \ovvert01\kern -\@tempdima \kern -\ovxx
549 <latexrelease> \fi
550 <latexrelease> \if@ovt \ovhorz \kern -\ovxx \fi
551 <latexrelease> \if@ovb \raise \ovyy \ovhorz \fi}\advance\ovdx\ovro
552 <latexrelease> \advance\ovdy\ovro \ht\@tempboxa\z@ \dp\@tempboxa\z@
553 <latexrelease> \put{-\ovdx}{-\ovdy}{\box\@tempboxa}%
554 <latexrelease> \endgroup}
555 <latexrelease>\EndIncludeInRelease
556 <*2ekernel>

```

(End definition for \oval. This function is documented on page ??.)

\@ovvert

```

557 </2ekernel>
558 <latexrelease>\IncludeInRelease{2016/03/31}%
559 <latexrelease> \ovvert{Avoid almost zero length leaders}%
560 <*2ekernel|latexrelease>
561 \def\@ovvert#1#2{\vbox to\ovyy{%
562 \if@ovb \@tempcntb \@tempcnta \advance \@tempcntb #1\relax
563 \kern -\ovro \hbox{\char \@tempcntb}\nointerlineskip
564 \else \kern \ovri \kern \ovdy \fi
565 \if@ovvline \leaders\vrule \@width \@wholewidth \fi
566 \vfil \nointerlineskip
567 \if@ovt \@tempcntb \@tempcnta \advance \@tempcntb #2\relax
568 \hbox{\char \@tempcntb}%
569 \else \kern \ovdy \kern \ovro \fi}}
570 </2ekernel|latexrelease>
571 <latexrelease>\EndIncludeInRelease
572 <latexrelease>\IncludeInRelease{0000/00/00}%
573 <latexrelease> \ovvert{Avoid almost zero length leaders}%
574 <latexrelease>\def\@ovvert#1#2{\vbox to\ovyy{%
575 <latexrelease> \if@ovb \@tempcntb \@tempcnta \advance \@tempcntb #1\relax
576 <latexrelease> \kern -\ovro \hbox{\char \@tempcntb}\nointerlineskip
577 <latexrelease> \else \kern \ovri \kern \ovdy \fi
578 <latexrelease> \leaders\vrule \@width \@wholewidth\vfil \nointerlineskip
579 <latexrelease> \if@ovt \@tempcntb \@tempcnta \advance \@tempcntb #2\relax
580 <latexrelease> \hbox{\char \@tempcntb}%
581 <latexrelease> \else \kern \ovdy \kern \ovro \fi}}
582 <latexrelease>\EndIncludeInRelease
583 <*2ekernel>

```

(End definition for \@ovvert. This function is documented on page ??.)

\@ovhorz

```

584 </2ekernel>
585 <latexrelease>\IncludeInRelease{2016/03/31}%
586 <latexrelease> \ovhorz{Avoid almost zero length leaders}%

```

```

587 <*2ekernel | latexrelease>
588 \def\@ovhorz{\hb@xt@\@ovxx{\kern \@ovro
589   \if@ovr \else \kern \@ovdx \fi

590   \if@ovhline \leaders \hrule \@height \@wholewidth \fi

591   \hfil
592   \if@ovl \else \kern \@ovdx \fi
593   \kern \@ovri}}
594 </2ekernel | latexrelease>

595 <latexrelease>\EndIncludeInRelease
596 <latexrelease>\IncludeInRelease{0000/00/00}%
597 <latexrelease>          {\@ovhorz}{Avoid almost zero length leaders}%
598 <latexrelease>\def\@ovhorz{\hb@xt@\@ovxx{\kern \@ovro
599 <latexrelease>   \if@ovr \else \kern \@ovdx \fi
600 <latexrelease>   \leaders \hrule \@height \@wholewidth \hfil
601 <latexrelease>   \if@ovl \else \kern \@ovdx \fi
602 <latexrelease>   \kern \@ovri}}
603 <latexrelease>\EndIncludeInRelease
604 <*2ekernel>

```

(End definition for \@ovhorz. This function is documented on page ??.)

\circle

```

605 \def\circle{\@inmatherr\circle\@ifstar\@dot\@circle}

```

(End definition for \circle. This function is documented on page ??.)

\@circle

```

606 </2ekernel>
607 <*2ekernel | latexrelease>
608 <latexrelease>\IncludeInRelease{2020/10/01}%
609 <latexrelease>          {\@circle}{default units}%
610 \def\@circle#1{%
611   \begingroup \boxmaxdepth \maxdimen
612   \@defaultunitsset\@tempdimb{#1}\unitlength
613   \ifdim \@tempdimb >15.5\p@ \getcirc\@tempdimb
614     \@ovro\ht\@tempboxa
615     \setbox\@tempboxa\hbox{\@circlefont
616       \advance\@tempcnta\tw@ \char \@tempcnta
617       \advance\@tempcnta\m@ne \char \@tempcnta \kern -2\@tempdima
618       \advance\@tempcnta\tw@
619       \raise \@tempdima \hbox{\char\@tempcnta}\raise \@tempdima
620       \box\@tempboxa}\ht\@tempboxa\z@ \dp\@tempboxa\z@
621       \put{-\@ovro}{-\@ovro}{\box\@tempboxa}%
622     \else \@circ\@tempdimb{96}\fi\endgroup}
623 </2ekernel | latexrelease>

624 <latexrelease>\EndIncludeInRelease
625 <latexrelease>\IncludeInRelease{0000/00/00}%
626 <latexrelease>          {\@circle}{default units}%
627 <latexrelease>\def\@circle#1{%
628 <latexrelease>   \begingroup \boxmaxdepth \maxdimen \@tempdimb #1\unitlength
629 <latexrelease>   \ifdim \@tempdimb >15.5\p@ \getcirc\@tempdimb
630 <latexrelease>   \@ovro\ht\@tempboxa

```

```

631 <latexrelease> \setbox\@tempboxa\hbox{\@circlefnt
632 <latexrelease> \advance\@tempcnta\tw@ \char \@tempcnta
633 <latexrelease> \advance\@tempcnta\m@ne \char \@tempcnta
634 <latexrelease> \kern -2\@tempdima
635 <latexrelease> \advance\@tempcnta\tw@
636 <latexrelease> \raise \@tempdima \hbox{\char\@tempcnta}%
637 <latexrelease> \raise \@tempdima
638 <latexrelease> \box\@tempboxa\ht\@tempboxa\z@ \dp\@tempboxa\z@
639 <latexrelease> \put{-\@ovro}{-\@ovro}{\box\@tempboxa}%
640 <latexrelease> \else \@circ\@tempdimb{96}\fi\endgroup}
641 <latexrelease>\EndIncludeInRelease
642 <*2ekernel>

```

(End definition for \@circ. This function is documented on page ??.)

\@dot Internal form of \circle\*.

```

643 </2ekernel>
644 <*2ekernel | latexrelease>
645 <latexrelease>\IncludeInRelease{2020/10/01}%
646 <latexrelease> {\@dot}{default units}%
647 \def\@dot#1{%
648 \@defaultunitsset\@tempdimb{#1}\unitlength
649 \@circ\@tempdimb{112}}
650 </2ekernel | latexrelease>
651 <latexrelease>\EndIncludeInRelease
652 <latexrelease>\IncludeInRelease{0000/00/00}%
653 <latexrelease> {\@dot}{default units}%
654 <latexrelease>\def\@dot#1{\@tempdimb #1\unitlength \@circ\@tempdimb{112}}
655 <latexrelease>\EndIncludeInRelease
656 <*2ekernel>

```

(End definition for \@dot. This function is documented on page ??.)

\@circ

```

657 \def\@circ#1#2{\@tempdima #1\relax \advance\@tempdima .5\p@
658 \@tempcnta\@tempdima \@tempdima \p@
659 \divide\@tempcnta\@tempdima
660 \ifnum\@tempcnta >15\relax \@tempcnta 15\relax \fi
661 \ifnum \@tempcnta >\z@ \advance\@tempcnta\m@ne\fi
662 \advance\@tempcnta #2\relax
663 \@circlefnt \char\@tempcnta}

```

(End definition for \@circ. This function is documented on page ??.)

\@xarg Counters used for manipulating the ‘slope’ arguments.

```

\@yarg \newcount\@xarg
\@yyarg \newcount\@yarg
\@yyarg \newcount\@yyarg

```

(End definition for \@xarg, \@yarg, and \@yyarg. These functions are documented on page ??.)

\@multicnt Counter used in \multitup, and also \multicolumn.

```

667 \newcount\@multicnt

```

(End definition for \@multicnt. This function is documented on page ??.)

```

\@xdim Length registers.
\@ydim 668 \newdimen\@xdim
        669 \newdimen\@ydim

(End definition for \@xdim and \@ydim. These functions are documented on page ??.)

\@linechar Box for holding a line segment character, for sloping lines.
        670 \newbox\@linechar

(End definition for \@linechar. This function is documented on page ??.)

\@linelen Length of the line currently being built.
        671 \newdimen\@linelen

(End definition for \@linelen. This function is documented on page ??.)

\@clnwd Height and width of current line segment.
\@clnht 672 \newdimen\@clnwd
        673 \newdimen\@clnht

(End definition for \@clnwd and \@clnht. These functions are documented on page ??.)

\@dashdim \dashbox internal registers.
\@dashbox 674 \newdimen\@dashdim
\@dashcnt 675 \newbox\@dashbox
        676 \newcount\@dashcnt

(End definition for \@dashdim, \@dashbox, and \@dashcnt. These functions are documented on page
??.)

Initialization: “\thinlines”
677 \let\@linefnt\tenln
678 \let\@circlefnt\tencirc
679 \@wholewidth\fontdimen8\tenln
680 \@halfwidth .5\@wholewidth

```

## 1.1 Curves

The new `\qbezier` command, based on the old `\bezier` defined in `bezier.sty`.  
*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```

\qbezier[N] == \bezier{N}

\bezier{N}(AX,AY)(BX,BY)(CX,CY) ==
BEGIN
  IF N = 0
  THEN \@xdima := |BX - AX|
      \@xb := |CX - BX|
      \@xa := Max(\@xa, \@xb)
      \@ya := |BY - AY|
      \@yb := |CY - BY|
      \@ya := Max(\@ya, \@yb)
      @sc := Max(\@xa, \@ya)
      %% The coefficient .5 below is the degree of overlap of

```

```

%% successive points, where 1 is no overlap and 0 is
%% complete overlap. A coefficient of C multiplies
%% the number of points plotted by 1/C.
%%
\@xa := .5 * \@halfwidth
@sc := @sc / \@halfwidth
@sc := Max(@sc, qbeziermax)
ELSE @sc := N
@scp := @sc+1
\@xb := 2 * (BX - AX) * \unitlength
\@xa := ((CX-AX)*\unitlength - \@xb)/@sc
\@yb := 2 * (BY - AY) * \unitlength
\@ya := ((CY-AY)*\unitlength - \@yb)/@sc
\@pictdot := square rule of width \@wholewidth
\count@ := 0
WHILE \count@ < @scp
DO \@xdim := ((\count@*\@xa + @xb) / @sc) * \count@
\@ydim := ((\count@*\@ya + @yb) / @sc) * \count@
plot pt with relative coords (\@xdim,\@ydim)
\count@ := \count@+1
OD

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

**\qbeziermax** The maximum number of points to plot.

```
681 \def\qbeziermax{500}
```

*(End definition for \qbeziermax. This function is documented on page ??.)*

In the code below, to save registers \@a ... are not used. Instead other registers are reused.

```

\newcounter{@sc} -> \c@multicnt
\newcounter{@scp} -> \@tempcnta
\newdimen\@xa -> \@ovxx
\newdimen\@xb -> \@ovdx
\newdimen\@ya -> \@ovyy
\newdimen\@yb -> \@ovdy
\newsavebox{\@pictdot} -> \@tempboxa

```

**\qbezier** Main user-level command to plot quadratic bezier curves. #2 should be (.

```
682 \newcommand\qbezier[2][0]{\bezier{#1}#2}
```

*(End definition for \qbezier. This function is documented on page ??.)*

**\bezier** Form of \bezier compatible with 2.09 bezier.sty, but modified to ignore spaces between its arguments. #2 should be white space, and #4 should be (.

```
683 \def\bezier#1)#2(#3)#4({\@bezier#1)(#3)(}
```



```

\@bezier
684 \kernel)
685 \*2kernel | latexrelease)
686 \latexrelease)\IncludeInRelease{2020/10/01}%
687 \latexrelease) {\@bezier}{default units}%
688 \def\@bezier#1(#2,#3)(#4,#5)(#6,#7){%
689 \ifnum #1=\z@
690 \@defaultunitsset\@ovxx{#4}\unitlength
691 \@defaultunitsset{\advance\@ovxx}{-#2}\unitlength
692 \ifdim \@ovxx<\z@ \@ovxx -\@ovxx \fi
693 \@defaultunitsset\@ovdx{#6}\unitlength
694 \@defaultunitsset{\advance\@ovdx}{-#4}\unitlength
695 \ifdim \@ovdx<\z@ \@ovdx -\@ovdx \fi
696 \ifdim \@ovxx<\@ovdx \@ovxx \@ovdx \fi
697 \@defaultunitsset\@ovyy{#5}\unitlength
698 \@defaultunitsset{\advance\@ovyy}{-#3}\unitlength
699 \ifdim \@ovyy<\z@ \@ovyy -\@ovyy \fi
700 \@defaultunitsset\@ovdy{#7}\unitlength
701 \@defaultunitsset{\advance\@ovdy}{-#5}\unitlength
702 \ifdim \@ovdy<\z@ \@ovdy -\@ovdy \fi
703 \ifdim \@ovyy<\@ovdy \@ovyy \@ovdy \fi
704 \@multicnt
705 \ifdim \@ovxx>\@ovyy \@ovxx \else \@ovyy \fi
706 \@ovxx .5\@halfwidth \divide\@multicnt\@ovxx
707 \ifnum \qbeziermax<\@multicnt
708 \@multicnt\qbeziermax\relax
709 \fi
710 \else \@multicnt#1\relax \fi
711 \@tempcnta\@multicnt \advance\@tempcnta\@one
712 \@defaultunitsset\@ovdx{#4}\unitlength
713 \@defaultunitsset{\advance\@ovdx}{-#2}\unitlength
714 \multiply\@ovdx \tw@
715 \@defaultunitsset\@ovxx{#6}\unitlength
716 \@defaultunitsset{\advance\@ovxx}{-#2}\unitlength
717 \advance\@ovxx -\@ovdx \divide\@ovxx\@multicnt
718 \@defaultunitsset\@ovdy{#5}\unitlength
719 \@defaultunitsset{\advance\@ovdy}{-#3}\unitlength
720 \multiply\@ovdy \tw@
721 \@defaultunitsset\@ovyy{#7}\unitlength
722 \@defaultunitsset{\advance\@ovyy}{-#3}\unitlength
723 \advance\@ovyy -\@ovdy \divide\@ovyy\@multicnt

724 \setbox\@tempboxa\hbox{%
725 \hskip -\@halfwidth
726 \vrule \@height\@halfwidth
727 \@depth \@halfwidth
728 \@width \@wholewidth}%
729 \put(#2,#3){%
730 \count@\z@
731 \@whilenum{\count@<\@tempcnta}\do
732 {\@xdim\count@\@ovxx
733 \advance\@xdim\@ovdx
734 \divide\@xdim\@multicnt
735 \multiply\@xdim\count@

```

```

736      \ydim\count@\@ovvy
737      \advance\ydim\@ovdy
738      \divide\ydim\@multicnt
739      \multiply\ydim\count@
740      \raise \ydim
741      \hb@xt@\z@{\kern\@xdim
742      \unhcopy\@tempboxa\hss}%
743      \advance\count@\@ne}}
744 (/2ekernel | latexrelease)

745 <latexrelease>\EndIncludeInRelease
746 <latexrelease>\IncludeInRelease{0000/00/00}%
747 <latexrelease>      {\@bezier}{default units}%
748 <latexrelease>\def\@bezier#1(#2,#3)(#4,#5)(#6,#7){%
749 <latexrelease>  \ifnum #1=\z@
750 <latexrelease>      \@ovxx #4\unitlength
751 <latexrelease>      \advance\@ovxx -#2\unitlength
752 <latexrelease>      \ifdim \@ovxx<\z@ \@ovxx -\@ovxx \fi
753 <latexrelease>      \@ovdx #6\unitlength
754 <latexrelease>      \advance\@ovdx -#4\unitlength
755 <latexrelease>      \ifdim \@ovdx<\z@ \@ovdx -\@ovdx \fi
756 <latexrelease>      \ifdim \@ovxx<\@ovdx \@ovxx \@ovdx \fi
757 <latexrelease>      \@ovyy #5\unitlength
758 <latexrelease>      \advance\@ovyy -#3\unitlength
759 <latexrelease>      \ifdim \@ovyy<\z@ \@ovyy -\@ovyy \fi
760 <latexrelease>      \@ovdy #7\unitlength
761 <latexrelease>      \advance\@ovdy -#5\unitlength
762 <latexrelease>      \ifdim \@ovdy<\z@ \@ovdy -\@ovdy \fi
763 <latexrelease>      \ifdim \@ovyy<\@ovdy \@ovyy \@ovdy \fi
764 <latexrelease>      \@multicnt
765 <latexrelease>      \ifdim \@ovxx>\@ovyy \@ovxx \else \@ovyy \fi
766 <latexrelease>      \@ovxx .5\@halfwidth \divide\@multicnt\@ovxx
767 <latexrelease>      \ifnum
768 <latexrelease>      \qbeziermax<\@multicnt \@multicnt\qbeziermax\relax
769 <latexrelease>      \fi
770 <latexrelease> \else \@multicnt#1\relax \fi
771 <latexrelease> \@tempcnta\@multicnt \advance\@tempcnta\@ne
772 <latexrelease> \@ovdx #4\unitlength \advance\@ovdx -#2\unitlength
773 <latexrelease>      \multiply\@ovdx \tw@
774 <latexrelease> \@ovxx #6\unitlength \advance\@ovxx -#2\unitlength
775 <latexrelease>      \advance\@ovxx -\@ovdx \divide\@ovxx\@multicnt
776 <latexrelease> \@ovdy #5\unitlength \advance\@ovdy -#3\unitlength
777 <latexrelease>      \multiply\@ovdy \tw@
778 <latexrelease> \@ovyy #7\unitlength \advance\@ovyy -#3\unitlength
779 <latexrelease>      \advance\@ovyy -\@ovdy \divide\@ovyy\@multicnt
780 <latexrelease> \setbox\@tempboxa\hbox{%
781 <latexrelease>      \hskip -\@halfwidth
782 <latexrelease>      \vrule \@height\@halfwidth
783 <latexrelease>      \@depth \@halfwidth
784 <latexrelease>      \@width \@wholewidth}%
785 <latexrelease> \put(#2,#3){%
786 <latexrelease>      \count@\z@
787 <latexrelease>      \@whilenum{\count@<\@tempcnta}\do
788 <latexrelease>      {\@xdim\count@\@ovxx
789 <latexrelease>      \advance\@xdim\@ovdx

```

```

790 <latexrelease>          \divide\@xdim\@multicnt
791 <latexrelease>          \multiply\@xdim\count@
792 <latexrelease>          \@ydim\count@\@ovvy
793 <latexrelease>          \advance\@ydim\@ovdy
794 <latexrelease>          \divide\@ydim\@multicnt
795 <latexrelease>          \multiply\@ydim\count@
796 <latexrelease>          \raise \@ydim
797 <latexrelease>          \hb@xt@\z@\{\kern\@xdim
798 <latexrelease>          \unhcopy\@tempboxa\hss}%
799 <latexrelease>          \advance\count@\@one}}
800 <latexrelease>\EndIncludeInRelease
801 <*2ekernel>

```

(End definition for \bezier and \@bezier. These functions are documented on page ??.)

As the commands above all use “picture” interface we couldn’t define them with \DeclareRobustCommand so we do that now.

```

802 </2ekernel>
803 <*2ekernel | latexrelease>
804 <latexrelease>\IncludeInRelease{2019/10/01}%
805 <latexrelease>          {\bezier}{Make commands robust}%
806 \MakeRobust\bezier
807 \MakeRobust\circle
808 \MakeRobust\dashbox
809 \MakeRobust\line
810 \MakeRobust\linethickness
811 \MakeRobust\multiput
812 \MakeRobust\oval
813 \MakeRobust\put
814 \MakeRobust\qbezier
815 \MakeRobust\shortstack
816 \MakeRobust\thinline
817 \MakeRobust\vector
818 </2ekernel | latexrelease>
819 <latexrelease>\EndIncludeInRelease
820 <latexrelease>\IncludeInRelease{0000/00/00}%
821 <latexrelease>          {\bezier}{Make commands robust}%
822 <latexrelease>
823 <latexrelease>\kernel@make@fragile\bezier
824 <latexrelease>\kernel@make@fragile\circle
825 <latexrelease>\kernel@make@fragile\dashbox
826 <latexrelease>\kernel@make@fragile\line
827 <latexrelease>\kernel@make@fragile\linethickness
828 <latexrelease>\kernel@make@fragile\multiput
829 <latexrelease>\kernel@make@fragile\oval
830 <latexrelease>\kernel@make@fragile\put
831 <latexrelease>\kernel@make@fragile\qbezier
832 <latexrelease>\kernel@make@fragile\shortstack
833 <latexrelease>\kernel@make@fragile\thinline
834 <latexrelease>\kernel@make@fragile\vector
835 <latexrelease>
836 <latexrelease>\EndIncludeInRelease
837 <*2ekernel>
838 </2ekernel>

```

# File J

## ltthm.dtx

### 1 Theorem Environments

The user creates his own theorem-like environments with the command

```
\newtheorem{<name>}{<text>}[<counter>] or  
\newtheorem{<name>}[<oldname>]{<text>}
```

This defines the environment  $\langle name \rangle$  to be just as one would expect a theorem environment to be, except that it prints  $\langle text \rangle$  instead of “Theorem”.

If  $\langle oldname \rangle$  is given, then environments  $\langle name \rangle$  and  $\langle oldname \rangle$  use the same counter, so using a  $\langle name \rangle$  environment advances the number of the next  $\langle name \rangle$  environment, and vice-versa.

If  $\langle counter \rangle$  is given, then environment  $\langle name \rangle$  is numbered within  $\langle counter \rangle$ .

E.g., if  $\langle counter \rangle = \text{subsection}$ , then the first  $\langle name \rangle$  in subsection 7.2 is numbered  $\langle text \rangle$  7.2.1.

The way  $\langle name \rangle$  environments are numbered can be changed by redefining  $\backslash\text{the}\langle name \rangle$ .  
*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

#### DOCUMENT STYLE PARAMETERS

$\backslash\text{thmcounter}\{\text{COUNTER}\}$  : A command such that

```
\edef\theCOUNTER{\@thmcounter{COUNTER}}
```

defines  $\backslash\text{theCOUNTER}$  to produce a number for a theorem environment.

The default is:

```
BEGIN \noexpand\arabic{COUNTER} END
```

$\backslash\text{thmcountersep}$  : A separator placed between a theorem number and the number of the counter within which it is numbered.

E.g., to make the third theorem of section 7.2 be numbered 7.2-3,  $\backslash\text{thmcountersep}$  should be  $\backslash\text{def}$ 'ed to ‘-’. Its default is ‘.’.

$\backslash\text{@begintheorem}\{\text{NAME}\}\{\text{NUMBER}\}$  : A command that begins a theorem environment for a ‘theorem’ named ‘NAME NUMBER’ – e.g.,  $\backslash\text{@begintheorem}\{\text{Lemma}\}\{3.7\}$  starts Lemma 3.7.

$\backslash\text{@opargbegintheorem}\{\text{NAME}\}\{\text{NUMBER}\}\{\text{OPARG}\}$  :

A command that begins a theorem environment for a ‘theorem’ named ‘NAME NUMBER’ with optional argument OPARG – e.g.,  $\backslash\text{@begintheorem}\{\text{Lemma}\}\{3.7\}\{\text{Jones}\}$  starts ‘Lemma 3.7 (Jones)’.

$\backslash\text{endtheorem}$  : A command that ends a theorem environment.

$\backslash\text{newtheorem}\{\text{NAME}\}\{\text{TEXT}\}[\text{COUNTER}] ==$

```
BEGIN
```

```
if \NAME is definable
```

```

        then \@definecounter{NAME}
        if COUNTER present
            then \@newctr{NAME}[COUNTER] fi
            \theNAME == BEGIN \theCOUNTER \@thmcountersep
                                eval\@thmcounter{NAME} END
            else \theNAME == BEGIN eval\@thmcounter{NAME} END
            \NAME == \@thm{NAME}{TEXT}
            \endNAME == \@endtheorem
        else error
        fi
    END

\newtheorem{NAME}[OLDNAME]{TEXT}==
BEGIN
    if counter OLDNAME nonexistent
    then ERROR
    else
        if \NAME is definable
        then BEGIN
            \theNAME == \theOLDNAME
            \NAME == \@thm{OLDNAME}{TEXT}
            \endNAME == \@endtheorem
            END
        else error
        fi
    fi
END

\@thm{NAME}{TEXT} ==
BEGIN
    \refstepcounter{NAME}
    if next char = [
        then \@ythm{NAME}{TEXT}
        else \@xthm{NAME}{TEXT}
    fi
END

\@xthm{NAME}{TEXT} ==
BEGIN
    \@begintheorem{TEXT}{\theNAME}
    \ignorespaces
END

\@ythm{NAME}{TEXT}[OPARG] ==
BEGIN
    \@opargbegintheorem{TEXT}{\theNAME}{OPARG}
    \ignorespaces
END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

`\newtheorem` `\newtheorem` ought really be allowed only in the preamble Which would be good document style, and allow some main memory to be saved by declaring these commands to be `\onlypreamble`. Unfortunately the L<sup>A</sup>T<sub>E</sub>X book indicates that `\newtheorem` may be used anywhere in the document...

```

1 <*2ekernel>
2 \def\newtheorem#1{%
3   \ifnextchar[{\@othm{#1}}{\@nthm{#1}}}
```

(End definition for `\newtheorem`. This function is documented on page ??.)

`\@nthm`

```

4 \def\@nthm#1#2{%
5   \ifnextchar[{\@xnthm{#1}{#2}}{\@ynthm{#1}{#2}}}
```

(End definition for `\@nthm`. This function is documented on page ??.)

`\@xnthm` 92/09/18 RmS: Changed `\@addtoreset` to `\@newctr` to produce error message if counter #3 does not exist (to be consistent with behaviour of `\newcounter`)

```

6 \def\@xnthm#1#2[#3]{%
7   \expandafter\@ifdefinable\csname #1\endcsname
8     {\@definecounter{#1}\@newctr{#1}[#3]%
9     \expandafter\xdef\csname the#1\endcsname{%
10      \expandafter\noexpand\csname the#3\endcsname \@thmcountersep
11      \@thmcounter{#1}}}%
12   \global\@namedef{#1}{\@thm{#1}{#2}}%
13   \global\@namedef{end#1}{\@endtheorem}}}
```

(End definition for `\@xnthm`. This function is documented on page ??.)

`\@ynthm`

```

14 \def\@ynthm#1#2{%
15   \expandafter\@ifdefinable\csname #1\endcsname
16     {\@definecounter{#1}%
17     \expandafter\xdef\csname the#1\endcsname{\@thmcounter{#1}}%
18     \global\@namedef{#1}{\@thm{#1}{#2}}%
19     \global\@namedef{end#1}{\@endtheorem}}}
```

(End definition for `\@ynthm`. This function is documented on page ??.)

`\@othm`

```

20 \def\@othm#1[#2]#3{%
21   \ifundefined{c@#2}{\@nocounterr{#2}}%
22   {\expandafter\@ifdefinable\csname #1\endcsname
23     {\global\@namedef{the#1}{\@nameuse{the#2}}}%
24     \global\@namedef{#1}{\@thm{#2}{#3}}%
25     \global\@namedef{end#1}{\@endtheorem}}}
```

(End definition for `\@othm`. This function is documented on page ??.)

`\@thm`

```

26 \def\@thm#1#2{%
27   \refstepcounter{#1}%
28   \@ifnextchar[{\@ythm{#1}{#2}}{\@xthm{#1}{#2}}}
```

(End definition for `\@thm`. This function is documented on page ??.)

```

\@xthm
\@ythm
29 \def\@xthm#1#2{%
30   \@begintheorem{#2}{\csname the#1\endcsname}\ignorespaces}
31 \def\@ythm#1#2[#3]{%
32   \@opargbegintheorem{#2}{\csname the#1\endcsname}{#3}\ignorespaces}

(End definition for \@xthm and \@ythm. These functions are documented on page ??.)
Default values

\@thmcounter
\@thmcountersep
33 \def\@thmcounter#1{\noexpand\arabic{#1}}
34 \def\@thmcountersep{.}

(End definition for \@thmcounter and \@thmcountersep. These functions are documented on page ??.)

\@begintheorem Providing theorem defaults.
\@opargbegintheorem
\@endtheorem
35 \def\@begintheorem#1#2{\trivlist
36   \item[\hskip \labelsep{\bfseries #1\ #2}]\itshape}
37 \def\@opargbegintheorem#1#2#3{\trivlist
38   \item[\hskip \labelsep{\bfseries #1\ #2\ (#3)}]\itshape}
39 \def\@endtheorem{\endtrivlist}
40 \endkernel

(End definition for \@begintheorem, \@opargbegintheorem, and \@endtheorem. These functions are
documented on page ??.)

```

# File K

## ltsect.dtx

### 1 Sectioning Commands

This file defines the declarations such as `\author` which are used by `\maketitle`. `\maketitle` itself is defined by each class, not in the L<sup>A</sup>T<sub>E</sub>X kernel.

The second part of the file defines the generic commands used for defining sectioning commands such as `\chapter`. Again the actual document level commands are defined in the class files, in terms of these commands.

```
1 <*2ekernel>
2 \message{title,}
```

#### 1.1 The Title

<code>\title</code>	The user defines the title and author by the declarations <code>\title{&lt;name&gt;}</code> , <code>\author{&lt;name&gt;}</code>
<code>\author</code>	Similarly the date is declared with <code>\date{&lt;date&gt;}</code> .
<code>\date</code>	Inside these, the <code>\thanks{&lt;footnote text&gt;}</code> command may be used to make acknowledgements, notice of address, etc. in a footnote. If there are multiple authors, they have
<code>\thanks</code>	to be separated with the <code>\and</code> command.
<code>\and</code>	
<code>\maketitle</code>	And finally, the <code>\maketitle</code> command produces the actual title, using the information previously saved with the other commands.

```
3 </2ekernel>
4 <*2ekernel | latexrelease>
5 <latexrelease>\IncludeInRelease{2019/10/01}%
6 <latexrelease>                {\title}{Make commands robust}%
```

`\title` `\title` for use in `\maketitle`. If not given `\maketitle` will produce an error message.

```
7 \DeclareRobustCommand\title[1]{\gdef\@title{#1}}
```

*(End definition for \title. This function is documented on page ??.)*

`\author` `\author` for use in `\maketitle`. If not given `\maketitle` will produce a warning message.

```
8 \DeclareRobustCommand*\author[1]{\gdef\@author{#1}}
```

*(End definition for \author. This function is documented on page ??.)*

`\date` `\date` for use in `\maketitle`. If not given `\maketitle` will produce `\today` as the default.

```
9 \DeclareRobustCommand*\date[1]{\gdef\@date{#1}}
```

*(End definition for \date. This function is documented on page ??.)*

`\thanks`

```
10 \DeclareRobustCommand\thanks[1]{\footnotemark
11     \protected@xdef\@thanks{\@thanks
12         \protect\footnotetext[\the\c@footnote]{#1}}%
13 }
```

*(End definition for \thanks. This function is documented on page ??.)*



`\and`

```
14 \DeclareRobustCommand\and{%    % \begin{tabular}
15   \end{tabular}%
16   \hskip 1em \@plus.17fil%
17   \begin{tabular}[t]{c}}%      % \end{tabular}
```

*(End definition for \and. This function is documented on page ??.)*

```
18 </2ekernel | latexrelease>
19 <latexrelease>\EndIncludeInRelease
20 <latexrelease>\IncludeInRelease{0000/00/00}%
21 <latexrelease>                {\title}{Make commands robust}%
22 <latexrelease>
23 <latexrelease>\kernel@make@fragile\title
24 <latexrelease>\kernel@make@fragile\author
25 <latexrelease>\kernel@make@fragile\date
26 <latexrelease>\kernel@make@fragile\thanks
27 <latexrelease>\kernel@make@fragile\and
28 <latexrelease>
29 <latexrelease>\EndIncludeInRelease
30 <*2ekernel>
```

`\@title`

```
31 \def\@title{\@latex@error{No \noexpand\title given}\@ehc}
```

*(End definition for \@title. This function is documented on page ??.)*

`\@author`

```
32 \def\@author{\@latex@warning@no@line{No \noexpand\author given}}
```

*(End definition for \@author. This function is documented on page ??.)*

`\@date`

```
33 \gdef\@date{\today}
```

*(End definition for \@date. This function is documented on page ??.)*

`\@thanks`

```
34 \let\@thanks\@empty
```

*(End definition for \@thanks. This function is documented on page ??.)*

```
35 \message{sectioning,}
```

## 1.2 Sectioning

`\@secpenalty`

```
36 \newcount\@secpenalty
37 \@secpenalty = -300
```

*(End definition for \@secpenalty. This function is documented on page ??.)*

`\if@noskipsec` Way back in 1991 (08/26) FMI & RmS set the `\@noskipsec` switch to true for the  
`\@noskipsectrue` preamble and to false in `\document`. This was done to trap lists and related text in the preamble but it does not catch everything.

```
38 \newif\if@noskipsec \@noskipsectrue
```

(End definition for `\if@noskipsec` and `\@noskipsectrue`. These functions are documented on page ??.)

`\@startsection` The `\@startsection{<name>}{<level>}{<indent>}{<before skip>}{<after skip>}{<style>}`\*[`<altheading>`] `{<heading>}` command is the mother of all the user level sectioning commands. The part after the \*, including the \* is optional.

**name:** e.g., 'subsection'

**level:** a number, denoting depth of section – e.g., chapter = 0, section = 1, etc.

**indent:** Indentation of heading from left margin

**before skip:** Absolute value = skip to leave above the heading. If negative, then paragraph indent of text following heading is suppressed.

**after skip:** if positive, then skip to leave below heading, else negative of skip to leave to right of run-in heading.

**style:** Commands to set style. Since June 1996 release the *last* command in this argument may be a command such as `\MakeUppercase` or `\fbox` that takes an argument. The section heading will be supplied as the argument to this command. So setting #6 to, say, `\bfseries\MakeUppercase` would produce bold, uppercase headings.

If '\*' is missing, then increment the counter. If it is present, then there should be no [`<altheading>`] argument. The command uses the counter 'secnumdepth'. It contains a pointer to the highest section level that is to be numbered.

**Warning:** The `\@startsection` command should be at the same or higher grouping level as the text that follows it. For example, you should *not* do something like

```
\def\foo{ \begingroup ...
           \paragraph{...}
           \endgroup}
```

Pseudocode for the `\@startsection` command *Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments* (not necessarily accurate any more):

```
\@startsection
{NAME}{LEVEL}{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE} ==
BEGIN
  IF @noskipsec = T THEN \leavevmode FI
                                % true if previous section had no body.

  \par
  \@tempskipa := BEFORESKIP
  @afterindent := T
  IF \@tempskipa < 0 THEN \@tempskipa := -\@tempskipa
                                @afterindent := F
  FI
  IF @nobreak = true
    THEN \everypar == null
    ELSE \addpenalty{\@secpenalty}
          \addvspace{\@tempskipa}
  FI
  IF * next
```

```

        THEN \@ssect{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}
        ELSE \@dblarg{\@sect
            {NAME}{LEVEL}{INDENT}
            {BEFORESKIP}{AFTERSKIP}{STYLE}}
    FI
END
End of historical LATEX 2.09 comments.

```

```

39 \def\@startsection#1#2#3#4#5#6{%
40   \if@noskipsec \leavevmode \fi
41   \par
42   \@tempskipa #4\relax
43   \@afterindenttrue
44   \ifdim \@tempskipa <\z@
45     \@tempskipa -\@tempskipa \@afterindentfalse
46   \fi
47   \if@nobreak
48     \everypar{}%
49   \else
50     \addpenalty\@secpenalty\addvspace\@tempskipa
51   \fi
52   \@ifstar
53     {\@ssect{#3}{#4}{#5}{#6}}%
54     {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}

```

*(End definition for \@startsection. This function is documented on page ??.)*

**\@sect** Pseudocode for the \@sect command *Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```

\@sect{NAME}{LEVEL}
    {INDENT}{BEFORESKIP}{AFTERSKIP}
    {STYLE}[ARG1]{ARG2}
    ==
BEGIN
    IF LEVEL > \c@secnumdepth
        THEN \@svsec :=L null
        ELSE \refstepcounter{NAME}
            \@svsec :=L BEGIN \@seccntformat{#1}\relax END
    FI
    IF AFTERSKIP > 0
        THEN \begingroup
            STYLE
            \@hangfrom{\hskip INDENT\@svsec}
            {\interlinepenalty 10000 ARG2\par}
        \endgroup
        \NAMEmark{ARG1}
        \addcontentsline{toc}{NAME}
        { IF LEVEL > \c@secnumdepth
            ELSE \protect\numberline{\theNAME} FI
            ARG1 }
    ELSE \@svsechd == BEGIN STYLE
        \hskip INDENT\@svsec

```

```

ARG2
\NAMEmark{ARG1}
\addcontentsline{toc}{NAME}
{ IF LEVEL > \c@secnumdepth
ELSE
\protect\numberline{\theNAME}
FI
ARG1 }

END

FI
\@xsect{AFTERSKIP}
END
End of historical LATEX 2.09 comments.

55 \def\@sect#1#2#3#4#5#6[#7]#8{%
56 \ifnum #2>\c@secnumdepth
57 \let\@svsec\@empty
58 \else
59 \refstepcounter{#1}%

Since \@secntformat might end with an improper \hskip which is scanning forward
for plus or minus we end the definition of \@svsec with \relax as a precaution.

60 \protected@edef\@svsec{\@secntformat{#1}\relax}%
61 \fi
62 \@tempskipa #5\relax
63 \ifdim \@tempskipa>\z@
64 \begingroup

This { used to be after the argument to \@hangfrom but was moved here to allow com-
mands such as \MakeUppercase to be used at the end of #6.

65 #6{%
66 \@hangfrom{\hskip #3\relax\@svsec}%
67 \interlinepenalty \@M #8\@par}%
68 \endgroup
69 \csname #1mark\endcsname{#7}%
70 \addcontentsline{toc}{#1}{%
71 \ifnum #2>\c@secnumdepth \else
72 \protect\numberline{\csname the#1\endcsname}%
73 \fi
74 #7}%
75 \else

\relax added 2 May 90

76 \def\@svsechd{%
77 #6{\hskip #3\relax
78 \@svsec #8}%
79 \csname #1mark\endcsname{#7}%
80 \addcontentsline{toc}{#1}{%
81 \ifnum #2>\c@secnumdepth \else
82 \protect\numberline{\csname the#1\endcsname}%
83 \fi
84 #7}}%
85 \fi
86 \@xsect{#5}}

```

(End definition for \@sect. This function is documented on page ??.)

`\@xsect` Pseudocode for the `\@xsect` command *Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```

\@xsect{AFTERSKIP} ==
BEGIN
  IF AFTERSKIP > 0
    THEN \par \nobreak
         \vskip AFTERSKIP
         \@afterheading
    ELSE @nobreak :=G F
         @noskipsec :=G T
         \everypar{ IF @noskipsec = T
                     THEN @noskipsec :=G F
                          \clubpenalty := 10000 % local
                          \hskip -\parindent
                          \begingroup
                          \@svsechd
                          \endgroup
                          \unskip
                          \hskip -AFTERSKIP \relax
                          %% relax added 14 Jan 91
                     ELSE \clubpenalty := \@clubpenalty % local
                          \everypar := NULL
                     FI
                   }
         FI
  FI
END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

```

87 \def\@xsect#1{%
88   \@tempskipa #1\relax
89   \ifdim \@tempskipa>\z@

```

Why not combine `\@sect` and `\@xsect` and save doing the same test twice? It is not possible to change this now as these have become hooks!

This `\par` seems unnecessary.

```

90   \par \nobreak
91   \vskip \@tempskipa
92   \@afterheading
93 \else
94   \@nobreakfalse
95   \global\@noskipsectrue
96   \everypar{%
97     \if@noskipsec
98       \global\@noskipsecfalse
99       {\setbox\z@\lastbox}%
100       \clubpenalty\@M
101       \begingroup \@svsechd \endgroup
102       \unskip
103       \@tempskipa #1\relax

```

```

104      \hskip -\@tempskipa
105    \else
106      \clubpenalty \@clubpenalty
107      \everypar{}\%
108    \fi}%
109  \fi
110  \ignorespaces}

```

(End definition for \xsect. This function is documented on page ??.)

**\@secCNTformat** This command formats the section number including the space following it.

```

111 \def\@secCNTformat#1{\csname the#1\endcsname\quad}

```

(End definition for \@secCNTformat. This function is documented on page ??.)

Pseudocode for the \ssect command *Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more)*:

```

\ssect{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}{ARG} ==
BEGIN
  IF AFTERSKIP > 0
    THEN \begingroup
          STYLE
          \@hangfrom{\hskip INDENT}
                {\interlinepenalty 10000 ARG\par}
          \endgroup
    ELSE \@svsechd == BEGIN STYLE
                      \hskip INDENT
                      ARG
                      END
  FI
  \@xsect{AFTERSKIP}
END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

Pseudocode for the \@afterheading command *Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more)*:

```

\@afterheading ==
BEGIN
  @nobreak :=G true
  \everypar := BEGIN IF @nobreak = T
                  THEN @nobreak :=G false
                  \clubpenalty := 10000 % local
                  IF @afterindent = F
                    THEN remove \lastbox
                  FI
                  ELSE \clubpenalty := \@clubpenalty % local
                  \everypar := NULL
                FI
  END
END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

`\@ssect`

```
112 \def\@ssect#1#2#3#4#5{%
113   \@tempkipa #3\relax
114   \ifdim \@tempkipa>\z@
115     \begingroup
This { used to be after the argument to \@hangfrom but was moved here to allow com-
mands such as \MakeUppercase to be used at the end of #4.
116     #4{%
117       \@hangfrom{\hskip #1}%
118       \interlinepenalty \@M #5\@par}%
119     \endgroup
120   \else
121     \def\@svsechd{#4{\hskip #1\relax #5}}%
122   \fi
123   \@xsect{#3}}
```

*(End definition for \@ssect. This function is documented on page ??.)*

`\if@afterindent`

`\@afterindenttrue` 124 `\newif\if@afterindent \@afterindenttrue`

*(End definition for \if@afterindent and \@afterindenttrue. These functions are documented on page ??.)*

`\@afterheading` This hook is used in setting up custom-built headings in classes.dtx.

```
125 \def\@afterheading{%
126   \@nobreaktrue
127   \everypar{%
128     \if@nobreak
129       \@nobreakfalse
130       \clubpenalty \@M
131     \if@afterindent \else
132       {\setbox\z@\lastbox}%
133     \fi
134   \else
135     \clubpenalty \@clubpenalty
136   \everypar{}%
137   \fi}}
```

*(End definition for \@afterheading. This function is documented on page ??.)*

`\@hangfrom` `\@hangfrom{<text>}` : Puts `<text>` in a box, and makes a hanging indentation of the following material up to the first `\par`. Should be used in vertical mode.

```
138 \def\@hangfrom#1{\setbox\@tempboxa\hbox{#1}}%
139   \hangindent \wd\@tempboxa\noindent\box\@tempboxa}
```

*(End definition for \@hangfrom. This function is documented on page ??.)*

`\c@secnumdepth`

`\c@tocdepth` 140 `\newcount\c@secnumdepth`  
141 `\newcount\c@tocdepth`

*(End definition for \c@secnumdepth and \c@tocdepth. These functions are documented on page ??.)*

`\secdef` `\secdef{\unstarcmds}{\unstarcmds}{\starcmds}`

When defining a `\chapter` or `\section` command without using `\@startsection`, you can use `\secdef` as follows:

1. `\def\chapter{... \secdef \starcmd \unstarcmd }`
2. `\def\starcmd[#1]#2{...} % Command to define \chapter[...]{...}`
3. `\def\unstarcmd#1{...} % Command to define \chapter*{...}`

142 `\def\secdef#1#2{\ifstar#2}{\@dblarg{#1}}`

(End definition for `\secdef`. This function is documented on page ??.)

### 1.2.1 Initializations

```
\sectionmark
\subsectionmark 143 \let\sectionmark\@gobble
\subsubsectionmark 144 \let\subsectionmark\@gobble
\paragraphmark 145 \let\subsubsectionmark\@gobble
\subparagraphmark 146 \let\paragraphmark\@gobble
147 \let\subparagraphmark\@gobble
```

(End definition for `\sectionmark` and others. These functions are documented on page ??.)

148 `\message{contents,}`

## 1.3 Table of Contents etc.

### 1.3.1 Convention

`\tf@{foo}` = file number for output for table foo. The file is opened only if `@files` = true.

### 1.3.2 Commands

A `\l@{type}{entry}{page}` Macro needs to be defined by document style for making an entry of type `<type>` in a table of contents, etc. E.g., the document style should define `\l@chapter`, `\l@section`, etc.

**Note:** When the `\protect` command is used in the `<entry>` or `<text>` of one of the commands below, it causes the following control sequence to be written on the file without being expanded. The sequence will be expanded when the table of contents entry is processed.

**Surprise:** Inside an `\addcontentsline` or `\addtocontents` command argument, the commands: `\index`, `\glossary`, and `\label` are no-ops. This could cause a problem if the user puts an `\index` or `\label` into one of the commands he writes, or into the optional ‘short version’ argument of a `\section` or `\caption` command.

`\@starttoc` The `\@starttoc{ext}` command is used to define the commands: `\tableofcontents`, `\listoffigures`, etc.

For example: `\@starttoc{lof}` is used in `\listoffigures`. This command reads the `.ext` file and sets up to write the new `.ext` file.

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

`\@starttoc{EXT} ==`



```

BEGIN
  \begingroup
  \makeatletter
  read file \jobname.EXT
  IF @filesw = true
    THEN open \jobname.EXT as file \tf@EXT
  FI
  @nobreak :=G FALSE %% added 24 May 89
  \endgroup
END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

```

149 \def\@starttoc#1{%
150   \begingroup
151   \makeatletter
152   \@input{\jobname.#1}%
153   \if@filesw
154     \expandafter\newwrite\csname tf@#1\endcsname
155     \immediate\openout \csname tf@#1\endcsname \jobname.#1\relax
156   \fi
157   \@nobreakfalse
158   \endgroup}

```

*(End definition for \@starttoc. This function is documented on page ??.)*

**\addcontentsline** The `\addcontentsline{<table>}{<type>}{<entry>}` command allows the user to add his/her own entry to a table of contents, etc. The command adds the entry `\contentsline{<type>}{<entry>}{<page>}` to the `.<table>` file.

This macro is implemented as an application of `\addtocontents`. Note that `\thepage` is not expandable during `\protected@write` therefore one gets the page number at the time of the `\shipout`.

```

159 </2kernel>
160 <*2kernel | latexrelease>
161 <latexrelease>\IncludeInRelease{2020/10/01}%
162 <latexrelease>          {\addcontentsline}{fourth argument}%
163 \def\addcontentsline#1#2#3{%

```

We add an empty brace pair at the end of `\contentsline` so that the number of argument is identical in documents with and without hyperref.

```

164   \addtocontents{#1}{\protect\contentsline{#2}{#3}{\thepage}}}%
165   \protected@file@percent}}
166 </2kernel | latexrelease>
167 <latexrelease>\EndIncludeInRelease
168 <latexrelease>\IncludeInRelease{2018/12/01}%
169 <latexrelease>          {\addcontentsline}{Mask line endings}%
170 <latexrelease> \def\addcontentsline#1#2#3{%
171 <latexrelease> \addtocontents{#1}{\protect\contentsline{#2}{#3}{\thepage}}%

```

We add `\protected@file@percent` at the end which is turned inside `\@writefile` into a percent character to mask the newline after the closing argument brace.

```

172 <latexrelease>          \protected@file@percent}}
173 <latexrelease>\EndIncludeInRelease
174 <latexrelease>\IncludeInRelease{0000/00/00}%
175 <latexrelease>          {\addcontentsline}{Mask line endings}%

```

```

176 <latexrelease>\def\addcontentsline#1#2#3{%
177 <latexrelease> \addtocontents{#1}{\protect\contentsline{#2}{#3}{\thepage}}
178 <latexrelease>\EndIncludeInRelease
179 <*2ekernel>

```

(End definition for `\addcontentsline`. This function is documented on page ??.)

**\addtocontents** The `\addtocontents{<table>}{<text>}` command adds `<text>` to the `.<table>` file, with no page number.

```

180 \long\def\addtocontents#1#2{%
181   \protected@write\@auxout
182     {\let\label\@gobble \let\index\@gobble \let\glossary\@gobble}%
183     {\string\@writefile{#1}{#2}}}

```

(End definition for `\addtocontents`. This function is documented on page ??.)

**\contentsline** The `\contentsline{<type>}{<entry>}{<page>}` macro produces a `<type>` entry in a table of contents, etc. It will appear in the `.toc` or other file. For example, The entry for subsection 1.4.3 in the table of contents for example, might be produced by:

```

\contentsline{subsection}
{\makebox{30pt}[r]{1.4.3} Gnats and Gnus}{22}

```

The `\protect` command causes command sequences to be written without expanding them.

```

184 \def\contentsline#1{\csname l@#1\endcsname}

```

(End definition for `\contentsline`. This function is documented on page ??.)

`\@dottedtocline{<level>}{<indent>}{<numwidth>}{<title>}{<page>}`: Macro to produce a table of contents line with the following parameters:

**level** If `<level> > \c@tocdepth`, then no line produced.

**indent** Total indentation from the left margin.

**numwidth** Width of box for number if the `<title>` has a `\numberline` command. As of 25 Jan 1988, this is also the amount of extra indentation added to second and later lines of a multiple line entry.

**title** Contents of entry.

**page** Page number.

Uses the following parameters, which must be set by the document style. They should be defined with `\def`'s.

**pnumwidth** Width of box in which page number is set.

**tocrmarg** Right margin indentation for all but last line of multiple-line entries.

**dotsep** Separation between dots, in mu units. Should be `\def`'d to a number like 2 or 1.7

`\@dottedtocline`

```

185 </2ekernel>
186 <*2ekernel | latexrelease>
187 <latexrelease>\IncludeInRelease{2018/12/01}%
188 <latexrelease>          {\@dottedtocline}{Prevent protrusion}%
189 \def\@dottedtocline#1#2#3#4#5{%
190   \ifnum #1>\c@tocdepth \else
191     \vskip \z@ \@plus.2\p@
192     {\leftskip #2\relax \rightskip \@tocrmarg \parfillskip -\rightskip
193     \parindent #2\relax\@afterindenttrue
194     \interlinepenalty\@M
195     \leavevmode
196     \@tempdima #3\relax
197     \advance\leftskip \@tempdima \null\nobreak\hskip -\leftskip
198     {#4}\nobreak
199     \leaders\hbox{$\m@th

```

If a document uses fonts other than computer modern, the use of a dot from math can be very disturbing despite the fact that this might be the only place in a document that then uses computer modern. Therefore we surround the dot with an `\hbox` to escape to the surrounding text font.

```

200       \mkern \@dotsep mu\hbox{.}\mkern \@dotsep
201       mu$}\hfill
202       \nobreak
203       \hb@xt@\@pnumwidth{\hfil\normalfont \normalcolor #5%

```

We finish off by preventing any protrusion if that is enabled. If protrusion happens the number may shift to the right and as a result you may end up with an additional dot in the toc line in some situations.

```

204               \kern-\p@\kern\p@}%
205       \par}%
206       \fi}

```

*(End definition for \@dottedtocline. This function is documented on page ??.)*

**\noprotrusion** This command, if placed directly to the right (or left) of a word, will prevent protrusion of that word into the margin. It is used in the toc entry lines as they shouldn't protrude. It is implemented as to kerns that cancel each other but being there hide the word so that protrusion is not added. Note that a zero kern or an empty box would not work as the protrusion mechanism will skip over those.

```

207 \DeclareRobustCommand\noprotrusion{\leavevmode\kern-\p@\kern\p@}

```

*(End definition for \noprotrusion. This function is documented on page ??.)*

```

208 </2ekernel | latexrelease>
209 <latexrelease>\EndIncludeInRelease
210 <latexrelease>\IncludeInRelease{0000/00/00}%
211 <latexrelease>          {\@dottedtocline}{Prevent protrusion}%
212 <latexrelease>\def\@dottedtocline#1#2#3#4#5{%
213 <latexrelease>  \ifnum #1>\c@tocdepth \else
214 <latexrelease>    \vskip \z@ \@plus.2\p@
215 <latexrelease>    {\leftskip #2\relax \rightskip \@tocrmarg \parfillskip -\rightskip
216 <latexrelease>    \parindent #2\relax\@afterindenttrue
217 <latexrelease>    \interlinepenalty\@M

```

```

218 <latexrelease> \leavevmode
219 <latexrelease> \@tempdima #3\relax
220 <latexrelease> \advance\leftskip \@tempdima \null\nobreak\hskip -\leftskip
221 <latexrelease> {#4}\nobreak
222 <latexrelease> \leaders\hbox{$\m@th
223 <latexrelease> \mkern \@dotsep mu\hbox{.}\mkern \@dotsep
224 <latexrelease> mu$}\hfill
225 <latexrelease> \nobreak
226 <latexrelease> \hb@xt@\@pnumwidth{\hfil\normalfont \normalcolor #5}%
227 <latexrelease> \par}%
228 <latexrelease> \fi}
229 <latexrelease>
230 <latexrelease>\let\noprotrusion\undefined
231 <latexrelease>\EndIncludeInRelease
232 <*2kernel>

```

**Note:** `\nobreak`'s added 7 Jan 86 to prevent bad line break that left the page number dangling by itself at left edge of a new line.

Changed 25 Jan 88 to use `\leftskip` instead of `\hangindent` so leaders of multiple-line contents entries would line up properly.

`\numberline` `\numberline{<number>}`: For use in a `\contentsline` command. It puts `<number>` flush-left in a box of width `\@tempdima` (Before 25 Jan 88 change, it also added `\@tempdima` to the hanging indentation.)

```

233 \def\numberline#1{\hb@xt@\@tempdima{#1\hfil}}
234 </2kernel>

```

(End definition for `\numberline`. This function is documented on page ??.)

# File L

## ltfloat.dtx

### 1 Floats

The different types of floats are identified by a  $\langle type \rangle$  name, which is the name of the counter for that kind of float. For example, figures are of type ‘figure’ and tables are of type ‘table’. Each  $\langle type \rangle$  has associated a positive  $\langle type\ number \rangle$ , which is a power of two. E.g., figures might have type number 1, tables type number 2, programs type number 4, etc.

The locations where a float can go are specified by a  $\langle placement\ specifier \rangle$ , which is a list of the possible locations, each denoted by a letter as follows:

h : here	— at the current location in the text.
t : top	— at the top of a text page.
b : bottom	— at the bottom of a text page.
p : page	— on a separate float page

In addition, in conjunction with these, you can use ‘!’ which means that the current values of the float positioning parameters are ignored for this float. (Has no effect on ‘p’, float page positioning.) For example, ‘pht’ specifies that the float can appear in any of three locations: page, here or top.

#### 1.1 Floating Environments

```
1 \*2kernel
2 \message{floats,}
```

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

Where floats may appear on a page, and how many may appear there are specified by the following float placement parameters. The numbers are named like counters so the user can set them with the ordinary counter-setting commands.

<code>\c@topnumber</code>	: Number of floats allowed at the top of a column.
<code>\topfraction</code>	: Fraction of column that can be devoted to floats.
<code>\c@dbltopnumber, \dbltopfraction</code>	: Same as above, but for double-column floats.
<code>\c@bottomnumber, \bottomfraction</code>	: Same as above for bottom of page.
<code>\c@totalnumber</code>	: Number of floats allowed in a single column, including in-text floats.
<code>\textfraction</code>	: Minimum fraction of column that must contain text.
<code>\floatpagefraction</code>	: Minimum fraction of page that must be taken up by float page.
<code>\dblfloatpagefraction</code>	: Same as above, for double-column floats.

The document style must define the following.

`\fps@TYPE` : The default placement specifier for floats of type TYPE.

`\ftype@TYPE` : The type number for floats of type TYPE.

`\ext@TYPE` : The file extension indicating the file on which the contents list for float type TYPE is stored.  
For example, `\ext@figure = 'lof'`.

`\fnum@TYPE` : A macro to generate the figure number for a caption.  
For example, `\fnum@TYPE == Figure \thefigure`.

`\@makecaption{NUM}{TEXT}` :  
A macro to make a caption, with NUM the value produced by `\fnum@...` and TEXT the text of the caption. It can assume it's in a `\parbox` of the appropriate width.

`\@float{TYPE}[PLACEMENT]` : This macro begins a float environment for a single-column float of type TYPE with PLACEMENT as the placement specifier. The default value of PLACEMENT is defined by `\fps@TYPE`. The environment is ended by `\end@float`.  
E.g., `\figure == \@float{figure}, \endfigure == \end@float`.

```
\@float{TYPE}[PLACEMENT] ==
BEGIN
  if hmode then \@bsphack
    \@floatpenalty := -10002
  else \@floatpenalty := -10003
  fi
  \@captype ==L TYPE
  \@dblflset
  \@fps ==L PLACEMENT
  \@onelevel@sanitize \@fps
  add default PLACEMENT if at most ! in PLACEMENT ==
\@fpsadddefault
  if inner
    then LaTeX Error: 'Not in outer paragraph mode.'
    \@floatpenalty := 0
  else if \@freelist nonempty
    then \@currbox :=L head of \@freelist
    \@freelist :=G tail of \@freelist
    \count\@currbox :=G 32*\ftype@TYPE +
                                bits determined by PLACEMENT
    else \@floatpenalty := 0
    LaTeX Error: 'Too many unprocessed floats'
  fi
fi
\@currbox :=G \color@vbox
```

```

\normalcolor
\ vbox{
  %% 15 Dec 87 -
  %% removed \boxmaxdepth :=L 0pt
  %% that made box 0 depth because it screwed
  %% things up. Instead, added \vskip0pt at end
  \hsize = \columnwidth
  \@parboxrestore
  \@floatboxreset
END

\caption ==
BEGIN
  \refstepcounter{\@capttype}
  \@dblarg{\@caption{\@capttype}}
END

```

In following definition, `\par` moved from after `\addcontentsline` to before `\addcontentsline` because the `\write` could cause an extra blank line to be added to the paragraph above the caption. (Change made 12 Jun 87)

```

\@caption{TYPE}[STEXT]{TEXT} ==
BEGIN
  \par
  \addcontentsline{\ext@TYPE}{TYPE}{\numberline{\theTYPE}{STEXT}}
  \begingroup
    \@parboxrestore
    \@normalsize
    \@makecaption{\fnum@TYPE}{TEXT}
  \par
  \endgroup
END

```

`\@dblfloat{TYPE}[PLACEMENT]` : Macro to begin a float environment for a double-column float of type TYPE with PLACEMENT as the placement specifier. The default value of PLACEMENT is 'tp'

The environment is ended by `\end@dblfloat`.

E.g., `\figure* == \@dblfloat{figure}`,  
`\endfigure* == \end@dblfloat`.

```

\@dblfloat{TYPE}[PLACEMENT] ==
  Identical to \@float{TYPE}[PLACEMENT] except \hsize and \linewidth
  are set to \textwidth.

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

`\@floatpenalty`

```

3 \newcount\@floatpenalty

```

*(End definition for \@floatpenalty. This function is documented on page ??.)*

`\caption` This is set to be an error message outside a float since no `captype` is defined there; this may need to be changed by some classes.

```

4 \def\caption{%
5   \ifx\@captype\@undefined
6     \latexerror{\noexpand\caption outside float}\@ehd
7     \expandafter\@gobble
8   \else
9     \refstepcounter\@captype
10    \expandafter\@firstofone
11  \fi
12  {\@dblarg{\@caption\@captype}}%
13 }
```

(End definition for `\caption`. This function is documented on page ??.)

`\@caption`

```

14 \long\def\@caption#1[#2]#3{%
15   \par
16   \addcontentsline{\csname ext@#1\endcsname}{#1}%
17   {\protect\numberline{\csname the#1\endcsname}{\ignorespaces #2}}%
18   \begingroup
```

The paragraph setting parameters are normalised at this point, however `\@parboxrestore` resets `\everypar` which is not correct in this context so `\@setminipage` is called if needed.

The float mechanism, like `minipage`, sets the flag `@minipage` true before executing the user-supplied text. Many L<sup>A</sup>T<sub>E</sub>X constructs test for this flag and do not add vertical space when it is true. The intention is that this emulates T<sub>E</sub>X's ‘top of page’ behaviour. The flag must be set false at the start of the first paragraph. This is achieved by a redefinition of `\everypar`, but the call to `\@parboxrestore` removes that redefinition, so it is re-inserted if needed. If the flag is already false then the `\caption` was not the first entry in the float, and so some other paragraph has already activated the special `\everypar`. In this case no further action is needed.

```

19   \@parboxrestore
20   \if@minipage
21     \@setminipage
22   \fi
23   \normalsize
24   \@makecaption{\csname fnum@#1\endcsname}{\ignorespaces #3}\par
25   \endgroup}
```

(End definition for `\@caption`. This function is documented on page ??.)

`\@float`  
`\@dblflset`

```

26 \def\@float#1{%
27   \@ifnextchar[%
28     {\@xfloat{#1}}%
29     {\edef\reserved@a{\noexpand\@xfloat{#1}[\csname fps@#1\endcsname]}}%
30     \reserved@a}}
```

(End definition for `\@float` and `\@dblflset`. These functions are documented on page ??.)

`\@dblfloat`

```

31 \def\@dblfloat{%
32   \if@twocolumn\let\reserved@a\@dblft\else\let\reserved@a\@float\fi
33   \reserved@a}
```



(End definition for \@dblfloat. This function is documented on page ??.)

`\fps@dbl` Note that all double floats have default fps ‘tp’.

(End definition for \fps@dbl. This function is documented on page ??.)

`\@setfps` This sets the fps, dealing with error conditions by adding the default.

(End definition for \@setfps. This function is documented on page ??.)

`\@xfloat` The first part of this sets the count register that stores all the information about the type and fps of the float.

We assume here that the default specifiers already contain no active characters.

It may be better to store the defaults as numbers, rather than symbol strings.

```

34 </2ekernel>
35 <latexrelease>\IncludeInRelease{2015/01/01}%
36 <latexrelease>          {\@xfloat}{Check float options}%
37 <*2ekernel | latexrelease>
38 \def\@xfloat #1[#2]{%
39   \@nodocument
40   \def \@capytype {#1}%
41   \def \@fps {#2}%
42   \@onelevel@sanitize \@fps
43   \def \reserved@a {!}%
44   \ifx \reserved@a \@fps
45     \fpsadddefault
46   \else
47     \ifx \@fps \@empty
48       \fpsadddefault
49     \fi
50   \fi
51   \ifhmode
52     \bsphack
53     \@floatpenalty -\@Mii
54   \else
55     \@floatpenalty-\@Miii
56   \fi
57   \ifinner
58     \@parmoderr\@floatpenalty\z@
59   \else
60     \@next\@currbox\@freelist
61     {%
62       \@tempcnta \sixt@@n
63       \expandafter \@tfor \expandafter \reserved@a
64       \expandafter : \expandafter =\@fps
65       \do

```

Start of changes, use a nested if structure, ending in an error.

```

66       {%
67       \if \reserved@a h%
68       \ifodd \@tempcnta
69       \else
70       \advance \@tempcnta \@ne
71       \fi

```

```

72         \else\if \reserved@a t%
73             \@setfpsbit \tw@
74         \else\if \reserved@a b%
75             \@setfpsbit 4%
76         \else\if \reserved@a p%
77             \@setfpsbit 8%
78         \else\if \reserved@a !%
79             \ifnum \@tempcnta>15
80                 \advance\@tempcnta -\sixt@@n\relax
81             \fi
82         \else
83             \@latex@error{Unknown float option ‘\reserved@a’}%
84             {Option ‘\reserved@a’ ignored and ‘p’ used.}%
85             \@setfpsbit 8%
86         \fi\fi\fi\fi\fi
87     }%

```

End of changes

```

88         \@tempcntb \csname ftype@\@capttype \endcsname
89         \multiply \@tempcntb \@xxxii
90         \advance \@tempcnta \@tempcntb
91         \global \count\@currbox \@tempcnta
92     }%
93     \@fltovf
94 \fi

```

The remainder sets up the box in which the float is typeset, and the typesetting environment to be used. It is essential to have the extra box to avoid the unwanted space that would otherwise often be put at the top of the float.

It ends with a hook; not sure how useful this is but it is needed at present to deal with double-column floats.

```

95     \global \setbox\@currbox
96         \color@vbox
97         \normalcolor
98         \vbox \bgroup
99             \hsize\columnwidth
100             \@parboxrestore
101             \@floatboxreset
102     }%
103 </2ekernel | latexrelease>
104 <latexrelease>\EndIncludeInRelease
105 <latexrelease>\IncludeInRelease{0000/00/00}%
106 <latexrelease>          {\@xfloat}{Check float options}%
107 <latexrelease>\def\@xfloat #1[#2]{%
108 <latexrelease>    \@nodocument
109 <latexrelease>    \def \@capttype {#1}%
110 <latexrelease>    \def \@fps {#2}%
111 <latexrelease>    \@onelevel@sanitize \@fps
112 <latexrelease>    \def \reserved@b {!}%
113 <latexrelease>    \ifx \reserved@b \@fps
114 <latexrelease>        \@fpsadddefault
115 <latexrelease>    \else
116 <latexrelease>        \ifx \@fps \@empty
117 <latexrelease>            \@fpsadddefault

```

```

118 <latexrelease> \fi
119 <latexrelease> \fi
120 <latexrelease> \ifhmode
121 <latexrelease> \@bsphack
122 <latexrelease> \@floatpenalty -\@Mii
123 <latexrelease> \else
124 <latexrelease> \@floatpenalty-\@Miii
125 <latexrelease> \fi
126 <latexrelease> \ifinner
127 <latexrelease> \@parmoderr\@floatpenalty\z@
128 <latexrelease> \else
129 <latexrelease> \@next\@currbox\@freelist
130 <latexrelease> {%
131 <latexrelease> \@tempcnta \sixt@@n
132 <latexrelease> \expandafter \@tfor \expandafter \reserved@a
133 <latexrelease> \expandafter :\expandafter =\@fps
134 <latexrelease> \do
135 <latexrelease> {%
136 <latexrelease> \if \reserved@a h%
137 <latexrelease> \ifodd \@tempcnta
138 <latexrelease> \else
139 <latexrelease> \advance \@tempcnta \@ne
140 <latexrelease> \fi
141 <latexrelease> \fi
142 <latexrelease> \if \reserved@a t%
143 <latexrelease> \@setfpsbit \tw@
144 <latexrelease> \fi
145 <latexrelease> \if \reserved@a b%
146 <latexrelease> \@setfpsbit 4%
147 <latexrelease> \fi
148 <latexrelease> \if \reserved@a p%
149 <latexrelease> \@setfpsbit 8%
150 <latexrelease> \fi
151 <latexrelease> \if \reserved@a !%
152 <latexrelease> \ifnum \@tempcnta>15
153 <latexrelease> \advance\@tempcnta -\sixt@@n\relax
154 <latexrelease> \fi
155 <latexrelease> \fi
156 <latexrelease> }%
157 <latexrelease> \@tempcntb \csname ftype@\@capttype \endcsname
158 <latexrelease> \multiply \@tempcntb \@xxxii
159 <latexrelease> \advance \@tempcnta \@tempcntb
160 <latexrelease> \global \count\@currbox \@tempcnta
161 <latexrelease> }%
162 <latexrelease> \fltovf
163 <latexrelease> \fi
164 <latexrelease> \global \setbox\@currbox
165 <latexrelease> \color@vbox
166 <latexrelease> \normalcolor
167 <latexrelease> \vbox \bgroup
168 <latexrelease> \hsize\columnwidth
169 <latexrelease> \@parboxrestore
170 <latexrelease> \@floatboxreset
171 <latexrelease> }%

```

```

172 <latexrelease>\EndIncludeInRelease
173 <*2kernel>

```

(End definition for \@xfloat. This function is documented on page ??.)

**\@floatboxreset** The rationale for allowing these normally global flags to be set locally here, via **\@parboxrestore**, was stated originally by Donald Arseneau and extended by Chris Rowley. It is because these flags are only set globally to true by section commands, and these should never appear within marginals or floats or, indeed, in any group; and they are only ever set globally to false when they are definitely true.

If anyone is unhappy with this argument then both flags should be treated as in **\set@nobreak**; otherwise this command will be redundant.

```

174 \def \@floatboxreset {%
175     \reset@font
176     \normalsize
177     \@setminipage
178 }

```

(End definition for \@floatboxreset. This function is documented on page ??.)

**\@setnobreak**

```

179 \def \@setnobreak{%
180     \if@nobreak
181         \let\outer@nobreak\@nobreaktrue
182         \@nobreakfalse
183     \fi
184 }

```

(End definition for \@setnobreak. This function is documented on page ??.)

**\@setminipage**

```

185 \def \@setminipage{%
186     \@minipagetrue
187     \everypar{\@minipagefalse\everypar{}}%
188 }

```

(End definition for \@setminipage. This function is documented on page ??.)

**\end@float**

```

189 \def\end@float{%
190     \@endfloatbox
191     \ifnum\@floatpenalty <\z@

```

We make sure that we never exceed **\textheight**, otherwise float will never get typeset (91/03/15 FMi).

```

192     \@largefloatcheck
193     \@cons\@currlist\@currbox
194     \ifnum\@floatpenalty <-\@Mii
195         \penalty -\@Miv

```

Saving and restoring **\prevdepth** added 26 May 87 to prevent extra vertical space when used in vertical mode.

```

196     \@tempdima\prevdepth
197     \vbox{}%
198     \prevdepth\@tempdima

```

```

199     \penalty\@floatpenalty

200     \else
201     \vadjust{\penalty -\@Miv \vbox{}\penalty\@floatpenalty}\@Esphack
202     \fi
203     \fi
204 }

```

(End definition for \end@float. This function is documented on page ??.)

\end@dblfloat

```

205 </2ekernel>
206 <latexrelease>\IncludeInRelease{2015/01/01}%
207 <latexrelease>           {\end@dblfloat}{float order in 2-column}%
208 <*2ekernel | latexrelease>
209 \def\end@dblfloat{%
210     \if@twocolumn
211     \endfloatbox
212     \ifnum\@floatpenalty <\z@
213     \@largefloatcheck

    Force the depth of two column float boxes.
214     \global\dp\@currbox1sp %
What follows is essentially \end@float without a starting \endfloatbox.
215     \@cons\@currlist\@currbox
216     \ifnum\@floatpenalty <-\@Mii
217     \penalty -\@Miv
218     \@tempdima\prevdepth
219     \vbox{}%
220     \prevdepth\@tempdima
221     \penalty\@floatpenalty
222     \else
223     \vadjust{\penalty -\@Miv \vbox{}\penalty\@floatpenalty}\@Esphack
224     \fi

225     \fi
226     \else
227     \end@float
228     \fi
229 }%
230 </2ekernel | latexrelease>
231 <latexrelease>\EndIncludeInRelease
232 <latexrelease>\IncludeInRelease{0000/00/00}%
233 <latexrelease>           {\end@dblfloat}{float order in 2-column}%
234 <latexrelease>\def\end@dblfloat{%
235 <latexrelease>\if@twocolumn
236 <latexrelease> \endfloatbox
237 <latexrelease> \ifnum\@floatpenalty <\z@

```

We make sure that we never exceed \textheight, otherwise float will never get typeset (91/03/15 FMi).

```

238 <latexrelease> \@largefloatcheck
239 <latexrelease> \@cons\@dbldeferlist\@currbox
240 <latexrelease> \fi

```

RmS 92/03/18 changed \@esphack to \@Esphack.

```
241 <latexrelease>    \ifnum \@floatpenalty =-\@Mii \@Esphack\fi
242 <latexrelease>\else
243 <latexrelease>    \end@float
244 <latexrelease>\fi
245 <latexrelease>}%
246 <latexrelease>\EndIncludeInRelease
247 <*2ekernel>
```

*(End definition for \enddblfloat. This function is documented on page ??.)*

**\@endfloatbox** This macro is not intended to be a hook; it is designed to help maintain the integrity of this code, which is used twice and, as can be seen, is subject to frequent changes.

```
248 \def \@endfloatbox{%
249     \par\vskip\z@skip      %% \par\vskip\z@ added 15 Dec 87

250     \@minipagefalse
251     \outer@nobreak
252     \egroup                %% end of vbox
253     \color@endbox
254 }
```

*(End definition for \@endfloatbox. This function is documented on page ??.)*

**\outer@nobreak**

```
255 \let\outer@nobreak\@empty
```

*(End definition for \outer@nobreak. This function is documented on page ??.)*

**\@largefloatcheck** This calculates by how much a float is oversize for the page and prints this in a warning message.

```
256 \def \@largefloatcheck{%
257     \ifdim \ht\@currbox>\textheight
258         \@tempdima -\textheight
259         \advance \@tempdima \ht\@currbox

260         \@latex@warning {Float too large for page by \the\@tempdima}%
261         \ht\@currbox \textheight
262     \fi
263 }
```

*(End definition for \@largefloatcheck. This function is documented on page ??.)*

**\@dbflt**

**\@xdblfloat**

```
264 \def\@dbflt#1{\@ifnextchar[{\@xdblfloat{#1}}{\@xdblfloat{#1}[tp]}}
265 \def\@xdblfloat#1[#2]{%
266     \@xfloat{#1}[#2]\hsize\textwidth\linewidth\textwidth}
```

*(End definition for \@dbflt and \@xdblfloat. These functions are documented on page ??.)*

Moved to ltoutput 93/12/16

```
267 %\newcount\c@topnumber
268 %\newcount\c@dbltopnumber
269 %\newcount\c@bottomnumber
270 %\newcount\c@totalnumber
```

`\@floatplacement` An analysis of `\@floatplacement`:  
This should be called whenever `\@colht` has been set.

```

271 \def\@floatplacement{\global\@topnum\c@topnumber
272   % Textpage bit, global:
273   \global\@toproom \topfraction\@colht
274   \global\@botnum \c@bottomnumber
275   \global\@botroom \bottomfraction\@colht
276   \global\@colnum \c@totalnumber
277   % Floatpage bit, local:
278   \@fpmin \floatpagefraction\@colht}
279 \endkernel

```

(End definition for `\@floatplacement`. This function is documented on page ??.)

`\@dblfloatplacement` This should be called only within a group. Now changed to provide extra checks in `\@addtodblcol`, needed when processing a BANG float.

```

280 \latexrelease\IncludeInRelease{2015/01/01}%
281 \latexrelease \@dblfloatplacement{float order in 2-column}%
282 \endkernel\latexrelease

```

When making two column float area, look for floats with 1sp depth.

```

283 \def\@dblfloatplacement{\global\@dbltopnum\c@dbltopnumber
284   \global\@dbltoproom \dbltopfraction\@colht
285   \@textmin \@colht
286   \advance \@textmin -\@dbltoproom
287   \@fpmin \dblfloatpagefraction\textheight
288   \fptop \@dblfpptop
289   \fpsep \@dblfpsep
290   \fpbot \@dblfpbot

```

`\f@depth` is used in `\@testwrongwidth` to look for either column or dbl-column floats. A value of 1sp signals the latter. Because of this setting here, `\@dblfloatplacement` needs to be called inside a group which is a questionable design.

```

291 \def\f@depth{1sp}%
292 \endkernel\latexrelease
293 \latexrelease\EndIncludeInRelease
294 \latexrelease\IncludeInRelease{0000/00/00}%
295 \latexrelease \@dblfloatplacement{float order in 2-column}%
296 \latexrelease\def \@dblfloatplacement {%

```

Textpage bit: global, but need not be.

```

297 \latexrelease \global \@dbltopnum \c@dbltopnumber
298 \latexrelease \global \@dbltoproom \dbltopfraction\@colht

```

This new bit uses `\@textmin` to locally store the amount of extra room in the column.

```

299 \latexrelease \@textmin \@colht
300 \latexrelease \advance \@textmin -\@dbltoproom

```

Floatpage bit: must be local.

```

301 \latexrelease \@fpmin \dblfloatpagefraction\textheight
302 \latexrelease \fptop \@dblfpptop
303 \latexrelease \fpsep \@dblfpsep
304 \latexrelease \fpbot \@dblfpbot
305 \latexrelease}%
306 \latexrelease\EndIncludeInRelease
307 \endkernel

```

(End definition for `\dblfloatplacement`. This function is documented on page ??.)  
 Historical *LaTeX* 2.09 comments (not necessarily accurate any more):

#### MARGINAL NOTES:

Marginal notes use the same mechanism as floats to communicate with the `\output` routine. Marginal notes are distinguished from floats by having a negative placement specification. The command `\marginpar [LTEXT]{RTEXT}` generates a marginal note in a parbox, using LTEXT if it's on the left and RTEXT if it's on the right. (Default is RTEXT = LTEXT.) It uses the following parameters.

`\marginparwidth` : Width of marginal notes.  
`\marginparsep` : Distance between marginal note and text.  
                   the page layout to determine how to move the marginal  
                   note into the margin. E.g., `\@leftmargin skip ==`  
                   `\hskip -\marginparwidth \hskip -\marginparsep` .  
`\marginparpush` : Minimum vertical separation between `\marginpar`'s

Marginal notes are normally put on the outside of the page if `@mparswitch = true`, and on the right if `@mparswitch = false`. The command `\reversemarginpar` reverses the side where they are put. `\normalmarginpar` undoes `\reversemarginpar`. These commands have no effect for two-column output.

SURPRISE: if two marginal notes appear on the same line of text, then the second one could appear on the next page, in a funny position.

```
\marginpar [LTEXT]{RTEXT} ==
BEGIN
  if hmode then \bsphack
                \@floatpenalty := -10002
                else \@floatpenalty := -10003
  fi
  if inner
    then LaTeX Error: 'Not in outer paragraph mode.'
    \@floatpenalty := 0
  else if \@freelist has two elements:
    then get \@marbox, \@currbox from \@freelist
    \count\@marbox :=G -1
    else \@floatpenalty := 0
    LaTeX Error: 'Too many unprocessed floats'
    \@currbox, \@marbox := \@tempboxa    %%use \def
  fi
fi
if optional argument
then %% \@xmpar ==
  \@savemarbox\@marbox{LTEXT}
  \@savemarbox\@currbox{RTEXT}
```



```

        else %% \@ympar ==
            \@savemarbox\@marbox{RTEXT}
            \box\@currbox :=G \box\@marbox
        fi
        \@xympar
    END

\reversemarginpar == BEGIN \@mparbottom :=G 0
                        @reversemargin :=G true
                        END

\normalmarginpar == BEGIN \@mparbottom :=G 0
                        @reversemargin :=G false
                        END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

**\marginpar**

```

308 \def\marginpar{%
309   \ifhmode
310     \@bsphack
311     \@floatpenalty -\@Mii
312   \else
313     \@floatpenalty-\@Miii
314   \fi
315   \ifinner
316     \@parmoderr
317     \@floatpenalty\z@
318   \else
319     \@next\@currbox\@freelist{}\{}%
320     \@next\@marbox\@freelist{\global\count\@marbox\m@ne}%
321     {\@floatpenalty\z@
322       \@fltovf\def\@currbox{\@tempboxa}\def\@marbox{\@tempboxa}}%
323   \fi
324   \@ifnextchar [\@xmpar\@ympar}

```

*(End definition for \marginpar. This function is documented on page ??.)*

**\@xmpar**

```

325 \long\def\@xmpar[#1]#2{%
326   \@savemarbox\@marbox{#1}%
327   \@savemarbox\@currbox{#2}%
328   \@xympar}

```

*(End definition for \@xmpar. This function is documented on page ??.)*

**\@ympar**

```

329 \long\def\@ympar#1{%
330   \@savemarbox\@marbox{#1}%
331   \global\setbox\@currbox\copy\@marbox
332   \@xympar}

```

*(End definition for \@ympar. This function is documented on page ??.)*

`\@savemarbox`

```
333 \long\def \@savemarbox #1#2{%
334   \global\setbox #1%
335     \color@vbox
336     \vtop{%
337       \hsize\marginparwidth
338       \@parboxrestore
339       \@marginparreset
340       #2%
341       \@minipagefalse
342       \outer@nobreak
343     }%
344   \color@endbox
345 }
```

*(End definition for \@savemarbox. This function is documented on page ??.)*

`\@marginparreset`

The rationale for allowing these normally global flags to be set locally here, via `\@parboxrestore` was stated originally by Donald Arsenau and extended by Chris Rowley. It is because these flags are only set globally to true by section commands, and these should never appear within marginals or floats or, indeed, in any group; and they are only ever set globally to false when they are definitely true.

If anyone is unhappy with this argument then both flags should be treated as in `\set@nobreak`; otherwise this command will be redundant.

```
346 \def \@marginparreset {%
347   \reset@font
348   \normalsize
349   % \let@if@nobreak\iffalse
350   % \let@if@noskipsec\iffalse
351   % \set@nobreak
352   \set@minipage
353 }
```

*(End definition for \@marginparreset. This function is documented on page ??.)*

`\@xympar`

Setting the box here is done only because the code uses `\end@float`; it will be empty and gets discarded.

```
354 \def \@xympar{%
355   \ifnum\@floatpenalty <\z@\@cons\@currlist\@marbox\fi
356   \setbox\@tempboxa
357     \color@vbox
358     \vbox \bgroup
359   \end@float
360   \@ignorefalse
361   \esphack
362 }
```

*(End definition for \@xympar. This function is documented on page ??.)*

`\reversemarginpar`

`\normalmarginpar`

```
363 \def\reversemarginpar{\global\@parbottom\z@ \@reversemargintrue}
364 \def\normalmarginpar{\global\@parbottom\z@ \@reversemarginfalse}
```

(End definition for `\reversemarginpar` and `\normalmarginpar`. These functions are documented on page ??.)

365 `\message{footnotes,}`

## 1.2 Footnotes

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

`\footnote{NOTE}` : User command to insert a footnote.

`\footnote[NUM]{NOTE}`: User command to insert a footnote numbered *NUM*, where *NUM* is a number – 1, 2, etc. For example, if footnotes are numbered \*, \*\*, etc. within pages, then `\footnote[2]{...}` produces footnote '\*\*'. This command does not step the footnote counter.

`\footnotemark[NUM]` : Command to produce just the footnote mark in the text, but no footnote. With no argument, it steps the footnote counter before generating the mark.

`\footnotetext[NUM]{TEXT}` : Command to produce the footnote but no mark. `\footnote` is equivalent to `\footnotemark \footnotetext` .

As in PLAIN, footnotes use `\insert\footins`, and the following parameters:

`\footnotesize` : Size-changing command for footnotes.

`\footnotesep` : The height of a strut placed at the beginning of every footnote.

`\skip\footins` : Space between main text and footnotes. The rule separating footnotes from text occurs in this space. This space lies above the strut of height `\footnotesep` which is at the beginning of the first footnote.

`\footnoterule` : Macro to draw the rule separating footnotes from text. It is executed right after a `\vspace` of `\skip\footins`. It should take zero vertical space–i.e., it should to a negative skip to compensate for any positive space it occupies. (See PLAIN.TEX.)

`\interfootnotelinepenalty` : Interline penalty for footnotes.

`\thefootnote` : In usual L<sup>A</sup>T<sub>E</sub>X style, produces the footnote number. If footnotes are to be numbered within pages, then the document style file must include an `\@addtoreset`

command to cause the footnote counter to be reset when the page counter is stepped. This is not a good idea, though, because the counter will not always be reset in time to ensure that the first footnote on a page is footnote number one.

`\@thefnmark` : Holds the current footnote's mark—e.g., `\dag` or `'1'` or `'a'`.

`\@mpfnnumber` : A macro that generates the numbers for `\footnote` and `\footnotemark` commands. It == `\thefootnote` outside a minipage environment, but can be changed inside to generate numbers for `\footnote`'s.

`\@makefnmark` : A macro to generate the footnote marker from `\@thefnmark`. The default definition was `\hbox{$^\@thefnmark$}`.

This is now replaced by  
`\textsuperscript{\@thefnmark}`

`\@makefntext{NOTE}` :

Must produce the actual footnote, using `\@thefnmark` as the mark of the footnote and `NOTE` as the text. It is called when effectively inside a `\parbox`, with `\hsize = \columnwidth`.

For example, it might be as simple as  
`$^\@thefnmark$ NOTE`

In a minipage environment, `\footnote` and `\footnotetext` are redefined so that

(a) they use the counter `mpfootnote`

(b) the footnotes they produce go at the bottom of the minipage.

The switch is accomplished by letting `\@mpfn == footnote` or `mpfootnote` and `\thempfn == \thefootnote` or `\thempfootnote`, and by redefining `\@footnotetext` to be `\@mpfootnotetext` in the minipage.

```
\footnote{NOTE} ==
BEGIN
  \stepcounter{\@mpfn}
  begingroup
    \protect == \noexpand
    \@thefnmark :=G eval (\thempfn)
  endgroup
  \@footnotemark
  \@footnotetext{NOTE}
END
```

```
\footnote[NUM]{NOTE} ==
BEGIN
```

```

begingroup
  \protect == \noexpand
  counter \@mpfn :=L NUM
  \@thefnmark :=G eval (\thempfn)
endgroup
\@footnotemark
\@footnotetext{NOTE}
END

\footnotemark ==
BEGIN \stepcounter{footnote}
begingroup
  \protect == \noexpand
  \@thefnmark :=G eval(\thefootnote)
endgroup
\@footnotemark
END

\footnotemark[NUM] ==
BEGIN
begingroup
  footnote counter :=L NUM
  \protect == \noexpand
  \@thefnmark :=G eval(\thefootnote)
endgroup
\@footnotemark
END

\@footnotemark ==
BEGIN
\leavevmode
IF hmode THEN \@x@sf := \the\spacefactor FI
\@makefnmark % put number in main text
IF hmode THEN \spacefactor := \@x@sf FI
END

\footnotetext ==
BEGIN begingroup \protect == \noexpand
  \@thefnmark :=G eval (\thempfn)
endgroup
\@footnotetext
END

\footnotetext[NUM] ==
BEGIN begingroup counter \@mpfn :=L NUM
  \protect == \noexpand
  \@thefnmark :=G eval (\thempfn)
endgroup
\@footnotetext
END

```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

`\footins` L<sup>A</sup>T<sub>E</sub>X does use the same insert for footnotes as PLAIN.

```
366 \newinsert\footins
```

L<sup>A</sup>T<sub>E</sub>X leaves these initializations for the `\footins` insert.

```
367 \skip\footins=\bigskipamount % space added when footnote is present
```

```
368 \count\footins=1000 % footnote magnification factor (1 to 1)
```

```
369 \dimen\footins=8in % maximum footnotes per page
```

*(End definition for \footins. This function is documented on page ??.)*

`\footnoterule` L<sup>A</sup>T<sub>E</sub>X keeps PLAIN T<sub>E</sub>X's `\footnoterule` as the default.

```
370 \def\footnoterule{\kern-3\p@
```

```
371   \hrule \@width 2in \kern 2.6\p@} % the \hrule is .4pt high
```

*(End definition for \footnoterule. This function is documented on page ??.)*

`\thefootnote`

```
372 \@definecounter{footnote}
```

```
373 \def\thefootnote{\@arabic\c@footnote}
```

*(End definition for \thefootnote. This function is documented on page ??.)*

`\thempfootnote` The default display for the footnote counter in minipages is to use italic letters. We use `\itshape` not `\textit` as the latter would add an italic correction.

```
374 \@definecounter{mpfootnote}
```

```
375 \def\thempfootnote{{\itshape\@alph\c@mpfootnote}}
```

*(End definition for \thempfootnote. This function is documented on page ??.)*

`\@makefnmark` Default definition.

```
376 %\def\@makefnmark{\hbox{$^{\@thefnmark}\m@th$}}
```

```
377 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}
```

*(End definition for \@makefnmark. This function is documented on page ??.)*

`\textsuperscript` This command provides superscript characters in the current text font. It's implementation might change!!!

```
378 \DeclareRobustCommand*\textsuperscript[1]{%
```

```
379   \@textsuperscript{\selectfont#1}}
```

*(End definition for \textsuperscript. This function is documented on page ??.)*

`\@textsuperscript` This command should not be used directly, but may be used to define other commands `\textsuperscript`, `\@makefnmark`. #1 should always start with a font selection command, to activate the font size switch.

```
380 </2ekernel>
```

```
381 <*2ekernel | latexrelease>
```

```
382 <latexrelease>\IncludeInRelease{2020/10/01}%
```

```
383 <latexrelease>          {\@textsuperscript}{superscript baseline}%
```

```
384 \def\@textsuperscript#1{%
```

```
385   {\m@th\ensuremath{\^{\mbox{\fontsize\sf@size\sf@size#1}}}}}
```

```
386 </2ekernel | latexrelease>
```

```
387 <latexrelease>\EndIncludeInRelease
```

```

388 <latexrelease>\IncludeInRelease{0000/00/00}%
389 <latexrelease>          {\@textsuperscript}{superscript baseline}%
390 <latexrelease>
391 <latexrelease>\def\@textsuperscript#1{%
392 <latexrelease>  {\m@th\ensuremath{\sim\mbox{\fontsize\sf@size\z@#1}}}}
393 <latexrelease>\EndIncludeInRelease
394 <*2ekernel>

```

(End definition for \@textsuperscript. This function is documented on page ??.)

\textsubscript

```

395 </2ekernel>
396 <latexrelease>\IncludeInRelease{2015/01/01}%
397 <latexrelease>          {\textsubscript}{\textsubscript}%
398 <*2ekernel | latexrelease>
399 \DeclareRobustCommand*\textsubscript[1]{%
400   \@textsubscript{\selectfont#1}}%
401 </2ekernel | latexrelease>
402 <latexrelease>\EndIncludeInRelease
403 <latexrelease>\IncludeInRelease{0000/00/00}%
404 <latexrelease>          {\textsubscript}{\textsubscript}%
405 <latexrelease>\let\textsubscript\undefined
406 <latexrelease>\EndIncludeInRelease
407 <*2ekernel>

```

(End definition for \textsubscript. This function is documented on page ??.)

\@textsubscript

```

408 </2ekernel>
409 <*2ekernel | latexrelease>
410 <latexrelease>\IncludeInRelease{2020/10/01}%
411 <latexrelease>          {\@textsubscript}{subscript baseline}%
412 \def\@textsubscript#1{%
413   {\m@th\ensuremath{\_ {\mbox{\fontsize\sf@size\sf@size#1}}}}}
414 </2ekernel | latexrelease>
415 <latexrelease>\EndIncludeInRelease
416 <latexrelease>\IncludeInRelease{2015/01/01}%
417 <latexrelease>          {\@textsubscript}{subscript baseline}%
418 <latexrelease>
419 <latexrelease>\def\@textsubscript#1{%
420 <latexrelease>  {\m@th\ensuremath{\_ {\mbox{\fontsize\sf@size\z@#1}}}}}
421 <latexrelease>\EndIncludeInRelease
422 <latexrelease>\IncludeInRelease{0000/00/00}%
423 <latexrelease>          {\@textsubscript}{subscript baseline}%
424 <latexrelease>\let\@textsubscript\undefined
425 <latexrelease>\EndIncludeInRelease
426 <*2ekernel>

```

(End definition for \@textsubscript. This function is documented on page ??.)

\footnotesep

```

427 \newdimen\footnotesep

```

(End definition for \footnotesep. This function is documented on page ??.)

\footnote

```
428 \def\footnote{\@ifnextchar[\@xfootnote{\stepcounter\@mpfn
429   \protected@xdef\@thefnmark{\thempfn}%
430   \@footnotemark\@footnotetext}}
```

(End definition for \footnote. This function is documented on page ??.)

\@xfootnote

```
431 \def\@xfootnote[#1]{%
432   \begingroup
433     \csname c@\@mpfn\endcsname #1\relax
434     \unrestored@protected@xdef\@thefnmark{\thempfn}%
435   \endgroup
436   \@footnotemark\@footnotetext}
```

(End definition for \@xfootnote. This function is documented on page ??.)

\@footnotetext

```
437 \long\def\@footnotetext#1{\insert\footins{%
438   \reset@font\footnotesize
439   \interlinepenalty\interfootnotelinepenalty
440   \splittopskip\footnotesep
441   \splitmaxdepth \dp\strutbox \floatingpenalty \@MM
442   \hsize\columnwidth \@parboxrestore
443   \protected@edef\@currentlabel{%
444     \csname p@footnote\endcsname\@thefnmark
445   }%
446   \color@begingroup
447     \@makefntext{%
448       \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
449   \color@endgroup}}%
```

(End definition for \@footnotetext. This function is documented on page ??.)

\footnotemark

```
450 \def\footnotemark{%
451   \@ifnextchar[\@xfootnotemark
452     {\stepcounter{footnote}%
453     \protected@xdef\@thefnmark{\thefootnote}%
454     \@footnotemark}}
```

(End definition for \footnotemark. This function is documented on page ??.)

\@xfootnotemark

```
455 \def\@xfootnotemark[#1]{%
456   \begingroup
457     \c@footnote #1\relax
458     \unrestored@protected@xdef\@thefnmark{\thefootnote}%
459   \endgroup
460   \@footnotemark}
```

(End definition for \@xfootnotemark. This function is documented on page ??.)



`\@footnotemark`

```
461 \def\@footnotemark{%  
462   \leavevmode  
463   \ifhmode\edef\x@sf{\the\spacefactor}\nobreak\fi  
464   \@makefnmark  
465   \ifhmode\spacefactor\x@sf\fi  
466   \relax}
```

*(End definition for \@footnotemark. This function is documented on page ??.)*

`\footnotetext`

```
467 \def\footnotetext{%  
468   \ifnextchar [\xfootnotenext  
469   {\protected@xdef\@thefnmark{\thempfn}%  
470   \@footnotetext}}
```

*(End definition for \footnotetext. This function is documented on page ??.)*

`\xfootnotenext`

```
471 \def\xfootnotenext[#1]{%  
472   \begingroup  
473   \csname c@\mpfn\endcsname #1\relax  
474   \unrestored@protected@xdef\@thefnmark{\thempfn}%  
475   \endgroup  
476   \@footnotetext}
```

*(End definition for \xfootnotenext. This function is documented on page ??.)*

`\thempfn`

`\@mpfn`

```
477 \def\@mpfn{footnote}  
478 \def\thempfn{\thefootnote}  
479 \</2ekernel>
```

*(End definition for \thempfn and \@mpfn. These functions are documented on page ??.)*

## File M

# ltidxglo.dtx

## 1 Index and Glossary Generation

Index and Glossary commands.

<code>\makeindex</code>	A preamble command to turn on indexing.
<code>\makeglossary</code>	A preamble command to turn on making glossary entries.
<code>\index</code>	Make an index entry for #1.
<code>\glossary</code>	Make a glossary entry for #1.

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```
\makeindex ==
  BEGIN
    \index == BEGIN \@bsphack
                \begingroup
                \protect{X} == \string X\space
                %% added 3 Feb 87 for \index commands
                %% in \footnotes
                re-\catcode special characters
                to 'other'
                \@wrindex

  END

\@wrindex{ITEM} ==
  BEGIN
    write of {\indexentry{ITEM}{page number}}
  \endgroup
  \@esphack
  END

INITIALIZATION:

\index == BEGIN \@bsphack
            \begingroup
            re-\catcode special characters (in case '%' there)
            \@index

  END

\@index{ITEM} == BEGIN \endgroup \@esphack END
```

Changes made 14 Apr 89 to write `\glossaryentry`'s instead of  
`\indexentry`'s on the .glo file.

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

```
1 \<*2kernel)
2 \message{index,}
```

`\makeindex`

```
3 \def\makeindex{%
4   \newwrite\@indexfile
5   \immediate\openout\@indexfile=\jobname.idx
6   \def\index{\@bsphack\beginingroup
7     \@sanitize
8     \@wrindex}\typeout
9     {Writing index file \jobname.idx}}%
```

Opening the write channel should be done only once since on some OS multiple opens are forbidden and in any case it is useless. So we turn this into a no-op after use.

```
10   \let\makeindex\@empty
11 }
12 \@onlypreamble\makeindex
```

*(End definition for \makeindex. This function is documented on page ??.)*

`\@wrindex`

```
13 \def\@wrindex#1{%
14   \protected@write\@indexfile{%
15     {\string\indexentry{#1}{\thepage}}}%
16   \endgroup
17   \@esphack}
```

*(End definition for \@wrindex. This function is documented on page ??.)*

`\index`

```
18 \def\index{\@bsphack\beginingroup \@sanitize\@index}
```

*(End definition for \index. This function is documented on page ??.)*

`\@index`

```
19 \def\@index#1{\endgroup\@esphack}
```

*(End definition for \@index. This function is documented on page ??.)*

`\makeglossary`

```
20 \def\makeglossary{%
21   \newwrite\@glossaryfile
22   \immediate\openout\@glossaryfile=\jobname.glo
23   \def\glossary{\@bsphack\beginingroup
24     \@sanitize
25     \@wrglossary}\typeout
26     {Writing glossary file \jobname.glo }}%
```

Opening the write channel should be done only once since on some OS multiple opens are forbidden and in any case it is useless. So we turn this into a no-op after use.

```
27   \let\makeglossary\@empty
28 }
29 \@onlypreamble\makeglossary
```

*(End definition for \makeglossary. This function is documented on page ??.)*

`\@wrglossary`

```
30 \def\@wrglossary#1{%  
31   \protected@write\@glossaryfile{%  
32     {\string\glossaryentry{#1}{\thepage}}%  
33   \endgroup  
34   \@esphack}
```

*(End definition for \@wrglossary. This function is documented on page ??.)*

`\glossary`

```
35 \def\glossary{\@bsphack\begin@group\@sanitize\@index}
```

*(End definition for \glossary. This function is documented on page ??.)*

```
36 \</2kernel>
```

## File N

# ltbibl.dtx

## 1 Bibliography Generation

A bibliography is created by the `thebibliography` environment, which generates a title such as “References”, and a list of entries. The `BIBTEX` program will create a file containing such an environment, which will be read in by the `\bibliography` command. With `BIBTEX`, the following commands will be used.

<code>\bibliography</code>	<code>\bibliography{&lt;file1,file2, ...,filen&gt;}</code> : specifies the bibdata files. Writes a <code>\bibdata</code> entry on the <code>.aux</code> file and tries to read in <code>mainfile.bbl</code> .
<code>\bibliographystyle</code>	<code>\bibliographystyle{&lt;style&gt;}</code> : Writes a <code>\bibstyle</code> entry on the <code>.aux</code> file.
<code>thebibliography</code>	The <code>thebibliography</code> environment is a list environment. To save the use of an extra counter, it should use <code>enumiv</code> as the item counter. Instead of using <code>\item</code> , items in the bibliography are produced by the following commands:

`\bibitem{<name>}` : Produces a numbered entry cited as `<name>`.

`\bibitem[<label>]{<name>}` : Produces an entry labeled by `<Label>` and cited by `<name>`.

The former is used for bibliographies with citations like [1], [2], etc.; the latter is used for citations like [Knuth82].

The document class must define the `thebibliography` environment. This environment has a single argument, which is the widest bibliography label— e.g., if the [Knuth67] is the widest entry, then this argument will be Knuth67. The `\thebibliography` command must begin a list environment, which the `\endthebibliography` command ends.

<code>\cite</code>	Entries are cited by the command <code>\cite{&lt;name&gt;}</code> .
<code>\nocite</code>	<code>\nocite{&lt; citations&gt;}</code> puts information on the <code>.aux</code> file that causes <code>BIBTEX</code> to include the <code>{&lt; citations&gt;}</code> list in the bibliography, but puts nothing in the text.

`\nocite{*}` is special: it tells `BIBTEX` to put the whole of a collection of references into the bibliography.

```
1 <*2kernel>
2 \message{bibliography,}
```

*Historical  $\LaTeX$  2.09 comments (not necessarily accurate any more):*

### PARAMETERS

`\@cite` : A macro such that `\@cite{LABEL1,LABEL2}{NOTE}` produces the output for a `\cite[NOTE]{FOO1,FOO2}` command, where entry `FOOi` is defined by `\bibitem[LABELi]{FOOi}`.

The switch `@tempswa` is true if the optional `NOTE` argument is present.

The default definition is :

```
\@cite{LABELS}{NOTE} ==
  BEGIN [LABELS
    IF @tempswa = T THEN , NOTE FI
  ]
END
```

`\@biblabel` : A macro to produce the label in the bibliography entry. For `\bibitem[LABEL]{NAME}`, the label is

generated by `\@biblabel{LABEL}`. It has the default definition `\@biblabel{LABEL} -> [LABEL]`.

#### CONVENTION

`\b@F00` : The name or number of the reference created by `\cite{FOO}`  
 E.g., if `\cite{FOO} -> [17]` , then `\b@F00 -> 17`.

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

`\bibitem`

```
3 \def\bibitem{\@ifnextchar[\@lbibitem\@bibitem}
```

*(End definition for \bibitem. This function is documented on page ??.)*

`\@lbibitem`

```
4 \def\@lbibitem[#1]#2{\item[\@biblabel{#1}\hfill]\if@filesw
5   {\let\protect\noexpand
6     \immediate
7     \write\@auxout{\string\bibcite{#2}{#1}}}\fi\ignorespaces}
```

*(End definition for \@lbibitem. This function is documented on page ??.)*

`\@bibitem`

```
8 \def\@bibitem#1{\item\if@filesw \immediate\write\@auxout
9   {\string\bibcite{#1}{\the\value{\@listctr}}}\fi\ignorespaces}
```

*(End definition for \@bibitem. This function is documented on page ??.)*

`\bibcite`

```
10 \def\bibcite{\@newl@bel b}
```

*(End definition for \bibcite. This function is documented on page ??.)*

`\citation`

```
11 \let\citation\@gobble
```

*(End definition for \citation. This function is documented on page ??.)*

`\cite`

```
12 \DeclareRobustCommand\cite{%
13   \@ifnextchar [{\@tempswatrue\@citex}{\@tempswafalse\@citex[]}]}
```

*(End definition for \cite. This function is documented on page ??.)*

`\@citex` `\penalty\@m` added to definition of `\@citex` to allow a line break after the ‘,’ in citations like [Jones80,Smith77] (Added 23 Oct 86)  
 space added after the ‘,’ (21 Nov 87)

```
14 \def\@citex[#1]#2{\leavevmode
15   \let\@citea\@empty
16   \@cite{\@for\@citeb:=#2\do
17     {\@citea\def\@citea{\penalty\@m\ }%
18     \edef\@citeb{\expandafter\@firstofone\@citeb\@empty}}%
19     \if@filesw\immediate\write\@auxout{\string\citation{\@citeb}}}\fi}
```

Using `\hbox` instead of `\mbox` is fine because of the `\leavevmode` above. In fact the use of a box around the citation contents is more than questionable in my view (FMi), but within 2e I have to keep that for compatibility reasons as it would probably change too many existing documents. Its main reason is to avoid hyphenation of labels such as [FOOB89] into [FOO- B89] so in certain styles it makes sense; but, for example, in author year citations it becomes more than questionable.

So Chris added yet another hook here, as suggested by, at least, Donald Arsenau. Note that this one is inside the first argument of the `\@cite` hook. This decouples the top-level typesetting of the citation from the details of the other business conducted here. All this really needs a complete rethink to get the right modularity.

```

20      \ifundefined{b@\@citeb}{\hbox{\reset@font\bfseries ?}%
21      \G@refundefinedtrue
22      \@latex@warning
23      {Citation ‘\@citeb’ on page \thepage \space undefined}}%
24      {\@cite@ofmt{\csname b@\@citeb\endcsname}}}{#1}}

```

*(End definition for \@citex. This function is documented on page ??.)*

```

\bigdata
\bigstyle
25 \let\bigdata=\@gobble
26 \let\bigstyle=\@gobble

```

*(End definition for \bigdata and \bigstyle. These functions are documented on page ??.)*

```

\bibliography
27 \def\bibliography#1{%
28   \if@filesw
29     \immediate\write\@auxout{\string\bibdata{\zap@space#1 \@empty}}%
30   \fi
31   \@input@{\jobname.bbl}}

```

*(End definition for \bibliography. This function is documented on page ??.)*

```

\bibliographystyle
32 \def\bibliographystyle#1{%
33   \ifx\@begindocumenthook\@undefined\else
34     \expandafter\AtBeginDocument
35   \fi
36   {\if@filesw
37     \immediate\write\@auxout{\string\bibstyle{#1}}%
38   \fi}}

```

*(End definition for \bibliographystyle. This function is documented on page ??.)*

`\nocite` (Added 14 Jun 85)

This puts information on the `.aux` file that causes `BIBTEX` to include the citation list in the bibliography, but puts nothing in the text.

RmS 93/08/06: Made loop for `\nocite` like that for `\@citex`, to get rid of leading spaces.

```

39 \def\nocite#1{\@bsphack

```

With the implementation designed already in L<sup>A</sup>T<sub>E</sub>X 2.09 the `\nocite` command will not work before `\begin{document}` since it tries to write to the `.aux` file which is not open before that point. As a result the “reference” will appear on the terminal and nothing else will happen.

This would be easy to fix, but then a document using the fix will silently fail on an older release of L<sup>A</sup>T<sub>E</sub>X, missing all citations done with `\nocite`. Thus we do only generate an error message and leave the fix for a L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> successor.

```
40 \ifx\@onlypreamble\document
```

Since we are after `\begin{document}` we can do the citations:

```
41 \@for\@citeb:=#1\do{%
42   \edef\@citeb{\expandafter\@firstofone\@citeb}%
43   \if@files\immediate\write\@auxout{\string\citation{\@citeb}}\fi
44   \@ifundefined{b@\@citeb}{\G@refundefinedtrue
45     \latex@warning{Citation ‘\@citeb’ undefined}}{}%
46   \else
```

But before `\begin{document}` we raise an error message:

```
47 \latex@error{Cannot be used in preamble}\@eha
```

Without the compatibility problems we could fix the problem as follows:

```
48 % \AtBeginDocument{\nocite{#1}}
49 \fi
50 \esphack}
```

Since `\nocite{*}` should not produce a warning about undefined citation keys (see PR 557), we need to set the control sequence ‘`\b@*`’ to something other than `\relax`. As a result `\cite{*}` will not warn either (but that never worked with BIB<sub>T</sub><sub>E</sub>X in the first place).

```
51 \expandafter\let\csname b@*\endcsname\@empty
```

*(End definition for \nocite. This function is documented on page ??.)*

## 1.1 Default definitions

This hook determines the ‘relative formatting’ of the two logical parts of a citation with comment.

`\@cite`

```
52 \def\@cite#1#2{[#1\if@tempswa , #2\fi]}
```

*(End definition for \@cite. This function is documented on page ??.)*

`\@cite@ofmt`

This is, in general, a command that appears to have one argument whose value is, in the kernel, a single cs whose name is the expansion of `b@\@citeb`; the expansion of this cs will typically be some hmode material that produces the detailed typeset form of just the citations themselves.

```
53 \let\@cite@ofmt\hbox
```

*(End definition for \@cite@ofmt. This function is documented on page ??.)*

`\@biblabel`

```
54 \def\@biblabel#1{[#1]}
55 \</2kernel)
```

*(End definition for \@biblabel. This function is documented on page ??.)*



## File O

# ltpage.dtx

## 1 Page styles and related commands

### 1.1 Page Style Commands

`\pagestyle{<style>}` : sets the page style of the current and succeeding pages to *style*

`\thispagestyle{<style>}` : sets the page style of the current page only to *style*.

To define a page style *style*, you must define `\ps@style` to set the page style parameters.

### 1.2 How a page style makes running heads and feet

The `\ps@...` command defines the macros `\@oddhead`, `\@oddfoot`, `\@evenhead`, and `\@evenfoot` to define the running heads and feet. (See output routine.) To make headings determined by the sectioning commands, the page style defines the commands `\chaptermark`, `\sectionmark`, etc., where `\chaptermark{<text>}` is called by `\chapter` to set a mark. The `\...mark` commands and the `\...head` macros are defined with the help of the following macros.

(All the `\...mark` commands should be initialized to no-ops.)

### 1.3 marking conventions

L<sup>A</sup>T<sub>E</sub>X extends T<sub>E</sub>X's `\mark` facility by producing two kinds of marks a 'left' and a 'right' mark, using the following commands:

`\markboth{<left>}{<right>}` : Adds both marks.

`\markright{<right>}` : Adds a 'right' mark.

`\leftmark` : Used in the output routine, gets the current 'left' mark. Works like T<sub>E</sub>X's `\botmark`.

`\rightmark` : Used in the output routine, gets the current 'right' mark. Works like T<sub>E</sub>X's `\firstmark`. The marking commands work reasonably well for right marks 'numbered within' left marks—e.g., the left mark is changed by a `\chapter` command and the right mark is changed by a `\section` command. However, it does produce somewhat anomalous results if 2 `\markboth`'s occur on the same page.

Commands like `\tableofcontents` that should set the marks in some page styles use a `\@mkboth` command, which is `\let` by the `\pagestyle` command (`\ps@...`) to `\markboth` for setting the heading or to `\@gobbletwo` to do nothing.

1 `<*2ekernel>`

`\pagestyle` User command to set the page style for this and following pages.

```
2 \def\pagestyle#1{%
3   \@ifundefined{ps@#1}%
4     \undefinedpagestyle
5     {\@nameuse{ps@#1}}}
```

(End definition for `\pagestyle`. This function is documented on page ??.)

`\thispagestyle` User command to set the page style for this page only.

```

6 \def\thispagestyle#1{%
7   \ifundefined{ps@#1}%
8     \undefinedpagestyle
9     {\global\@specialpagetrue\gdef\@specialstyle{#1}}

```

*(End definition for \thispagestyle. This function is documented on page ??.)*

`\ps@empty` The empty page style: No head or foot line.

```

10 \def\ps@empty{%
11   \let\@mkboth\@gobbletwo\let\@oddhead\@empty\let\@oddfoot\@empty
12   \let\@evenhead\@empty\let\@evenfoot\@empty}

```

*(End definition for \ps@empty. This function is documented on page ??.)*

`\ps@plain` The plain page style: No head, centred page number in foot.

```

13 \def\ps@plain{\let\@mkboth\@gobbletwo
14   \let\@oddhead\@empty\def\@oddfoot{\reset@font\hfil\thepage
15   \hfil}\let\@evenhead\@empty\let\@evenfoot\@oddfoot}

```

*(End definition for \ps@plain. This function is documented on page ??.)*

`\@leftmark` We implement `\@leftmark` and `\@rightmark` in terms of already defined commands to  
`\@rightmark` save token space. We can't get rid of them since they are sometimes used in applications.

```

16 \let\@leftmark\@firstoftwo
17 \let\@rightmark\@secondoftwo

```

*(End definition for \@leftmark and \@rightmark. These functions are documented on page ??.)*

```

18 </2ekernel>
19 <*2ekernel | latexrelease>
20 <latexrelease>\IncludeInRelease{2019/10/01}%
21 <latexrelease>          {\markboth}{Make commands robust}%

```

`\markboth` User commands for setting L<sup>A</sup>T<sub>E</sub>X marks.

`\markright` Test for `\@nobreak` added 15 Apr 86 in `\markboth` and `\markright` letting `\label` and `\index` to `\relax` added 22 Feb 86 so these commands can appear in sectioning command arguments RmS 91/06/21 Same for `\glossary`

```

22 \DeclareRobustCommand*\markboth[2]{%
23   \begingroup
24     \let\label\relax \let\index\relax \let\glossary\relax
25     \unrestored@protected@xdef\@themark {\{#1\}{#2}}%
26     \@temptokena \expandafter{\@themark}%
27     \mark{\the\@temptokena}%
28   \endgroup
29   \if@nobreak\ifvmode\nobreak\fi\fi}

```

```

30 \DeclareRobustCommand*\markright[1]{%
31   \begingroup
32     \let\label\relax \let\index\relax \let\glossary\relax

```

Protection is handled inside `\@markright`.

```

33   \expandafter\@markright\@themark {#1}%
34   \@temptokena \expandafter{\@themark}%
35   \mark{\the\@temptokena}%
36 \endgroup
37 \if@nobreak\ifvmode\nobreak\fi\fi}

```

(End definition for `\markboth` and `\markright`. These functions are documented on page ??.)

```

38 </2ekernel | latexrelease>
39 <latexrelease>\EndIncludeInRelease
40 <latexrelease>\IncludeInRelease{0000/00/00}%
41 <latexrelease>                {\markboth}{Make commands robust}%
42 <latexrelease>
43 <latexrelease>\kernel@make@fragile\markboth
44 <latexrelease>\kernel@make@fragile\markright
45 <latexrelease>
46 <latexrelease>\EndIncludeInRelease
47 <*2ekernel>

```

```

\@markright
\leftmark 48 \def\@markright#1#2#3{\@temptokena {#1}%
\rightmark 49 \unrestored@protected@xdef\@themark{\the\@temptokena}{#3}}
50 \def\leftmark{\expandafter\@leftmark\botmark\@empty\@empty}
51 \def\rightmark{\expandafter\@rightmark\firstmark\@empty\@empty}

```

(End definition for `\@markright`, `\leftmark`, and `\rightmark`. These functions are documented on page ??.)

```

\@themark Initialise LATEX's marks without setting a TEX mark <whatsit>.
52 \def\@themark{\{}{\}}

```

(End definition for `\@themark`. This function is documented on page ??.)

`\mark` Test versions of L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> initialised T<sub>E</sub>X's `\mark` system at this point, but this was removed before the first release.

```

AtBeginDocument{\mark{\{}{\}}

```

(End definition for `\mark`. This function is documented on page ??.)

`\raggedbottom` `\raggedbottom` typesets pages with no vertical stretch, so they have their natural height instead of all being exactly the same height. (Uses a space of .0001fil to avoid interfering with the 1fil space of `\newpage`.)

```

53 \DeclareRobustCommand\raggedbottom{%
54   \def\@textbottom{\vskip \z@ \@plus.0001fil}\let\@texttop\relax}

```

(End definition for `\raggedbottom`. This function is documented on page ??.)

`\flushbottom` `\flushbottom`: Inverse of `\raggedbottom` — makes all pages the same height.

```

55 \DeclareRobustCommand\flushbottom{%
56   \let\@textbottom\relax \let\@texttop\relax}

```

(End definition for `\flushbottom`. This function is documented on page ??.)

`\sloppy` `\sloppy` will never (well, hardly ever) produce overfull boxes, but may produce underfull ones. (14 June 85)

```

57 \DeclareRobustCommand\sloppy{%
58   \tolerance 9999%
59   \emergencystretch 3em%
60   \hfuzz .5\p@
61   \vfuzz\hfuzz}

```

*(End definition for \sloppy. This function is documented on page ??.)*

**sloppypar** A sloppypar environment is equivalent to `{\par \sloppy ... \par}`.

```
62 \def\sloppypar{\par\sloppy}
```

```
63 \def\endsloppypar{\par}
```

**\fussy** Resets T<sub>E</sub>X's parameters to their normal finicky values.

```
64 \DeclareRobustCommand\fussy{%
```

```
65   \emergencystretch\z@
```

```
66   \tolerance 200%
```

```
67   \hfuzz .1\p@
```

```
68   \vfuzz\hfuzz}
```

*(End definition for \fussy. This function is documented on page ??.)*

**\overfullrule** L<sup>A</sup>T<sub>E</sub>X default is no overfull box rule. Changed by document class option.

```
69 \overfullrule 0pt
```

*(End definition for \overfullrule. This function is documented on page ??.)*

```
70 </2ekernel>
```

# File P

## ltclass.dtx

### 1 Introduction

This file implements the following declarations, which replace `\documentstyle` in  $\text{\LaTeX} 2_{\epsilon}$  documents.

Note that old documents containing `\documentstyle` will be run using a compatibility option—thus keeping everyone happy, we hope!

The overall idea is that there are two types of ‘style files’: ‘class files’ which define elements and provide a default formatting for them; and ‘packages’ which provide extra functionality. One difference between  $\text{\LaTeX} 2_{\epsilon}$  and  $\text{\LaTeX} 2.09$  is that  $\text{\LaTeX} 2_{\epsilon}$  packages may have options. Note that options to classes/packages may be implemented such that they input files, but these file names are not necessarily directly related to the option name.

### 2 User interface

`\documentclass[<main-option-list>]{<class>}[<version>]`

There must be exactly one such declaration, and it must come first. The *<main-option-list>* is a list of options which can modify the formatting of elements which are defined in the *<class>* file as well as in all following `\usepackage` declarations (see below). The *<version>* is a version number, beginning with a date in the format YYYY/MM/DD. If an older version of the class is found, a warning is issued.

`\documentstyle[<main-option-list>]{<class>}[<version>]`

The `\documentstyle` declaration is kept in order to maintain upward compatibility with  $\text{\LaTeX} 2.09$  documents. It is similar to `\documentclass`, but it causes all options in *<main-option-list>* that the *<class>* does not use to be passed to `\RequirePackage` after the options have been processed. This maintains compatibility with the 2.09 behaviour. Also a flag is set to indicate that the document is to be processed in  $\text{\LaTeX} 2.09$  compatibility mode. As far as most packages are concerned, this only affects the warnings and errors  $\text{\LaTeX}$  generates. This flag does affect the definition of font commands, and `\sloppy`.

`\usepackage[<package-option-list>]{<package-list>}[<version>]`

There can be any number of these declarations. All packages in *<package-list>* are called with the same options.

Each *<package>* file defines new elements (or modifies those defined in the *<class>*), and thus extends the range of documents which can be processed. The *<package-option-list>* is a list of options which can modify the formatting of elements defined in the *<package>* file. The *<version>* is a version number, beginning with a date in the format YYYY/MM/DD. If an older version of the package is found, a warning is issued.

Each package is loaded only once. If the same package is requested more than once, nothing happens, unless the package has been requested with options that were not given the first time it was loaded, in which case an error is produced.

As well as processing the options given in the *<package-option-list>*, each package processes the *<main-option-list>*. This means that options that affect all of the packages can be given globally, rather than repeated for every package.

`filecontents`

Note that class files have the extension `.cls`, packages have the extension `.sty`.

The environment `filecontents` is intended for passing the contents of packages, options, or other files along with a document in a single file. It has one argument, which is the name of the file to create. If that file already exists (maybe only in the current directory if the OS supports a notion of a ‘current directory’ or ‘default directory’) then nothing happens (except for an information message) and the body of the environment is bypassed. Otherwise, the body of the environment is written verbatim to the file name given as the first argument, together with some comments about how it was produced.

The environment can also be called with an optional argument which is used to alter some of its behavior: option `force` or `overwrite` will allow for overwriting existing files, option `nosearch` will only check the current directory when looking if the file exists. This can be useful if you want to generate a local (modified) copy of some file that is already in the search tree of  $\text{\TeX}$ . Finally, you can use `noheader` to prevent it from writing the standard blurb at the top of the file (this is actually the same as using the star form of the environment).

The environment is now allowed anywhere in the document, but to ensure that all packages or options necessary are available when the document is run, it is normally best to place it at the top of your file (before `\documentclass`). A possible use case for using it inside the document body is if you want to reuse some text several times in the document you could then write it and later use `\input` to retrieve it where needed.

The begin and end tags should each be on a line by itself.

## 2.1 Option processing

When the options are processed, they are divided into two types: *local* and *global*:

- For a class, the options in the `\documentclass` command are local.
- For a package, the options in the `\usepackage` command are local, and the options in the `\documentclass` command are global.

The options for `\documentclass` and `\usepackage` are processed in the following way:

1. The local and global options that have been declared (using `\DeclareOption` as described below) are processed first.

In the case of `\ProcessOptions`, they are processed in the order that they were declared in the class or package.

In the case of `\ProcessOptions*`, they are processed in the order that they appear in the option-lists. First the global options, and then the local ones.

2. Any remaining local options are dealt with using the default option (declared using the `\DeclareOption*` declaration described below). For document classes, this usually does nothing, but records the option on a list of unused options. For packages, this usually produces an error.

Finally, when `\begin{document}` is reached, if there are any global options which have not been used by either the class or any package, the system will produce a warning.

## 3 Class and Package interface

### 3.1 Class name and version

`\ProvidesClass` A class can identify itself with the `\ProvidesClass{<name>}[<version>]` command. The `<version>` should begin with a date in the format YYYY/MM/DD.

### 3.2 Package name and version

`\ProvidesPackage` A package can identify itself with the `\ProvidesPackage{<name>}[<version>]` command. The `<version>` should begin with a date in the format YYYY/MM/DD.

### 3.3 Requiring other packages

`\RequirePackage` Packages or classes can load other packages using `\RequirePackage[<options>]{<name>}[<version>]`. If the package has already been loaded, then nothing happens unless the requested options are not a subset of the options with which it was loaded, in which case an error is called.

`\LoadClass` Similar to `\RequirePackage`, but for classes, may not be used in package files.

`\PassOptionsToPackage` Packages can pass options to other packages using:

`\PassOptionsToPackage{<options>}{<package>}`.

`\PassOptionsToClass` This adds the `<options>` to the options list of any future `\RequirePackage` or `\usepackage` command. For example:

```
\PassOptionsToPackage{foo,bar}{fred}
```

is the same as:

```
\RequirePackage[foo,bar,baz]{fred}
```

`\LoadClassWithOptions` `\LoadClassWithOptions{<name>}[<version>]:`

This is similar to `\LoadClass`, but it always calls class `<name>` with exactly the same option list that is being used by the current class, rather than an option explicitly supplied or passed on by `\PassOptionsToClass`. `\RequirePackageWithOptions` is the analogous command for packages.

This is mainly intended to allow one class to simply build on another, for example:

```
\LoadClassWithOptions{article}
```

This should be contrasted with the slightly different construction

```
\DeclareOption*{\PassOptionsToClass{\CurrentOption}{article}}
\ProcessOptions
\LoadClass{article}
```

As used here, the effects are more or less the same, but the version using `\LoadClassWithOptions` is slightly quicker (and less to type). If, however, the class declares options of its own then the two constructions are different; compare, for example:

```
\DeclareOption{landscape}{...}
\ProcessOptions
\LoadClassWithOptions{article}
```

with:

```
\DeclareOption{landscape}{...}
\DeclareOption*{\PassOptionsToClass{\CurrentOption}{article}}
\ProcessOptions
\LoadClass{article}
```

In the first case, the `article` class will be called with option `landscape` precisely when the current class is called with this option; but in the second example it will not as in that case `article` is only passed options by the default option handler, which is not used for `landscape` as that option is explicitly declared.

<pre>\@ifpackageloaded \@ifclassloaded \@ifpackagelater \@ifclasslater \@ifpackagewith \@ifclasswith</pre>	<pre>To find out if a package has already been loaded, use \@ifpackageloaded{&lt;package&gt;}{&lt;true&gt;}{&lt;false&gt;}. To find out if a package has already been loaded with a version equal to or more recent than &lt;version&gt;, use \@ifpackagelater{&lt;package&gt;}{&lt;version&gt;}{&lt;true&gt;}{&lt;false&gt;}. To find out if a package has already been loaded with at least the options &lt;options&gt;, use \@ifpackagewith{&lt;package&gt;}{&lt;options&gt;}{&lt;true&gt;}{&lt;false&gt;}.</pre>
------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

There exists one package that can't be tested with the above commands: the `fontenc` package pretends that it was never loaded to allow for repeated reloading with different options (see `ltoutenc.dtx` for details).

### 3.4 Declaring new options

Options for classes and packages are built using the same macros.

<pre>\DeclareOption \DeclareOption*</pre>	<pre>To define a builtin option, use \DeclareOption{&lt;name&gt;}{&lt;code&gt;}. To define the default action to perform for local options which have not been declared, use \DeclareOption*{&lt;code&gt;}.</pre>
-------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

*Note:* there should be no use of

```
\RequirePackage, \DeclareOption, \DeclareOption* or \ProcessOptions
inside \DeclareOption or \DeclareOption*.
```

Possible uses for `\DeclareOption*` include:

```
\DeclareOption*{}
```

Do nothing. Silently accept unknown options. (This suppresses the usual warnings.)

```
\DeclareOption*{@unkownoptionerror}
```

Complain about unknown local options. (The initial setting for package files.)

```
\DeclareOption*{\PassOptionsToPackage{\CurrentOption}{<pkg-name>}}
```

Handle the current option by passing it on to the package `<pkg-name>`, which will presumably be loaded via `\RequirePackage` later in the file. This is useful for building 'extension' packages, that perhaps handle a couple of new options, but then pass everything else on to an existing package.

```
\DeclareOption*{\InputIfFileExists{xx-\CurrentOption.yyy}%
{}%
{\OptionNotUsed}}
```

Handle the option `foo` by loading the file `xx-foo.yyy` if it exists, otherwise do nothing, but declare that the option was not used. Actually the `\OptionNotUsed` declaration is only needed if this is being used in class files, but does no harm in package files.



### 3.5 Safe Input Macros

<code>\InputIfFileExists</code>	<code>\InputIfFileExists{&lt;file&gt;}{&lt;then&gt;}{&lt;else&gt;}</code> Inputs <code>&lt;file&gt;</code> if it exists. Immediately before the input, <code>&lt;then&gt;</code> is executed. Otherwise <code>&lt;else&gt;</code> is executed.
<code>\IfFileExists</code>	As above, but does not input the file. One thing you might like to put in the <code>&lt;else&gt;</code> clause is
<code>\@missingfileerror</code>	This starts an interactive request for a filename, supplying default extensions. Just hitting return causes the whole input to be skipped and entering <code>x</code> quits the current run,
<code>\input</code>	This has been redefined from the L <sup>A</sup> T <sub>E</sub> X 2.09 definition, in terms of the new commands <code>\InputIfFileExists</code> and <code>\@missingfileerror</code> .
<code>\listfiles</code>	Giving this declaration in the preamble causes a list of all files input via the ‘safe input’ commands to be listed at the end. Any strings specified in the optional argument to <code>\ProvidesPackage</code> are listed alongside the file name. So files in standard (and other non-standard) distributions can put informative strings in this argument.

## 4 Implementation

	<code>1 &lt;*2ekernel&gt;</code>
<code>\if@compatibility</code>	The flag for compatibility mode. <code>2 \newif\if@compatibility</code>  (End definition for <code>\if@compatibility</code> . This function is documented on page ??.)
<code>\@documentclasshook</code>	This legacy hook is called after the first <code>\documentclass</code> command. It is <i>not</i> integrated with the new 2020 hook management system! By default this checks to see if <code>\@normalsize</code> is undefined, and if so, sets it to <code>\normalsize</code> .  <code>3 \def\@documentclasshook{%</code> <code>4   \ifx\@normalsize\undefined</code> <code>5     \let\@normalsize\normalsize</code> <code>6   \fi</code> <code>7 }</code>  (End definition for <code>\@documentclasshook</code> . This function is documented on page ??.)
<code>\@declaredoptions</code>	This list is automatically built by <code>\DeclareOption</code> . It is the list of options (separated by commas) declared in the class or package file and it defines the order in which the the corresponding <code>\ds@&lt;option&gt;</code> commands are executed. All local <code>&lt;option&gt;</code> s which are not declared will be processed in the order defined by the optional argument of <code>\documentclass</code> or <code>\usepackage</code> .  <code>8 \let\@declaredoptions\@empty</code>  (End definition for <code>\@declaredoptions</code> . This function is documented on page ??.)
<code>\@classoptionslist</code>	List of options of the main class.  <code>9 \let\@classoptionslist\relax</code> <code>10 \@onlypreamble\@classoptionslist</code>  (End definition for <code>\@classoptionslist</code> . This function is documented on page ??.)

`\@unusedoptionlist` List of options of the main class that haven't been declared or loaded as class option files.

```
11 \let\@unusedoptionlist\@empty
12 \@onlypreamble\@unusedoptionlist
```

*(End definition for \@unusedoptionlist. This function is documented on page ??.)*

`\CurrentOption` Name of current package or option.

```
13 \let\CurrentOption\@empty
```

*(End definition for \CurrentOption. This function is documented on page ??.)*

`\@currname` Name of current package or option.

```
14 \let\@currname\@empty
```

*(End definition for \@currname. This function is documented on page ??.)*

`\@currentx` The current file extension.

```
15 \global\let\@currentx=\@empty
```

*(End definition for \@currentx. This function is documented on page ??.)*

`\@clsextension` The two possible values of `\@currentx`.

```
\@pkgextension 16 \def\@clsextension{cls}
17 \def\@pkgextension{sty}
18 \@onlypreamble\@clsextension
19 \@onlypreamble\@pkgextension
```

*(End definition for \@clsextension and \@pkgextension. These functions are documented on page ??.)*

`\@pushfilename` Commands to push and pop the file name and extension.

`\@popfilename` #1 current name.

`\@currnamestack` #2 current extension.

#3 current catcode of @.

#4 Rest of the stack.

```
20 </2ekernel>
21 <*2ekernel | latexrelease>
22 <latexrelease>
23 <latexrelease>\IncludeInRelease{2020/10/01}{\@pushfilename}%
24 <latexrelease> {Add \@expl@push@filename@@ and \@expl@push@filename@aux@@}%
25 \def\@pushfilename{%
```

The push and pop macros are injected in `\@pushfilename` and `\@popfilename` so that they correctly keep track of the hook labels.

This needs cleanup with the expl3 interfaces also playing here, e.g., `\@expl@push@filename@@` needs cleanup and (and should probably not have this name either).

```
26 \@expl@@@hook@curr@name@push@@n{}%
27 \@expl@push@filename@@
28 \xdef\@currnamestack{%
29   {\@currname}%
30   {\@currentx}%
31   {\the\catcode'\@}%
32   \@currnamestack}%
33 \@expl@push@filename@aux@@}
34 <latexrelease>\EndIncludeInRelease
```

The following version of `\@pushfilename` didn't formally exist in this file, but in the 2020/02/02 release, `expl3` was preloaded and it patched `\@pushfilename` (and `\@popfilename`) by adding some hooks in there. But rolling back to 2020/02/02, `expl3` doesn't patch these macros again, so rolling back has to take those hooks into account. Same goes for `\@popfilename`.

```

35 <latexrelease>
36 <latexrelease>\IncludeInRelease{2020/02/02}{\@pushfilename}%
37 <latexrelease> {Add \@expl@push@filename@@}%
38 <latexrelease>\def\@pushfilename{%
39 <latexrelease> \@expl@push@filename@@
40 <latexrelease> \xdef\@currnamestack{%
41 <latexrelease> {\@currname}%
42 <latexrelease> {\@currentx}%
43 <latexrelease> {\the\catcode'\@}%
44 <latexrelease> \@currnamestack}%
45 <latexrelease> \@expl@push@filename@aux@@}
46 <latexrelease>\EndIncludeInRelease
47 <latexrelease>
48 <latexrelease>\IncludeInRelease{0000/00/00}{\@pushfilename}%
49 <latexrelease> {Add \@expl@push@filename@@ and \@expl@push@filename@aux@@}%
50 <latexrelease>\def\@pushfilename{%
51 <latexrelease> \xdef\@currnamestack{%
52 <latexrelease> {\@currname}%
53 <latexrelease> {\@currentx}%
54 <latexrelease> {\the\catcode'\@}%
55 <latexrelease> \@currnamestack}}
56 <latexrelease>\EndIncludeInRelease
57 \@onlypreamble\@pushfilename

58 <latexrelease>
59 <latexrelease>\IncludeInRelease{2020/10/01}{\@popfilename}%
60 <latexrelease> {Add \@expl@pop@filename@@}%
61 \def\@popfilename{\@expl@@@hook@curr@name@pop@@
62 \expandafter\@p@pfilename\@currnamestack\@nil
63 \@expl@pop@filename@@}
64 <latexrelease>\EndIncludeInRelease
65 <latexrelease>
66 <latexrelease>\IncludeInRelease{2020/02/02}{\@popfilename}%
67 <latexrelease> {Add \@expl@push@filename@@}%
68 <latexrelease>\def\@popfilename{\expandafter\@p@pfilename\@currnamestack\@nil
69 <latexrelease> \@expl@pop@filename@@}
70 <latexrelease>\EndIncludeInRelease
71 <latexrelease>
72 <latexrelease>\IncludeInRelease{0000/00/00}{\@popfilename}%
73 <latexrelease> {Add \@expl@push@filename@@ and \@expl@push@filename@aux@@}%
74 <latexrelease>\def\@popfilename{\expandafter\@p@pfilename\@currnamestack\@nil}
75 <latexrelease>\EndIncludeInRelease
76 \@onlypreamble\@popfilename

77 </2ekernel | latexrelease>
78 <*2ekernel>

79 \def\@p@pfilename#1#2#3#4\@nil{%
80 \gdef\@currname{#1}%
81 \gdef\@currentx{#2}%

```

```

82 \catcode'\@#3\relax
83 \gdef\@currnamestack{#4}}
84 \@onlypreamble\@p@pfilename
85 \gdef\@currnamestack{}
86 \@onlypreamble\@currnamestack

```

(End definition for \@pushfilename, \@popfilename, and \@currnamestack. These functions are documented on page ??.)

**\@optionlist** Returns the option list of the file.

```

87 \def\@optionlist#1{%
88 \ifundefined{opt@#1}\@empty{\csname opt@#1\endcsname}}
89 \@onlypreamble\@optionlist

```

(End definition for \@optionlist. This function is documented on page ??.)

**\@ifpackageloaded** **\@ifclassloaded** **\@ifpackageloaded{<name>}** Checks to see whether a file has been loaded.

```

90 \def\@ifpackageloaded{\@ifl@aded\@pkgextension}
91 \def\@ifclassloaded{\@ifl@aded\@clsextension}
92 \@onlypreamble\@ifpackageloaded
93 \@onlypreamble\@ifclassloaded
94 \def\@ifl@aded#1#2{%
95 \expandafter\ifx\csname ver@#2.#1\endcsname\relax
96 \expandafter\@secondoftwo
97 \else
98 \expandafter\@firstoftwo
99 \fi}
100 \@onlypreamble\@ifl@aded

```

(End definition for \@ifpackageloaded and \@ifclassloaded. These functions are documented on page ??.)

**\@ifpackagelater** **\@ifclasslater** **\@ifpackagelater{<name>}{YYYY/MM/DD}{<true code>}{<false code>}** Checks that the package loaded is more recent or equal to the given date. A better name for it would therefore been \@ifpackagelaterorequal but it is in use for more than 30 years, so ...

```

101 \def\@ifpackagelater{\@ifl@ter\@pkgextension}
102 \def\@ifclasslater{\@ifl@ter\@clsextension}
103 \@onlypreamble\@ifpackagelater
104 \@onlypreamble\@ifclasslater

```

(End definition for \@ifpackagelater and \@ifclasslater. These functions are documented on page ??.)

**\IfPackageAtLeastTF** **\IfClassAtLeastTF** **\IfFormatAtLeastTF{YYYY/MM/DD}{<true code>}{<false code>}** Test if the format is later or equal to the given date.

```

105 </2ekernel>
106 <*2ekernel | latexrelease>
107 <latexrelease>\IncludeInRelease{2020/10/01}%
108 <latexrelease> \IfFormatAtLeastTF{Test format date}%
109 \def\IfFormatAtLeastTF{\@ifl@t@r\fmtversion}
110 \let\IfPackageAtLeastTF\@ifpackagelater
111 \let\IfClassAtLeastTF\@ifclasslater
112 \@onlypreamble\IfFormatAtLeastTF
113 \@onlypreamble\IfPackageAtLeastTF
114 \@onlypreamble\IfClassAtLeastTF

```

For rollback pretend it was available since the beginning of dawn.

```

115 </2ekernel | latexrelease>
116 <latexrelease>\EndIncludeInRelease
117 <latexrelease>\IncludeInRelease{0000/00/00}%
118 <latexrelease>          {\IfFormatAtLeastTF}{Test format date}%
119 <latexrelease>\def\IfFormatAtLeastTF{\@ifl@t@r\fmtversion}
120 <latexrelease>\let\IfPackageAtLeastTF\@ifpackagelater
121 <latexrelease>\let\IfClassAtLeastTF\@ifclasslater
122 <latexrelease>\EndIncludeInRelease
123 <*2ekernel>

```

(End definition for \IfPackageAtLeastTF, \IfClassAtLeastTF, and \IfFormatAtLeastTF. These functions are documented on page ??.)

\@ifl@ter

```

124 \def\@ifl@ter#1#2{%
125   \expandafter\@ifl@t@r
126   \csname ver@#2.#1\endcsname}
127 \onlypreamble\@ifl@ter
128 </2ekernel>

```

This internal macro is also used in \NeedsTeXFormat.

```

129 <latexrelease>\IncludeInRelease{2018/04/01}%
130 <latexrelease>          {\@ifl@t@r}{Guard against bad input}%
131 <*2ekernel | latexrelease>
132 \def\@ifl@t@r#1#2{%
133   \ifnum\expandafter\@parse@version@#1//00\@nil<%
134     \expandafter\@parse@version@#2//00\@nil
135     \expandafter\@secondoftwo
136   \else
137     \expandafter\@firstoftwo
138   \fi}
139 \def\@parse@version@#1{\@parse@version0#1}
140 </2ekernel | latexrelease>
141 <latexrelease>\EndIncludeInRelease
142 <latexrelease>\IncludeInRelease{0000/00/00}%
143 <latexrelease>          {\@ifl@t@r}{Guard against bad input}%
144 <latexrelease>\def\@ifl@t@r#1#2{%
145 <latexrelease>  \ifnum\expandafter\@parse@version#1//00\@nil<%
146 <latexrelease>    \expandafter\@parse@version#2//00\@nil
147 <latexrelease>    \expandafter\@secondoftwo
148 <latexrelease>  \else
149 <latexrelease>    \expandafter\@firstoftwo
150 <latexrelease>  \fi}
151 <latexrelease>\let\@parse@version@\@undefined
152 <latexrelease>\EndIncludeInRelease
153 <*2ekernel>

```

154 \onlypreamble\@ifl@t@r

(End definition for \@ifl@ter. This function is documented on page ??.)

```

155 </2ekernel>
156 <*2ekernel | latexreleasefirst>
157 \def\@parse@version#1/#2/#3#4#5\@nil{%
158   \@parse@version@dash#1-#2-#3#4\@nil
159 }

```

The `\if` test here ensures that an argument with no / or - produces 0 (actually 00).

```

160 \def\@parse@version@dash#1-#2-#3#4#5\@nil{%
161   \if\relax#2\relax\else#1\fi#2#3#4 }
162 </2ekernel | latexreleasefirst>
163 <*2ekernel>

```

`\@ifpackagewith` `\@ifclasswith` `\@ifpackagewith{<name>}{<option-list>}` Checks that `<option-list>` is a subset of the options **with** which `<name>` was loaded.

```

164 \def\@ifpackagewith{\@ifoptions\@pkgextension}
165 \def\@ifclasswith{\@ifoptions\@clsextension}
166 \onlypreamble\@ifpackagewith
167 \onlypreamble\@ifclasswith
168 \def\@ifoptions#1#2{%
169   \expandtwoargs\@ifpti@ns{\@optionlist{#2.#1}}
170 \onlypreamble\@ifoptions

```

Probably shouldn't use `\CurrentOption` here... (changed to `\reserved@b`.)

```

171 </2ekernel>
172 <latexrelease>\IncludeInRelease{2017/01/01}%
173 <latexrelease>           {\@ifpti@ns}{Spaces in option clash check}%
174 <*2ekernel | latexrelease>
175 \def\@ifpti@ns#1#2{%
176   \let\reserved@a\@firstoftwo

177   \edef\reserved@b{\zap@space#2 \@empty}%
178   \@for\reserved@b:=\reserved@b\do{%
179     \ifx\reserved@b\@empty
180     \else
181       \expandafter\in@\expandafter{\expandafter,\reserved@b,}{, #1,}%
182       \ifin@
183       \else
184         \let\reserved@a\@secondoftwo
185       \fi
186     \fi
187   }%
188   \reserved@a}
189 </2ekernel | latexrelease>
190 <latexrelease>\EndIncludeInRelease
191 <latexrelease>\IncludeInRelease{0000/00/00}%
192 <latexrelease>           {\@ifpti@ns}{Spaces in option clash check}%
193 <latexrelease>\def\@ifpti@ns#1#2{%
194 <latexrelease> \let\reserved@a\@firstoftwo
195 <latexrelease> \@for\reserved@b:=#2\do{%
196 <latexrelease> \ifx\reserved@b\@empty
197 <latexrelease> \else
198 <latexrelease> \expandafter\in@\expandafter
199 <latexrelease>           {\expandafter,\reserved@b,}{, #1,}%
200 <latexrelease> \ifin@
201 <latexrelease> \else
202 <latexrelease> \let\reserved@a\@secondoftwo
203 <latexrelease> \fi
204 <latexrelease> \fi
205 <latexrelease> }%
206 <latexrelease> \reserved@a}

```

```
207 <latexrelease>\EndIncludeInRelease
```

```
208 <*2ekernel>
```

```
209 \@onlypreamble\if@pti@ns
```

(End definition for \@ifpackagewith and \@ifclasswith. These functions are documented on page ??.)

**\ProvidesPackage** Checks that the current filename is correct, and defines **\ver@filename**.

```
210 \def\ProvidesPackage#1{%
211   \xdef\@gtempa{#1}%
212   \ifx\@gtempa\@currname\else
213     \@latex@warning@no@line{You have requested
214       \@cls@pkg\space'\@currname',\MessageBreak
215       but the \@cls@pkg\space provides '#1'}%
216   \fi
217   \@ifnextchar[\@pr@videpackage{\@pr@videpackage[]}]%
218   \@onlypreamble\ProvidesPackage
```

(End definition for \ProvidesPackage. This function is documented on page ??.)

**\@pr@videpackage** This is the helper command for **\ProvidesPackage**. It tries to be cautious when handling the identification string in case it contains UTF-8 characters.

```
219 </2ekernel>
220 <*2ekernel | latexrelease>
221 <latexrelease>\IncludeInRelease{2020/10/01}%
222 <latexrelease>          {\@pr@videpackage}{Allow for package substitution}%
223 \def\@pr@videpackage[#1]{%
224   \expandafter\protected@xdef          %      <-- protected...
225     \csname ver@\@currname.\@current\endcsname{#1}% Loaded package
226   \expandafter\let
227     \csname ver@\@currpkg@reqd\expandafter\endcsname % Requested package
228     \csname ver@\@currname.\@current\endcsname
229   \ifx\@current\@clsextension
230     \typeout{Document Class: \@gtempa\space#1}%
231   \else
232     \protected@wlog{Package: \@gtempa\space#1}% <--- protected
233   \fi}
```

(End definition for \@pr@videpackage. This function is documented on page ??.)

**\protected@wlog** This is like plain TeX's **\wlog** but gracefully handles protected commands.

```
234 \long\def\protected@wlog#1{\begingroup
235   \set@display@protect
236   \immediate \write \m@ne {#1}\endgroup }
```

(End definition for \protected@wlog. This function is documented on page ??.)

```
237 </2ekernel | latexrelease>
238 <latexrelease>\EndIncludeInRelease
239 <latexrelease>\IncludeInRelease{2020/02/02}%
240 <latexrelease>          {\@pr@videpackage}{Protection for package info}%
241 <latexrelease>
242 <latexrelease>\def\@pr@videpackage[#1]{%
243 <latexrelease>   \expandafter\protected@xdef          %      <-- protected...
244 <latexrelease>     \csname ver@\@currname.\@current\endcsname{#1}%
245 <latexrelease>\ifx\@current\@clsextension
```

```

246 <latexrelease> \typeout{Document Class: \@gtempa\space#1}%
247 <latexrelease> \else
248 <latexrelease> \protected@wlog{Package: \@gtempa\space#1}% <--- protected
249 <latexrelease> \fi}
250 <latexrelease>
251 <latexrelease>\EndIncludeInRelease
252 <latexrelease>\IncludeInRelease{0000/00/00}%
253 <latexrelease> \{\@pr@videpackage\}{Protection for package info}%
254 <latexrelease>
255 <latexrelease>\def\@pr@videpackage[#1]{%
256 <latexrelease> \expandafter\xdef\csname ver@\@currname.\@current\endcsname{#1}%
257 <latexrelease> \ifx\@current\@clsextension
258 <latexrelease> \typeout{Document Class: \@gtempa\space#1}%
259 <latexrelease> \else
260 <latexrelease> \wlog{Package: \@gtempa\space#1}%
261 <latexrelease> \fi}
262 <latexrelease>\let\protected@wlog\@undefined
263 <latexrelease>
264 <latexrelease>\EndIncludeInRelease
265 (*2ekernel)
266 \@onlypreamble\@pr@videpackage

```

**\ProvidesClass** Like **\ProvidesPackage**, but for classes.

```

267 \let\ProvidesClass\ProvidesPackage
268 \@onlypreamble\ProvidesClass

```

*(End definition for \ProvidesClass. This function is documented on page ??.)*

**\ProvidesFile** Like **\ProvidesPackage**, but for arbitrary files. Do not apply **\@onlypreamble** to these, as we may want to label files input during the document.

```

\@providesfile 269 \def\ProvidesFile#1{%
270 \begingroup
271 \catcode'\ 10 %
272 \ifnum \endlinechar<256 %
273 \ifnum \endlinechar>\m@ne
274 \catcode\endlinechar 10 %
275 \fi
276 \fi
277 \@makeother\/%
278 \@makeother\&%
279 \kernel@ifnextchar[{\@providesfile{#1}}{\@providesfile{#1}[]}]

```

During initex a special version of **\@providesfile** is used. The real definition is installed right at the end, in **ltfinal.dtx**.

```

def\@providesfile#1[#2]{%
\wlog{File: #1 #2}%
\expandafter\xdef\csname ver@#1\endcsname{#2}%
\endgroup}

```

*(End definition for \ProvidesFile and \@providesfile. These functions are documented on page ??.)*



`\PassOptionsToPackage` If the package has been loaded, we check that it was first loaded with the options.  
`\PassOptionsToClass` Otherwise we add the option list to that of the package.

```

280 </2ekernel>
281 <latexrelease>\IncludeInRelease{2020/10/01}{\@pass@options}
282 <latexrelease> {Add file replacement in \@pass@options}%
283 <*2ekernel|latexrelease>
284 \def\@pass@options#1#2#3{%
285   \@expl@@@filehook@set@curr@file@@nNN
286   {\@expl@@@filehook@resolve@file@subst@@w #3.#1\@nil}%
287   \reserved@a\reserved@b
288   \expandafter\xdef\csname opt@\reserved@a\endcsname{%
289     \@ifundefined{opt@\reserved@a}\@empty
290     {\csname opt@\reserved@a\endcsname,}%
291     \zap@space#2 \@empty}}
292 </2ekernel|latexrelease>
293 <latexrelease>\EndIncludeInRelease
294 %
295 <latexrelease>\IncludeInRelease{0000/00/00}{\@pass@options}
296 <latexrelease> {\@pass@options}%
297 <latexrelease>\def\@pass@options#1#2#3{%
298 <latexrelease> \expandafter\xdef\csname opt@#3.#1\endcsname{%
299 <latexrelease>   \@ifundefined{opt@#3.#1}\@empty
300 <latexrelease>   {\csname opt@#3.#1\endcsname,}%
301 <latexrelease>   \zap@space#2 \@empty}}
302 <latexrelease>\EndIncludeInRelease
303 <*2ekernel>
304 \@onlypreamble\@pass@options
305 \def\PassOptionsToPackage{\@pass@options\@pkgextension}
306 \def\PassOptionsToClass{\@pass@options\@clsextension}
307 \@onlypreamble\PassOptionsToPackage
308 \@onlypreamble\PassOptionsToClass

```

*(End definition for \PassOptionsToPackage and \PassOptionsToClass. These functions are documented on page ??.)*

`\DeclareOption` Adds an option as a `\ds@` command, or the default `\default@ds` command.

```

\DeclareOption*
309 \def\DeclareOption{%
310   \let\@fileswith@pti@ns\@badrequireerror
311   \@ifstar\@defdefault@ds\@declareoption}
312 \long\def\@declareoption#1#2{%
313   \xdef\@declaredoptions{\@declaredoptions,#1}%
314   \toks@{#2}%
315   \expandafter\edef\csname ds@#1\endcsname{\the\toks@}}
316 \long\def\@defdefault@ds#1{%
317   \toks@{#1}%
318   \edef\default@ds{\the\toks@}}
319 \@onlypreamble\DeclareOption
320 \@onlypreamble\@declareoption
321 \@onlypreamble\@defdefault@ds

```

*(End definition for \DeclareOption and \DeclareOption\*. These functions are documented on page ??.)*

`\OptionNotUsed` If we are in a class file, add `\CurrentOption` to the list of unused options. Otherwise, in a package file do nothing.

```

322 \def\OptionNotUsed{%
323   \ifx\@current\@clsextension
324     \xdef\@unusedoptionlist{%
325       \ifx\@unusedoptionlist\@empty\else\@unusedoptionlist,\fi
326       \CurrentOption}%
327   \fi}
328 \@onlypreamble\OptionNotUsed

```

*(End definition for \OptionNotUsed. This function is documented on page ??.)*

`\default@ds` The default option code. Set by `\@onefilewithoptions` to either `\OptionNotUsed` for classes, or `\@unknownoptionerror` for packages. This may be reset in either case with `\DeclareOption*`.

```

329 % \let\default@ds\OptionNotUsed

```

*(End definition for \default@ds. This function is documented on page ??.)*

`\ProcessOptions` `\ProcessOptions` calls `\ds@option` for each known package option, then calls `\default@ds` for each option on the local options list. Finally resets all the declared options to `\relax`. The empty option does nothing, this has to be reset on the off chance it's set to `\relax` if an empty element gets into the `\@declaredoptions` list.

The star form is similar but executes options given in the order specified in the document, not the order they are declared in the file. In the case of packages, global options are executed before local ones.

```

330 \def\ProcessOptions{%
331   \let\ds@\@empty
332   \edef\@curroptions{\@optionlist{\@currname.\@current}}%
333   \@ifstar\@xprocessoptions\@processoptions}
334 \@onlypreamble\ProcessOptions

335 \def\@processoptions{%
336   \@for\CurrentOption:=\@declaredoptions\do{%
337     \ifx\CurrentOption\@empty\else
338       \@expandtwoargs\in{,\CurrentOption,}{%
339         ,\ifx\@current\@clsextension\else\@classoptionslist,\fi
340         \@curroptions,}%
341       \ifin@
342         \@useoption
343         \expandafter\let\csname ds@\CurrentOption\endcsname\@empty
344       \fi
345     \fi}%
346   \@processoptions}
347 \@onlypreamble\@processoptions

348 \def\@xprocessoptions{%
349   \ifx\@current\@clsextension\else
350     \@for\CurrentOption:=\@classoptionslist\do{%
351       \ifx\CurrentOption\@empty\else
352         \@expandtwoargs\in{,\CurrentOption,}{,\@declaredoptions,}%
353       \ifin@
354         \@useoption
355       \fi
356     \fi}

```

```

356         \fi
357     \fi}%
358 \fi
359 \@process@pti@ns}
360 \@onlypreamble\@xprocess@ptions

    The common part of \ProcessOptions and \ProcessOptions*.
361 </2ekernel>
362 <*2ekernel | latexrelease>
363 <latexrelease>\IncludeInRelease{2020/10/01}%
364 <latexrelease>                {\@process@pti@ns}{Unused options issue}%
365 \def\@process@pti@ns{%
366     \@for\CurrentOption:=\@curroptions\do{%
367         \ifundefined{ds@\CurrentOption}%
368             {\@use@option
369                 \default@ds}%

```

There should not be any non-empty definition of \CurrentOption at this point, as all the declared options were executed earlier. This is for compatibility with 2.09 styles which use \def\ds@... directly, and so have options which do not appear in \@declaredoptions.

```

370     \@use@option}%

Clear all the definitions for option code. First set all the declared options to \relax,
then reset the ‘default’ and ‘empty’ options. and the lst of declared options.

```

```

371     \@for\CurrentOption:=\@declaredoptions\do{%
372         \expandafter\let\csname ds@\CurrentOption\endcsname\relax}%

373 \let\CurrentOption\@empty
374 \let\@fileswith@pti@ns\@fileswith@pti@ns
375 \AtEndOfPackage{\expandafter\let
376                 \csname unprocessedoptions-\@currname.\@current\endcsname
377                 \relax}}
378 \@onlypreamble\@process@pti@ns
379 </2ekernel | latexrelease>
380 <latexrelease>\EndIncludeInRelease
381 <latexrelease>\IncludeInRelease{0000/00/00}%
382 <latexrelease>                {\@process@pti@ns}{Unused options issue}%
383 <latexrelease>
384 <latexrelease>\def\@process@ptions{%
385 <latexrelease>    \@for\CurrentOption:=\@curroptions\do{%
386 <latexrelease>        \ifundefined{ds@\CurrentOption}%
387 <latexrelease>            {\@use@option
388 <latexrelease>                \default@ds}%
389 <latexrelease>            \@use@option}%
390 <latexrelease>    \@for\CurrentOption:=\@declaredoptions\do{%
391 <latexrelease>        \expandafter\let\csname ds@\CurrentOption\endcsname\relax}%
392 <latexrelease>    \let\CurrentOption\@empty
393 <latexrelease>    \let\@fileswith@pti@ns\@fileswith@pti@ns
394 <latexrelease>    \AtEndOfPackage{\let\@unprocessedoptions\relax}}
395 <latexrelease>\EndIncludeInRelease
396 <*2ekernel>

```

(End definition for \ProcessOptions and \ProcessOptions\*. These functions are documented on page ??.)

`\@options` `\@options` is a synonym for `\ProcessOptions*` for upward compatibility with L<sup>A</sup>T<sub>E</sub>X 2.09 style files.

```

397 \def\@options{\ProcessOptions*}
398 \@onlypreamble\@options

```

*(End definition for \@options. This function is documented on page ??.)*

`\@use@option` Execute the code for the current option.

```

399 \def\@use@option{%
400   \@expandtwoargs\@removeelement\CurrentOption
401   \@unusedoptionlist\@unusedoptionlist
402   \csname ds@\CurrentOption\endcsname}
403 \@onlypreamble\@use@option

```

*(End definition for \@use@option. This function is documented on page ??.)*

`\ExecuteOptions` `\ExecuteOptions{<option-list>}` executes the code declared for each option.

```

404 </2kernel>
405 <latexrelease>\IncludeInRelease{2017/01/01}%
406 <latexrelease>           {\ExecuteOptions}{Spaces in \ExecuteOptions}%
407 <*2kernel | latexrelease>
408 \def\ExecuteOptions#1{%

```

Use `\@fortmp` here as it is anyway cleared during `\@for` loop so does not change any existing names.

```

409   \edef\@fortmp{\zap@space#1 \@empty}%
410   \def\reserved@a##1\@nil{%
411     \@for\CurrentOption:=\@fortmp\do
412       {\csname ds@\CurrentOption\endcsname}%
413     \edef\CurrentOption{##1}}%
414   \expandafter\reserved@a\CurrentOption\@nil}
415 </2kernel | latexrelease>
416 <latexrelease>\EndIncludeInRelease
417 <latexrelease>\IncludeInRelease{0000/00/00}%
418 <latexrelease>           {\ExecuteOptions}{Spaces in \ExecuteOptions}%
419 <latexrelease>\def\ExecuteOptions#1{%
420 <latexrelease>   \def\reserved@a##1\@nil{%
421 <latexrelease>     \@for\CurrentOption:=#1\do
422 <latexrelease>       {\csname ds@\CurrentOption\endcsname}%
423 <latexrelease>     \edef\CurrentOption{##1}}%
424 <latexrelease>   \expandafter\reserved@a\CurrentOption\@nil}
425 <latexrelease>\EndIncludeInRelease
426 <*2kernel>
427 \@onlypreamble\ExecuteOptions

```

*(End definition for \ExecuteOptions. This function is documented on page ??.)*

The top-level commands, which just set some parameters then call the internal command, `\@fileswithoptions`.

`\documentclass` The main new-style class declaration.

```

428 \def\documentclass{%
429   \let\documentclass\@twoclasseserror
430   \if@compatibility\else\let\usepackage\RequirePackage\fi
431   \@fileswithoptions\@clsextension}
432 \@onlypreamble\documentclass

```

(End definition for \documentclass. This function is documented on page ??.)

**\documentstyle** 2.09 style class ‘style’ declaration.

```
433 \def\documentstyle{%  
434   \makeatletter\input{latex209.def}\makeatother  
435   \documentclass}  
436 \@onlypreamble\documentstyle
```

(End definition for \documentstyle. This function is documented on page ??.)

**\RequirePackage** Load package if not already loaded.

```
437 \def\RequirePackage{%  
438   \@fileswithoptions\@pkgextension}  
439 \@onlypreamble\RequirePackage
```

(End definition for \RequirePackage. This function is documented on page ??.)

**\LoadClass** Load class.

```
440 \def\LoadClass{%  
441   \ifx\@current\@pkgextension  
442     \@latex@error  
443       {\noexpand\LoadClass in package file}%  
444       {You may only use \noexpand\LoadClass in a class file.}%  
445   \fi  
446   \@fileswithoptions\@clsextension}  
447 \@onlypreamble\LoadClass
```

(End definition for \LoadClass. This function is documented on page ??.)

**\@loadwithoptions** Pass the current option list on to a class or package. #1 is \@cls-or-pkgextension, #2 is \RequirePackage or \LoadClass, #3 is the class or package to be loaded.

```
448 \def\@loadwithoptions#1#2#3{%  
449   \expandafter\let\csname opt@#3.#1\expandafter\endcsname  
450     \csname opt@#2\currname.\@current\endcsname  
451   #2{#3}}  
452 \@onlypreamble\@loadwithoptions
```

(End definition for \@loadwithoptions. This function is documented on page ??.)

**\LoadClassWithOptions** Load class ‘#1’ with the current option list.

```
453 \def\LoadClassWithOptions{%  
454   \@loadwithoptions\@clsextension\LoadClass}  
455 \@onlypreamble\LoadClassWithOptions
```

(End definition for \LoadClassWithOptions. This function is documented on page ??.)

**\RequirePackageWithOptions** Load package ‘#1’ with the current option list.

```
456 \</2ekernel>  
457 \<*/2ekernel | latexrelease>  
458 \<latexrelease>\IncludeInRelease{2020/10/01}%  
459 \<latexrelease>          {\RequirePackageWithOptions}{Unused options issue}%  
460 \def\RequirePackageWithOptions{%
```

The resetting of the unprocessed options is now done on a par package basis.

```

461 \AtEndOfPackage{\expandafter\let
462                 \csname unprocessedoptions-\@currname.\@current\endcsname
463                 \relax}%
464 \loadwithoptions\@pkgextension\RequirePackage}
465 \onlypreamble\RequirePackageWithOptions
466 \if2kernel\latexrelease
467 \latexrelease\EndIncludeInRelease
468 \latexrelease\IncludeInRelease{0000/00/00}%
469 \latexrelease\RequirePackageWithOptions{Unused options issue}%
470 \latexrelease
471 \latexrelease\def\RequirePackageWithOptions{%
472 \latexrelease \AtEndOfPackage{\let\unprocessedoptions\relax}%
473 \latexrelease \loadwithoptions\@pkgextension\RequirePackage}
474 \latexrelease\EndIncludeInRelease
475 \if2kernel

```

(End definition for \RequirePackageWithOptions. This function is documented on page ??.)

**\usepackage** To begin with, \usepackage produces an error. This is reset by \documentclass.

```

476 \def\usepackage#1{%
477 \latex@error
478   {\noexpand \usepackage before \string\documentclass}%
479   {\noexpand \usepackage may only appear in the document
480    preamble, i.e.,\MessageBreak
481    between \noexpand\documentclass and
482    \string\begin{document}.}%
483 \gobble}
484 \onlypreamble\usepackage

```

(End definition for \usepackage. This function is documented on page ??.)

**\NeedsTeXFormat** Check that the document is running on the correct system.

```

485 \def\NeedsTeXFormat#1{%
486 \def\reserved@a{#1}%
487 \ifx\reserved@a\fmtname
488 \expandafter\@needsformat
489 \else
490 \latex@error{This file needs format '\reserved@a'%
491 \MessageBreak but this is '\fmtname'}{%
492 The current input file will not be processed
493 further,\MessageBreak
494 because it was written for some other flavor of
495 TeX.\MessageBreak\@ehd}%

```

If the file is not meant to be processed by L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> we stop inputting it, but we do not end the run. We just end inputting the current file.

```

496 \endinput \fi}
497 \onlypreamble\NeedsTeXFormat
498 \def\@needsformat{%
499 \ifnextchar[%]
500 \@needsformat
501 {}
502 \onlypreamble\@needsformat

```

```

503 \def\@needsf@rmat[#1]{%
504     \ifl@t@r\fmtversion{#1}{}%
505     {\@latex@warning@no@line
506         {You have requested release ‘#1’ of LaTeX,\MessageBreak
507             but only release ‘\fmtversion’ is available}}}%
508 \@onlypreamble\@needsf@rmat

```

(End definition for \NeedsTeXFormat. This function is documented on page ??.)

**\zap@space** **\zap@space** *foo**<space>*\@empty removes all spaces from *foo* that are not protected by { } groups.

```

509 \def\zap@space#1 #2{%
510     #1%
511     \ifx#2\@empty\else\expandafter\zap@space\fi
512     #2}

```

(End definition for \zap@space. This function is documented on page ??.)

**\@fileswithoptions** The common part of \documentclass and \usepackage.

```

513 \def\@fileswithoptions#1{%
514     \ifnextchar[%]
515         {\@fileswith@ptions#1}%
516         {\@fileswith@ptions#1[]}}
517 \@onlypreamble\@fileswithoptions

518 \def\@fileswith@ptions#1[#2]#3{%
519     \ifnextchar[%]
520         {\@fileswith@pti@ns#1[#{#2}]#3}%
521         {\@fileswith@pti@ns#1[#{#2}]#3[]}}
522 \@onlypreamble\@fileswith@ptions

```

Then we do some work.

First of all, we define the global variables. Then we look to see if the file has already been loaded. If it has, we check that it was first loaded with at least the current options. If it has not, we add the current options to the package options, set the default version to be 0000/00/00, and load the file if we can find it. Then we check the version number.

Finally, we restore the old file name, reset the default option, and we set the catcode of @.

For classes, we can immediately process the file. For other types, #2 could be a comma separated list, so loop through, processing each one separately.

```

523 </2ekernel>
524 <latexrelease>\IncludeInRelease{2017/01/01}%
525 <latexrelease>     {\@fileswith@pti@ns}{ifx tests in \@fileswith@pti@ns}%
526 <*2ekernel | latexrelease>
527 \def\@fileswith@pti@ns#1[#2]#3[#4]{%
528     \ifx#1\@clsextension
529         \ifx\@classoptionslist\relax
530             \xdef\@classoptionslist{\zap@space#2 \@empty}%
531             \def\reserved@a{%
532                 \@onefilewithoptions#3[#{#2}][#{#4}]#1%
533                 \@documentclasshook}%
534         \else
535             \def\reserved@a{%
536                 \@onefilewithoptions#3[#{#2}][#{#4}]#1%

```

```

537     \fi
538     \else

```

build up a list of calls to `\@onefilewithoptions` (one for each package) without thrashing the parameter stack.

```

539     \def\reserved@b##1,{%

```

If `#1` is `\@nnil` we have reached the end of the list (older version used `\@nil` here but `\@nil` is undefined so `\ifx` equal to all undefined commands)

```

540     \ifx\@nnil##1\relax\else

```

If `\ifx\@nnil##1\@nil` is true then `#1` is (presumably) empty (Older code used `\relax` which is slightly easier to get into `#1` by mistake, which would spoil this test.)

```

541     \ifx\@nnil##1\@nil\else
542         \noexpand\@onefilewithoptions##1[#{#2}][#{#4}]%
543         \noexpand\@pkgextension
544     \fi
545     \expandafter\reserved@b
546 \fi}%
547 \edef\reserved@a{\zap@space#3 \@empty}%
548 \edef\reserved@a{\expandafter\reserved@b\reserved@a,\@nnil,}%
549 \fi
550 \reserved@a}
551 </2ekernel | latexrelease>

552 <latexrelease>\EndIncludeInRelease
553 <latexrelease>\IncludeInRelease{0000/00/00}%
554 <latexrelease>    {\@fileswith@pti@ns}{\ifx tests in \@fileswith@pti@ns}%
555 <latexrelease>\def\@fileswith@pti@ns#1[#2]#3[#4]{%
556 <latexrelease>    \ifx#1\@clsextension
557 <latexrelease>        \ifx\@classoptionslist\relax
558 <latexrelease>            \xdef\@classoptionslist{\zap@space#2 \@empty}%
559 <latexrelease>            \def\reserved@a{%
560 <latexrelease>                \@onefilewithoptions#3[#{#2}][#{#4}]#1%
561 <latexrelease>                \@documentclasshook}%
562 <latexrelease>        \else
563 <latexrelease>            \def\reserved@a{%
564 <latexrelease>                \@onefilewithoptions#3[#{#2}][#{#4}]#1}%
565 <latexrelease>        \fi
566 <latexrelease>    \else
567 <latexrelease>        \def\reserved@b##1,{%
568 <latexrelease>            \ifx\@nil##1\relax\else
569 <latexrelease>                \ifx\relax##1\relax\else
570 <latexrelease>                    \noexpand\@onefilewithoptions##1[#{#2}][#{#4}]%
571 <latexrelease>                    \noexpand\@pkgextension
572 <latexrelease>                \fi
573 <latexrelease>                \expandafter\reserved@b
574 <latexrelease>            \fi}%
575 <latexrelease>            \edef\reserved@a{\zap@space#3 \@empty}%
576 <latexrelease>            \edef\reserved@a{%
577 <latexrelease>                \expandafter\reserved@b\reserved@a,\@nil,}%
578 <latexrelease>        \fi
579 <latexrelease>    \reserved@a}
580 <latexrelease>\EndIncludeInRelease
581 <*2ekernel>

```



```
582 \@onlypreamble\@fileswith@ptions
```

This macro is used when loading packages or classes.

`\load@onefilewithoptions` Have the main argument as #1, so we only need one `\expandafter` above.

```
583 </2kernel>
584 <*2kernel | latexrelease>
585 <latexrelease>\IncludeInRelease{2020/10/01}%
586 <latexrelease>    {\@onefilewithoptions}{Hooks and unused options issue}%
587 \def\@onefilewithoptions#1[#2][#3]#4{%
588   \@pushfilename
589   \xdef\@currname{#1}%
590   \global\let\@currentx#4%
```

The command `\ver@<file>.<ext>` is used to signal that a package is already loaded, either because it is in fact loaded, or because its loading was suppressed. In minimal installations, said package may not exist but still have its loading suppressed with `\ver@<file>.<ext>`, so before checking if the file exists we have to check that we do need to load it with `\@ifl@aded`. If we don't, then there's no point in checking for a typo or load-disabling.

```
591   \@ifl@aded\@currentx\@currname
```

If the package is already loaded, check that there were no option clashes:

```
592   {\@if@ptions\@currentx\@currname}{#2}{}%
593   {\@latex@error
594     {Option clash for \@cls@pkg\space \@currname}%
595     {The package \@currname\space has already been loaded
596       with options:\MessageBreak
597       \space\space[\@optionlist{\@currname.\@currentx}]\MessageBreak
598       There has now been an attempt to load it
599       with options:\MessageBreak
600       \space\space[#2]\MessageBreak
601       Adding the global options:\MessageBreak
602       \space\space
603       \@optionlist{\@currname.\@currentx},#2\MessageBreak
604       to your \noexpand\documentclass declaration may fix this.%
605       \MessageBreak
606       Try typing \space <return> \space to proceed.}}%
607   \@firstofone}%
608   {\makeatletter
```

The next line seems to be necessary for 2.09 compatibility (the way the code is written there) This seems questionable and should be look at as in 2e it is definitely unnecessary at this point!

```
609   \@reset@ptions
```

First we take the `<name>` and `<ext>` given in the argument and check if the file exists, and issue an error otherwise asking for a correction with `\@missingfileerror`.

```
610   \IfFileExists{\@currname.\@currentx}{}%
611   {\@missing@onefilewithoptions{#2}}%
```

If `\@currname` is empty (the user replied to the “Enter file name” prompt with `<RETURN>`), so stop here (do `\@popfilename` to pop the item just added above).

This `\@gobble` omits the date check at the end.

```
612   \ifx\@currname\@empty
613     \expandafter\@gobble
614   \else
```

If the file exists, check if it was load-prevented, and otherwise do the bookkeeping with `\@filehook@file@push` then call `\set@curr@file` to set `\@curr@file` (and do any required substitution), then actually load the class/package with `\load@onefile@withoptions`.

```

615     \disable@packageload@do{\@currname.\@current}%
616     {\@expl@@@filehook@file@push@@
617     \set@curr@file{\@currname.\@current}%
618     \@filehook@set@CurrentFile

```

The `\set@curr@file` line above might have replaced the file, so `\@currname` and `\@current` may no longer hold the actual package being loaded, so in that case we need to update these two token lists (`\@curr@file` holds the file name after replacement, so we parse that).

The requested file is saved in `\@currpkg@reqd` to be used in `\InputIfFileExists` later: if the updated `\@currname` and `\@current` are used we lose track of the substitution, so `\CurrentFile` and `\CurrentFileUsed` will be (incorrectly) the same.

```

619     \expandafter\@swaptwoargs\expandafter
620     {\expandafter{\@currpkg@reqd}}%
621     {% <
622     \edef\@currpkg@reqd{\@currname.\@current}%
623     \ifx\CurrentFile\CurrentFileUsed
624     \else
625     \filename@parse\@curr@file
626     \edef\@currname{\string@makeletter\filename@base}%
627     \edef\@current{\string@makeletter\filename@ext}%
628     \fi
629     \load@onefile@withoptions{#2}%
630     \def\@currpkg@reqd%\@currpkg@reqd{
631     }% >

```

Now just clean up and exit.

```

632     \@expl@@@filehook@file@pop@@}%
633     \expandafter\@firstofone
634     \fi}%

```

Except in the case where `\@currname` is empty, the date is checked against the date marked in the package file:

```

635     {\@ifl@ter\@current{\@currname}{#3}{}}%
636     {\@latex@warning@no@line
637     {You have requested,\on@line,
638     version\MessageBreak
639     ‘#3’ of \@cls@pkg\space \@currname,\MessageBreak
640     but only version\MessageBreak
641     ‘\csname ver@\@currname.\@current\endcsname’\MessageBreak
642     is available}}%

643     \ifx\@current\@clsextension\let\LoadClass\@twoloadclasserror\fi}%
644     \@popfilename
645     \@reset@options}

646 \let\@currpkg@reqd\@empty
647 \@onlypreamble\@onefilewithoptions

```

The kernel no longer uses `\@unprocessedoptions`

```

648 \let\@unprocessedoptions\@undefined

```

Now the action taken when a file is not found.

```
\@missing@onefilewithoptions 649 \def\@missing@onefilewithoptions#1{%
650 \@missingfileerror\@currname\@currentx
651 \xdef\@currname{\@missingfile@area\@missingfile@base}%
652 \global\let\@currentx\@missingfile@ext}
```

Now the code that actually does the file loading:

```
\load@onefile@withoptions 653 \def\load@onefile@withoptions#1{%
654 \let\CurrentOption\@empty
655 \@reset@ptions
```

Grab everything in a macro, so the parameter stack is popped before any processing begins.

```
656 \def\reserved@a{%
657 \@pass@ptions\@currentx{#1}\@currname}%
658 \global\expandafter
659 \let\csname ver@\@currname.\@currentx\endcsname\@empty
```

We initialize `\dots-h@@k` here and only if we load the file so that it remains undefined otherwise.

```
660 \expandafter\let\csname\@currname.\@currentx-h@@k\endcsname\@empty
```

When the current extension is `\@pkgextension` we are loading a package otherwise, if it is `\@clsextension`, a class, so depending on that we execute different hooks. If the extension is neither, then it is another type of file without special hooks.

```
661 %-----
662 \ifx\@currentx\@pkgextension
663 \UseHook{package/before}%
664 \UseHook{package/before/\@currname}%
665 \else
666 \ifx\@currentx\@clsextension
667 \UseHook{class/before}%
668 \UseHook{class/before/\@currname}%
669 \fi
670 \fi
```

Now actually load the file (at this point we are certain it exists, but use `\InputIfFileExists` so that file hooks are executed):

```
671 \InputIfFileExists{\@currpkg@reqd}{}%
672 {\@latex@error
673 {The \@cls@pkg\space\@currpkg@reqd\space failed to load.}\@ehd}%
674 %-----
```

In older versions of the code `\@unprocessedoptions` would generate an error for each specified option in a package unless a `\ProcessOptions` has appeared in the package file.

This has changed in 2020. We now use a separate macro per package to avoid interferences in case of nested packages. The whole code for handling this issue (GitHub 22) was provided by Hironobu Yamashita, thanks for that.

```
675 \expandafter\let\csname unprocessedoptions-\@currname.\@currentx\endcsname
676 \@unprocessedoptions
677 \csname\@currname.\@currentx-h@@k\endcsname
678 \expandafter\let\csname\@currname.\@currentx-h@@k\endcsname
679 \@undefined
```

Catch the case where the packages has handled the options and redefined `\@unprocessedoptions` to `\relax` (old interface). In that case no error should be produced.

```
680 \ifx\@unprocessedoptions\relax
681 \let\@unprocessedoptions\undefined
```

Otherwise run the per package set of unused options.

```
682 \else
683 \csname unprocessedoptions-\@currname.\@current\endcsname
684 \fi
```

In either case we drop the macro afterwards as it is no longer needed.

```
685 \expandafter\let
686 \csname unprocessedoptions-\@currname.\@current\endcsname
687 \undefined
```

And same procedure, James, when we are finished loading, except that the hook order is now reversed.

```
688 %-----
689 \ifx\@current\@pkgextension
690 \UseHook{package/after/\@currname}%
691 \UseHook{package/after}%
692 \else
693 \ifx\@current\@clsextension
694 \UseHook{class/after/\@currname}%
695 \UseHook{class/after}%
696 \fi
697 \fi}%
698 %-----
699 \@ifl@aded\@current\@currname{}\{\reserved@a}\}

700 </2ekernel | latexrelease>
701 <latexrelease>\EndIncludeInRelease
702 <latexrelease>\IncludeInRelease{0000/00/00}%
703 <latexrelease> \{\@onefilewithoptions\}{Hooks and unused options issue}%
704 <latexrelease>
```

Because of the way `\@onefilewithoptions` is changed for rollback handling below we have to define `\load@onefilewithoptions` when rolling back!

```
705 <latexrelease>\def\load@onefilewithoptions#1[#2][#3]#4{%
706 <latexrelease> \@pushfilename
707 <latexrelease> \xdef\@currname{#1}%
708 <latexrelease> \global\let\@current#4%
709 <latexrelease> \let\CurrentOption\@empty
710 <latexrelease> \@reset@ptions
711 <latexrelease> \makeatletter
712 <latexrelease> \def\reserved@a{%
713 <latexrelease> \@ifl@aded\@current{#1}%
714 <latexrelease> \{\@if@ptions\@current{#1}{#2}\}%
715 <latexrelease> \{\@latex@error
716 <latexrelease> {Option clash for \@cls@pkg\space #1}%
717 <latexrelease> {The package #1 has already been loaded
718 <latexrelease> with options:\MessageBreak
719 <latexrelease> \space\space[\@optionlist{#1.\@current}]\MessageBreak
720 <latexrelease> There has now been an attempt to load it
721 <latexrelease> with options\MessageBreak
```

```

722 <latexrelease> \space\space[#2]\MessageBreak
723 <latexrelease> Adding the global options:\MessageBreak
724 <latexrelease> \space\space
725 <latexrelease> \optionlist{#1.\@currentx},#2\MessageBreak
726 <latexrelease> to your \noexpand\documentclass declaration may fix this.%
727 <latexrelease> \MessageBreak
728 <latexrelease> Try typing \space <return> \space to proceed.}}}%
729 <latexrelease> {\@pass@options\@currentx{#2}{#1}%
730 <latexrelease> \global\expandafter
731 <latexrelease> \let\csname ver@\@currname.\@currentx\endcsname\@empty
732 <latexrelease> \expandafter\let\csname\@currname.\@currentx-h@@k\endcsname\@empty
733 <latexrelease> \InputIfFileExists
734 <latexrelease> {\@currname.\@currentx}%
735 <latexrelease> {}%
736 <latexrelease> {\@missingfileerror\@currname\@currentx}%
737 <latexrelease> \let\@unprocessedoptions\@unprocessedoptions
738 <latexrelease> \csname\@currname.\@currentx-h@@k\endcsname
739 <latexrelease> \expandafter\let\csname\@currname.\@currentx-h@@k\endcsname
740 <latexrelease> \undefined
741 <latexrelease> \@unprocessedoptions}%
742 <latexrelease> \ifl@ter\@currentx{#1}{#3}{}%
743 <latexrelease> {\@latex@warning@no@line
744 <latexrelease> {You have requested,\on@line,
745 <latexrelease> version\MessageBreak
746 <latexrelease> ‘#3’ of \cls@pkg\space #1,\MessageBreak
747 <latexrelease> but only version\MessageBreak
748 <latexrelease> ‘\csname ver@#1.\@currentx\endcsname’\MessageBreak
749 <latexrelease> is available}}%
750 <latexrelease> \ifx\@currentx\clsextension\let\LoadClass\@twoloadclasserror\fi
751 <latexrelease> \@popfilename
752 <latexrelease> \@reset@options}%
753 <latexrelease> \reserved@a}
754 <latexrelease>
755 <latexrelease>\let \load@onefile@withoptions \undefined
756 <latexrelease>\let \@missing@onefile@withoptions \undefined
757 <latexrelease>
758 <latexrelease>\EndIncludeInRelease
759 <*2ekernel>

```

*(End definition for \@fileswithoptions and others. These functions are documented on page ??.)*

**\@@fileswith@pti@ns** Save the definition (for error checking).

```

760 \let\@@fileswith@pti@ns\@fileswith@pti@ns
761 \@onlypreamble\@@fileswith@pti@ns

```

*(End definition for \@@fileswith@pti@ns. This function is documented on page ??.)*

**\@reset@ptions** Reset the default option, and clear lists of declared options.

```

762 \def\@reset@ptions{%
763   \global\ifx\@currentx\clsextension
764     \let\default@ds\OptionNotUsed
765   \else
766     \let\default@ds\@unknownoptionerror
767   \fi
768   \global\let\ds@\@empty

```

```

769 \global\let\@declaredoptions\@empty}
770 \@onlypreamble\@reset@ptions

```

(End definition for \@reset@ptions. This function is documented on page ??.)

## 4.1 Hooks

Allow code to be saved to be executed at specific later times.

Save things in macros, I considered using toks registers, (and \addto@hook from the NFSS code, that would require stacking the contents in the case of required packages, so just generate a new macro for each package.

**\@begindocumenthook** Stuff to appear at the beginning or end of the document.

```

\@enddocumenthook
771 \ifx\@begindocumenthook\undefined
772 \let\@begindocumenthook\@empty
773 \fi
774 \let\@enddocumenthook\@empty

```

(End definition for \@begindocumenthook and \@enddocumenthook. These functions are documented on page ??.)

**\AtEndOfPackage** The access functions.

```

\AtEndOfClass
\AtBeginDocument
\AtEndDocument
775 \def\AtEndOfPackage{%
776 \expandafter\g@addto@macro\csname\@currname.\@current-h@@k\endcsname}
777 \let\AtEndOfClass\AtEndOfPackage
778 \@onlypreamble\AtEndOfPackage
779 \@onlypreamble\AtEndOfClass

780 </2ekernel>
781 <*2ekernel | latexrelease>
782 <latexrelease>\IncludeInRelease{2020/10/01}%
783 <latexrelease> \AtBeginDocument}{Use hook system}%
784 \DeclareRobustCommand\AtBeginDocument{\AddToHook{begindocument}}
785 \DeclareRobustCommand\AtEndDocument {\AddToHook{enddocument}}
786 %\DeclareRobustCommand\AtEndDocument {\AddToHook{env/document/end}} % alternative impl

787 </2ekernel | latexrelease>
788 <latexrelease>\EndIncludeInRelease
789 <latexrelease>\IncludeInRelease{0000/00/00}%
790 <latexrelease> \AtBeginDocument}{Use hook system}%
791 <latexrelease>
792 <latexrelease>\DeclareRobustCommand\AtBeginDocument{\g@addto@macro\@begindocumenthook}
793 <latexrelease>\DeclareRobustCommand\AtEndDocument{\g@addto@macro\@enddocumenthook}
794 <latexrelease>
795 <latexrelease>\EndIncludeInRelease
796 <*2ekernel>

797 \@onlypreamble\AtBeginDocument

```

(End definition for \AtEndOfPackage and others. These functions are documented on page ??.)

**\@cls@pkg** The current file type.

```

798 \def\@cls@pkg{%
799 \ifx\@current\@clsextension
800 document class%
801 \else

```

```

802     package%
803     \fi}
804     \@onlypreamble\@cls@pkg

```

*(End definition for \@cls@pkg. This function is documented on page ??.)*

**\@unknownoptionerror** Bad option.

```

805 \def\@unknownoptionerror{%
806   \latex@error
807   {Unknown option ‘\CurrentOption’ for \@cls@pkg\space‘\@currname’}%
808   {The option ‘\CurrentOption’ was not declared in
809     \@cls@pkg\space‘\@currname’, perhaps you\MessageBreak
810     misspelled its name.
811     Try typing \space <return>
812     \space to proceed.}}
813 \@onlypreamble\@unknownoptionerror

```

*(End definition for \@unknownoptionerror. This function is documented on page ??.)*

**\@@unprocessedoptions** Declare an error for each option, unless a \ProcessOptions occurred.

```

814 \def\@@unprocessedoptions{%
815   \ifx\@current\@pkgextension
816     \edef\@curroptions{\@optionlist{\@currname.\@current}}%
817     \@for\CurrentOption:=\@curroptions\do{%
818       \ifx\CurrentOption\@empty\else\@unknownoptionerror\fi}%
819   \fi}
820 \@onlypreamble\@@unprocessedoptions
821 \@onlypreamble\@@unprocessedoptions

```

*(End definition for \@@unprocessedoptions. This function is documented on page ??.)*

**\@badrequireerror** \RequirePackage or \LoadClass occurs in the options section.

```

822 \def\@badrequireerror#1[#2]#3[#4]{%
823   \latex@error
824   {\noexpand\RequirePackage or \noexpand\LoadClass
825     in Options Section}%
826   {The \@cls@pkg\space ‘\@currname’ is defective.\MessageBreak
827     It attempts to load ‘#3’ in the options section, i.e.,\MessageBreak
828     between \noexpand\DeclareOption and \string\ProcessOptions.}}
829 \@onlypreamble\@badrequireerror

```

*(End definition for \@badrequireerror. This function is documented on page ??.)*

**\@twoloadclasserror** Two \LoadClass in a class.

```

830 \def\@twoloadclasserror{%
831   \latex@error
832   {Two \noexpand\LoadClass commands}%
833   {You may only use one \noexpand\LoadClass in a class file}}
834 \@onlypreamble\@twoloadclasserror

```

*(End definition for \@twoloadclasserror. This function is documented on page ??.)*

```

\@twoclasseserror Two \documentclass or \documentstyle.
835 \def\@twoclasseserror#1#{%
836   \latex@error
837   {Two \noexpand\documentclass or \noexpand\documentstyle commands}%
838   {The document may only declare one class.}\@gobble}
839 \@onlypreamble\@twoclasseserror

```

(End definition for \@twoclasseserror. This function is documented on page ??.)

## 4.2 Providing shipment

```

\two@digits Prefix a number less than 10 with '0'.
840 \def\two@digits#1{\ifnum#1<10 0\fi\number#1}

```

(End definition for \two@digits. This function is documented on page ??.)

```

\filecontents This environment implements inline files. The star-form does not write extra comments
\endfilecontents into the file.
841 \</2ekernel>
842 \<*2ekernel | latexrelease>
843 \<latexrelease>\IncludeInRelease{2020/10/01}%
844 \<latexrelease> \filec@ntents\{Define \q@curr@file directly (gh/220)\}%
845 %

```

We use @tempswa to mean no preamble writing and reuse @filesw to indicate no overwriting:

```

846 \def\filecontents{\@tempswatrue\@fileswtrue
847   \ifnextchar[\filec@ntents@opt\filec@ntents
848   }
849   \@namedef{filecontents*}{\@tempswafalse\@fileswtrue
850   \ifnextchar[\filec@ntents@opt\filec@ntents
851   }

```

To handle the optional argument we execute for each option the command \filec@ntents@OPTION if it exist or complain about unknown option.

```

852 \def\filec@ntents@opt[#1]{%
853   \edef\@fortmp{\zap@space#1 \@empty}%
854   \@for\reserved@a:=\@fortmp\do{%
855     \ifcsname filec@ntents@\reserved@a\endcsname
856       \csname filec@ntents@\reserved@a\endcsname
857     \else
858       \latex@error{Unknown filecontents option \reserved@a}%
859       {Valid options are force (or overwrite), nosearch, noheader}%
860     \fi}%
861   \filec@ntents
862 }

```

Option force (or overwrite) changes the overwriting switch

```

863 \let\filec@ntents@force\@fileswfalse
864 \let\filec@ntents@overwrite\@fileswfalse % alternative name

```

and option noheader the preamble switch (which is equivalent to using the star form of the environment).

```

865 \let\filec@ntents@noheader\@tempswafalse

```



Option `nosearch` only checks the current directory not the whole  $\TeX$  tree for the existence of the file to write.

```

866 \def\filec@ntents@nosearch{%
867   \let\filec@ntents@checkdir\@currdir
868   \def\filec@ntents@where{in current directory}}

```

By default we search the whole tree:

```

869 \let\filec@ntents@checkdir\@empty
870 \def\filec@ntents@where{exists on the system}

871 \begingroup%
872 \@tempcnta=1
873 \loop
874   \catcode\@tempcnta=12 %
875   \advance\@tempcnta\@ne %
876   \ifnum\@tempcnta<32 %
877     \repeat %
878   \catcode'\*=11 %
879   \catcode'\^^M\active%
880   \catcode'\^^L\active\let^^L\relax%
881   \catcode'\^^I\active%

```

```

882 \gdef\filec@ntents#1{%
883   \set@curr@file{\filec@ntents@checkdir#1}%
884   \edef\q@curr@file{"\@curr@file"}%

```

Lua $\TeX$  has more writes (and 18 is safe here).

```

885 \chardef\reserved@c\ifx\directlua\@undefined 15 \else 127 \fi%
886 \openin\@inputcheck\q@curr@file \space %
887 \ifeof\@inputcheck%
888   \@latex@warning@no@line%
889     {Writing file '\@currdir\@curr@file'}%

890   \ch@ck7\reserved@c\write\relax%
891   \immediate\openout\reserved@c\q@curr@file\relax%
892 \else%

893   \if@filesw%
894     \@latex@warning@no@line%
895       {File '\@curr@file' already \filec@ntents@where.\MessageBreak%
896         Not generating it from this source}%
897     \let\write\@gobbles%
898     \let\closeout\@gobble%
899   \else%

```

If we are overwriting, we try to make sure that the user is not by mistake overwriting the input file (`\jobname`). Of course, this only works for input files ending in `.tex`. If a different extension is used there is no way to see that we are overwriting ourselves!

```

900   \edef\reserved@a{#1}%
901   \edef\reserved@a{\detokenize\expandafter{\reserved@a}}%
902   \edef\reserved@b{\detokenize\expandafter{\jobname}}%
903   \ifx\reserved@a\reserved@b%
904     \@fileswtrue%
905   \else%
906     \edef\reserved@b{\reserved@b\detokenize{.tex}}%

```

```

907      \ifx\reserved@a\reserved@b
908      \@fileswrite%
909      \fi%
910    \fi%

```

We allocate a write channel but we open it only if it is (hopefully) safe. If not opened that means we are going to write on the terminal.

```

911      \ch@ck7\reserved@c\write\relax%
912      \if@files% % Foul ... trying to overwrite \jobname!
913      \@latex@error{Trying to overwrite '\jobname.tex'}{You can't %
914        write to the file you are reading from!\MessageBreak%
915        Data is written to screen instead.}%
916      \else%
917        \@latex@warning@no@line%
918          {Writing or overwriting file '\@currdir\@curr@file'}%
919        \immediate\openout\reserved@c\q@curr@file\relax%
920      \fi%
921    \fi%
922  \fi%

```

Closing the \@inputcheck is done here to avoid having to do this in each branch.

```

923  \closein\@inputcheck%
924  \if@tempswa%
925    \immediate\write\reserved@c{%
926      \@percentchar\@percentchar\space%
927        \expandafter\@gobble\string\LaTeX2e file '\@curr@file'^^J%
928      \@percentchar\@percentchar\space generated by the %
929        '\@currenvir' \expandafter\@gobblefour\string\newenvironment^^J%
930      \@percentchar\@percentchar\space from source '\jobname' on %
931        \number\year/\two@digits\month/\two@digits\day.^^J%
932      \@percentchar\@percentchar}%
933  \fi%
934  \let\do\@makeother\dospecials%

```

If there are active characters in the upper half (e.g., from inputenc there would be confusion so we render everything harmless.

```

935  \count@ 128\relax%
936  \loop%
937    \catcode\count@ 11\relax%
938    \advance\count@ \@ne%
939    \ifnum\count@<\ccclvi%
940  \repeat%
941  \edef\E{\@backslashchar end\string{\@currenvir\string}}%
942  \edef\reserved@b{%
943    \def\noexpand\reserved@b%
944      #####1\E####2\E####3\relax}%
945  \reserved@b{%
946    \ifx\relax##3\relax%

```

There was no \end{filecontents}

```

947    \immediate\write\reserved@c{##1}%
948  \else%

```

There was a `\end{filecontents}`, so stop this time.

```

949      \edef^^M{\noexpand\end{\@currentvir}}%
950      \ifx\relax##1\relax%
951      \else%

```

Text before the `\end`, write it with a warning.

```

952          \@latex@warning{Writing text ‘##1’ before %
953          \string\end{\@currentvir}\MessageBreak as last line of \@curr@file}%
954      \immediate\write\reserved@c{##1}%
955      \fi%
956      \ifx\relax##2\relax%
957      \else%

```

Text after the `\end`, ignore it with a warning.

```

958          \@latex@warning{%
959          Ignoring text ‘##2’ after \string\end{\@currentvir}}%
960      \fi%
961      \fi%
962      ^^M}%

```

```

963      \catcode'\^^L\active%
964      \let\L\@undefined%
965      \def^^L{\expandafter\ifx\csname L\endcsname\relax\fi ^^J^^J}%
966      \catcode'\^^I\active%
967      \let\I\@undefined%
968      \def^^I{\expandafter\ifx\csname I\endcsname\relax\fi\space}%
969      \catcode'\^^M\active%
970      \edef^^M##1^^M{%
971          \noexpand\reserved@b##1\E\E\relax}}%
972      \endgroup%

973      </2ekernel | latexrelease>
974      <latexrelease>\EndIncludeInRelease
975      <latexrelease>\IncludeInRelease{2019/10/01}%
976      <latexrelease>          {\filec@ntents}{Spaces in file names + optional arg}%
977      <latexrelease>\def\filecontents{\@tempswatrue\@fileswtrue
978      <latexrelease>  \ifnextchar[\filec@ntents@opt\filec@ntents
979      <latexrelease> }
980      <latexrelease>\@namedef{filecontents*}{\@tempswafalse\@fileswtrue
981      <latexrelease>  \ifnextchar[\filec@ntents@opt\filec@ntents
982      <latexrelease> }
983      <latexrelease>\def\filec@ntents@opt[#1]{%
984      <latexrelease>  \edef\@fortmp{\zap@space#1 \@empty}%
985      <latexrelease>  \@for\reserved@a:=\@fortmp\do{%
986      <latexrelease>      \ifcsname filec@ntents@\reserved@a\endcsname
987      <latexrelease>      \csname filec@ntents@\reserved@a\endcsname
988      <latexrelease>      \else
989      <latexrelease>      \@latex@error{Unknown filecontents option \reserved@a}%
990      <latexrelease>      {Valid options are force (or overwrite), nosearch, noheader}%
991      <latexrelease>      \fi}%
992      <latexrelease>  \filec@ntents
993      <latexrelease> }
994      <latexrelease>\let\filec@ntents@force\@fileswfalse
995      <latexrelease>\let\filec@ntents@overwrite\@fileswfalse % alternative name
996      <latexrelease>\let\filec@ntents@noheader\@tempswafalse

```

```

997 <latexrelease>\def\filec@ntents@nosearch{%
998 <latexrelease> \let\filec@ntents@checkdir\@currdir
999 <latexrelease> \def\filec@ntents@where{in current directory}}
1000 <latexrelease>\let\filec@ntents@checkdir\@empty
1001 <latexrelease>\def\filec@ntents@where{exists on the system}
1002 <latexrelease>\begingroup%
1003 <latexrelease>\@tempcnta=1
1004 <latexrelease>\loop
1005 <latexrelease> \catcode\@tempcnta=12 %
1006 <latexrelease> \advance\@tempcnta\@one %
1007 <latexrelease>\ifnum\@tempcnta<32 %
1008 <latexrelease>\repeat %
1009 <latexrelease>\catcode'\*=11 %
1010 <latexrelease>\catcode'\^^M\active%
1011 <latexrelease>\catcode'\^^L\active\let^^L\relax%
1012 <latexrelease>\catcode'\^^I\active%
1013 <latexrelease>\gdef\filec@ntents#1{%
1014 <latexrelease> \set@curr@file{\filec@ntents@checkdir#1}%
1015 <latexrelease> \edef\q@curr@file{\expandafter\quote@name\expandafter{\@curr@file}}%
1016 <latexrelease> \chardef\reserved@c\ifx\directlua\@undefined 15 \else 127 \fi%
1017 <latexrelease> \openin\@inputcheck\q@curr@file \space %
1018 <latexrelease> \ifeof\@inputcheck%
1019 <latexrelease> \@latex@warning@no@line%
1020 <latexrelease> {Writing file '\@currdir\@curr@file'}%
1021 <latexrelease> \ch@ck7\reserved@c\write\relax%
1022 <latexrelease> \immediate\openout\reserved@c\q@curr@file\relax%
1023 <latexrelease> \else%
1024 <latexrelease> \if@filesw%
1025 <latexrelease> \@latex@warning@no@line%
1026 <latexrelease> {File '\@curr@file' already \filec@ntents@where.\MessageBreak%
1027 <latexrelease> Not generating it from this source}%
1028 <latexrelease> \let\write\@gobbletwo%
1029 <latexrelease> \let\closeout\@gobble%
1030 <latexrelease> \else%
1031 <latexrelease> \edef\reserved@a{\#1}%
1032 <latexrelease> \edef\reserved@a{\detokenize\expandafter{\reserved@a}}%
1033 <latexrelease> \edef\reserved@b{\detokenize\expandafter{\jobname}}%
1034 <latexrelease> \ifx\reserved@a\reserved@b%
1035 <latexrelease> \@fileswtrue%
1036 <latexrelease> \else%
1037 <latexrelease> \edef\reserved@b{\reserved@b\detokenize{.tex}}%
1038 <latexrelease> \ifx\reserved@a\reserved@b
1039 <latexrelease> \@fileswtrue%
1040 <latexrelease> \fi%
1041 <latexrelease> \fi%
1042 <latexrelease> \ch@ck7\reserved@c\write\relax%
1043 <latexrelease> \if@filesw% % Foul ... trying to overwrite \jobname!
1044 <latexrelease> \@latex@error{Trying to overwrite '\jobname.tex'}{You can't %
1045 <latexrelease> write to the file you are reading from!\MessageBreak%
1046 <latexrelease> Data is written to screen instead.}%
1047 <latexrelease> \else%
1048 <latexrelease> \@latex@warning@no@line%
1049 <latexrelease> {Writing or overwriting file '\@currdir\@curr@file'}%
1050 <latexrelease> \immediate\openout\reserved@c\q@curr@file\relax%

```

```

1051 <latexrelease> \fi%
1052 <latexrelease> \fi%
1053 <latexrelease> \fi%
1054 <latexrelease> \closein\@inputcheck%
1055 <latexrelease> \if@tempswa%
1056 <latexrelease> \immediate\write\reserved@c{%
1057 <latexrelease> \@percentchar\@percentchar\space%
1058 <latexrelease> \expandafter\@gobble\string\LaTeX2e file '\@curr@file'^^J%
1059 <latexrelease> \@percentchar\@percentchar\space generated by the %
1060 <latexrelease> '\@currenvir' \expandafter\@gobblefour\string\newenvironment^^J%
1061 <latexrelease> \@percentchar\@percentchar\space from source '\jobname' on %
1062 <latexrelease> \number\year/\two@digits\month/\two@digits\day.^^J%
1063 <latexrelease> \@percentchar\@percentchar}%
1064 <latexrelease> \fi%
1065 <latexrelease> \let\do\@makeoother\dospecials%
1066 <latexrelease> \count@ 128\relax%
1067 <latexrelease> \loop%
1068 <latexrelease> \catcode\count@ 11\relax%
1069 <latexrelease> \advance\count@ \@ne%
1070 <latexrelease> \ifnum\count@<\@ccclvi%
1071 <latexrelease> \repeat%
1072 <latexrelease> \edef\E{\@backslashchar end\string{\@currenvir\string}}%
1073 <latexrelease> \edef\reserved@b{%
1074 <latexrelease> \def\noexpand\reserved@b%
1075 <latexrelease> #####1\E####2\E####3\relax}%
1076 <latexrelease> \reserved@b{%
1077 <latexrelease> \ifx\relax##3\relax%
1078 <latexrelease> \immediate\write\reserved@c{##1}%
1079 <latexrelease> \else%
1080 <latexrelease> \edef^^M{\noexpand\end{\@currenvir}}%
1081 <latexrelease> \ifx\relax##1\relax%
1082 <latexrelease> \else%
1083 <latexrelease> \@latex@warning{Writing text '##1' before %
1084 <latexrelease> \string\end{\@currenvir}\MessageBreak as last line of \@curr@file}%
1085 <latexrelease> \immediate\write\reserved@c{##1}%
1086 <latexrelease> \fi%
1087 <latexrelease> \ifx\relax##2\relax%
1088 <latexrelease> \else%
1089 <latexrelease> \@latex@warning{%
1090 <latexrelease> Ignoring text '##2' after \string\end{\@currenvir}}%
1091 <latexrelease> \fi%
1092 <latexrelease> \fi%
1093 <latexrelease> ^^M}%
1094 <latexrelease> \catcode'\^^L\active%
1095 <latexrelease> \let\L\@undefined%
1096 <latexrelease> \def^^L{\expandafter\ifx\csname L\endcsname\relax\fi ^^J^^J}%
1097 <latexrelease> \catcode'\^^I\active%
1098 <latexrelease> \let\I\@undefined%
1099 <latexrelease> \def^^I{\expandafter\ifx\csname I\endcsname\relax\fi\space}%
1100 <latexrelease> \catcode'\^^M\active%
1101 <latexrelease> \edef^^M##1^^M{%
1102 <latexrelease> \noexpand\reserved@b##1\E\E\relax}}%
1103 <latexrelease> \endgroup%
1104 <latexrelease> \EndIncludeInRelease

```

```

1105 <latexrelease>\IncludeInRelease{0000/00/00}%
1106 <latexrelease>                {\filec@ntents}{Spaces in file names + optional arg}%
1107 <latexrelease>
1108 <latexrelease>\let\filec@ntents@opt      \@undefined
1109 <latexrelease>\let\filec@ntents@force    \@undefined
1110 <latexrelease>\let\filec@ntents@overwrite \@undefined
1111 <latexrelease>\let\filec@ntents@noheader \@undefined
1112 <latexrelease>\let\filec@ntents@nosearch \@undefined
1113 <latexrelease>\let\filec@ntents@checkdir \@undefined
1114 <latexrelease>\let\filec@ntents@where    \@undefined
1115 <latexrelease>
1116 <latexrelease>\begingroup%
1117 <latexrelease>\@tempcnta=1
1118 <latexrelease>\loop
1119 <latexrelease> \catcode\@tempcnta=12 %
1120 <latexrelease> \advance\@tempcnta\@ne %
1121 <latexrelease> \ifnum\@tempcnta<32 %
1122 <latexrelease> \repeat %
1123 <latexrelease> \catcode'\*=11 %
1124 <latexrelease> \catcode'\^~M\active%
1125 <latexrelease> \catcode'\^~L\active\let^~L\relax%
1126 <latexrelease> \catcode'\^~I\active%
1127 <latexrelease>
1128 <latexrelease>\gdef\filec@ntents#1{%
1129 <latexrelease> \openin\@inputcheck#1 %
1130 <latexrelease> \ifeof\@inputcheck%
1131 <latexrelease> \@latex@warning@no@line%
1132 <latexrelease> {Writing file '\@currdir#1'}%
1133 <latexrelease> \chardef\reserved@c15 %
1134 <latexrelease> \ch@ck7\reserved@c\write%
1135 <latexrelease> \immediate\openout\reserved@c#1\relax%
1136 <latexrelease> \else%
1137 <latexrelease> \closein\@inputcheck%
1138 <latexrelease> \@latex@warning@no@line%
1139 <latexrelease> {File '#1' already exists on the system.\MessageBreak%
1140 <latexrelease> Not generating it from this source}%
1141 <latexrelease> \let\write\@gobbletwo%
1142 <latexrelease> \let\closeout\@gobble%
1143 <latexrelease> \fi%
1144 <latexrelease> \if@tempswa%
1145 <latexrelease> \immediate\write\reserved@c{%
1146 <latexrelease> \@percentchar\@percentchar\space%
1147 <latexrelease> \expandafter\@gobble\string\LaTeX2e file '#1'^~J%
1148 <latexrelease> \@percentchar\@percentchar\space generated by the %
1149 <latexrelease> '\@currenvir' \expandafter\@gobblefour\string\newenvironment^~J%
1150 <latexrelease> \@percentchar\@percentchar\space from source '\jobname' on %
1151 <latexrelease> \number\year/\two@digits\month/\two@digits\day.^~J%
1152 <latexrelease> \@percentchar\@percentchar}%
1153 <latexrelease> \fi%
1154 <latexrelease> \let\do\@makeoother\dospecials%
1155 <latexrelease> \count@ 128\relax%
1156 <latexrelease> \loop%
1157 <latexrelease> \catcode\count@ 11\relax%
1158 <latexrelease> \advance\count@ \@ne%

```

```

1159 <latexrelease> \ifnum\count@<\@ccclvi%
1160 <latexrelease> \repeat%
1161 <latexrelease> \edef\E{\@backslashchar end\string{\@currentvir\string}}%
1162 <latexrelease> \edef\reserved@b{%
1163 <latexrelease> \def\noexpand\reserved@b%
1164 <latexrelease> #####1\E####2\E####3\relax}%
1165 <latexrelease> \reserved@b{%
1166 <latexrelease> \ifx\relax##3\relax%
1167 <latexrelease> \immediate\write\reserved@c{##1}%
1168 <latexrelease> \else%
1169 <latexrelease> \edef^^M{\noexpand\end{\@currentvir}}%
1170 <latexrelease> \ifx\relax##1\relax%
1171 <latexrelease> \else%
1172 <latexrelease> \@latex@warning{Writing text ‘##1’ before %
1173 <latexrelease> \string\end{\@currentvir}\MessageBreak as last line of #1}%
1174 <latexrelease> \immediate\write\reserved@c{##1}%
1175 <latexrelease> \fi%
1176 <latexrelease> \ifx\relax##2\relax%
1177 <latexrelease> \else%
1178 <latexrelease> \@latex@warning{%
1179 <latexrelease> Ignoring text ‘##2’ after \string\end{\@currentvir}}%
1180 <latexrelease> \fi%
1181 <latexrelease> \fi%
1182 <latexrelease> ^^M}%
1183 <latexrelease>
1184 <latexrelease> \catcode‘^^L\active%
1185 <latexrelease> \let\L\@undefined%
1186 <latexrelease> \def^^L{\expandafter\ifx\csname L\endcsname\relax\fi ^^J^^J}%
1187 <latexrelease> \catcode‘^^I\active%
1188 <latexrelease> \let\I\@undefined%
1189 <latexrelease> \def^^I{\expandafter\ifx\csname I\endcsname\relax\fi\space}%
1190 <latexrelease> \catcode‘^^M\active%
1191 <latexrelease> \edef^^M##1^^M{%
1192 <latexrelease> \noexpand\reserved@b##1\E\E\relax}}%
1193 <latexrelease>\endgroup%
1194 <latexrelease>\EndIncludeInRelease
1195 <*2ekernel>

1196 \begingroup
1197 \catcode‘|= \catcode‘\%
1198 \catcode‘\%=12
1199 \catcode‘\*=11
1200 \gdef\@percentchar{%
1201 \gdef\endfilecontents{|
1202 \immediate\closeout\reserved@c
1203 \def\T##1##2##3{|
1204 \ifx##1\@undefined\else
1205 \@latex@warning@no@line{##2 has been converted to Blank ##3e}|
1206 \fi}|
1207 \T\L{Form Feed}{Lin}|
1208 \T\I{Tab}{Spac}|
1209 \immediate\write\@unused{}}
1210 \global\let\endfilecontents*\endfilecontents

```

We no longer prevent the code to be used after begin document (no rollback needed for

this change).

```

1211 %\onlypreamble\filecontents
1212 %\onlypreamble\endfilecontents
1213 %\onlypreamble\filecontents*
1214 %\onlypreamble\endfilecontents*
1215 \endgroup
1216 %\onlypreamble\filecontents

```

(End definition for `\filecontents` and `\endfilecontents`. These functions are documented on page ??.)

## 5 Package/class rollback mechanism

```

1217 </2ekernel>
1218 <*2ekernel | latexreleasefirst>

```

`\pkgcls@debug` For testing we have a few extra lines of code that by default do nothing but one can set `\pkgcls@debug` to `\typeout` to get extra info. Sometime in the future this will be dropped.

```

1219 <*tracerollback>
1220 %\let\pkgcls@debug\typeout
1221 \let\pkgcls@debug\@gobble
1222 </tracerollback>

```

(End definition for `\pkgcls@debug`. This function is documented on page ??.)

`\requestedLaTeXdate` The macro (!) `\requestedLaTeXdate` holds the globally requested rollback date (via `latexrelease`) or zero if no such request was made.

```

1223 \def\requestedLaTeXdate{0}

```

(End definition for `\requestedLaTeXdate`. This function is documented on page ??.)

`\pkgcls@targetdate` If a rollback for a package or class is requested then `\pkgcls@targetdate` holds the requested date as a number YYYYMMDD (if there was one, otherwise the value of `\requestedLaTeXdate`) and `\pkgcls@targetlabel` will be empty. If there was a request for a named version then `\pkgcls@targetlabel` holds the version name and `\pkgcls@targetdate` is set to 1.

`\pkgcls@targetdate=0` is used to indicate that there was no rollback request. While loading an old release `\pkgcls@targetdate` is also reset to zero so that `\DeclareRelease` declarations are bypassed.

In contrast `\pkgcls@innerdate` will always hold the requested date (in a macro not a counter) if there was one, otherwise, e.g., if there was no request or a request to a version name it will contain T<sub>E</sub>X largest legal number. While loading a file this can be used to provide conditionals that select code based on the request.

```

1224 \ifx\pkgcls@targetdate\@undefined
1225 \newcount\pkgcls@targetdate
1226 \fi
1227 \let\pkgcls@targetlabel\@empty
1228 \def\pkgcls@innerdate{\maxdimen}

```

(End definition for `\pkgcls@targetdate`, `\pkgcls@targetlabel`, and `\pkgcls@innerdate`. These functions are documented on page ??.)



`\pkgcls@candidate` When looping through the `\DeclareRelease` declarations we record if the release is the best candidate we have seen so far. This is recorded in `\pkgcls@candidate` and we update it whenever we see a better one.

In `\pkgcls@releasedate` we keep track of the release date of that candidate.

```
1229 \let\pkgcls@candidate\@empty
1230 \let\pkgcls@releasedate\@empty
```

*(End definition for `\pkgcls@candidate` and `\pkgcls@releasedate`. These functions are documented on page ??.)*

`\load@onefilewithoptions` the best place to add the rollback code is at the point where `\@onefilewithoptions` is called to load a single class or package.

To make things easy we save the old definition as `\load@onefilewithoptions` and then provide a new interface.

Important: as this code is also unconditionally placed into `latexrelease` we can only do this name change once otherwise both macros will contain the same code.

```
1231 \ifx\load@onefilewithoptions\undefined
1232 \let\load@onefilewithoptions\@onefilewithoptions
1233 \def\@onefilewithoptions#1[#2][#3]#4{%
```

First a bit of tracing normally disabled.

```
1234 (*tracrollback)
1235 \pkgcls@debug{--- File loaded request (\noexpand\usepackage or ...)}%
1236 \pkgcls@debug{\@spaces 1: #1}%
1237 \pkgcls@debug{\@spaces 2: #2}%
1238 \pkgcls@debug{\@spaces 3: #3}%
1239 \pkgcls@debug{\@spaces 4: #4}%
1240 /tracrollback)
```

Two of the arguments are needed later on in error/warning messages so we save them.

```
1241 \def\pkgcls@name{#1}% % for info message
1242 \def\pkgcls@arg {#3}% % for info message
```

then we parse the final optional argument to determine if there is a specific rollback request for the current file. This will set `\pkgcls@targetdate`, `\pkgcls@targetlabel` and `\pkgcls@mindate`.

```
1243 \pkgcls@parse@date@arg{#3}%
```

When determining the correct release to load we keep track of candidates in `\pkgcls@candidate` and initially we don't have any:

```
1244 \let\pkgcls@candidate\@empty
```

If we had a rollback request then `#3` may contain data but not necessarily a “minimal date” so instead of passing it on we pass on the content of `\pkgcls@mindate`. We need to pass the value not the command, otherwise nested packages may pick up the wrong information.

```
1245 \begingroup
1246 \edef\reserved@a{%
1247 \endgroup
1248 \unexpanded{\load@onefilewithoptions#1[#2]}%
1249 [\pkgcls@mindate]%
1250 \unexpanded{#4}}%
1251 \reserved@a
1252 }
1253 \fi
```

(End definition for `\loadonefilewithoptions` and `\@onefilewithoptions`. These functions are documented on page ??.)

`\pkgcls@parse@date@arg` The `\pkgcls@parse@date@arg` command parses the second optional argument of `\usepackage`, `\RequirePackage` or `\documentclass` for a rollback request setting the values of `\pkgcls@targetdate` and `\pkgcls@targetlabel`.

This optional argument has a dual purpose: If it just contains a date string then this means that the package should have at least that date (to ensure that a certain feature is actually available, or a certain bug has been fixed). When the package gets loaded the information in `\Provides...` will then be checked against this request.

But if it starts with an equal sign followed by a date string or followed by a version name then this means that we should roll back to the state of the package at that date or to the version with the requested name.

If there was no optional argument or the optional argument does not start with “=” then the `\pkgcls@targetdate` is set to the date of the overall rollback request (via `latexrelease`) or if that was not given it is set to 0. In either case `\pkgcls@targetlabel` will be made empty.

If the argument doesn’t start with “=” then it is supposed to be a “minimal date” and we therefore save the value in `\pkgcls@mindate`, otherwise this macro is made empty.

So in summary we have:

Input	<code>\pkgcls@targetdate</code>	<code>\pkgcls@targetlabel</code>	<code>\pkgcls@mindate</code>
<code>&lt;empty&gt;</code>	<code>&lt;global-rollbackdate-as-number&gt;</code>	<code>&lt;empty&gt;</code>	<code>&lt;empty&gt;</code>
<code>&lt;date&gt;</code>	<code>&lt;global-rollbackdate-as-number&gt;</code>	<code>&lt;empty&gt;</code>	<code>&lt;date&gt;</code>
<code>=&lt;date&gt;</code>	<code>&lt;date-as-number&gt;</code>	<code>&lt;empty&gt;</code>	<code>&lt;empty&gt;</code>
<code>=&lt;version&gt;</code>	1	<code>&lt;version&gt;</code>	<code>&lt;empty&gt;</code>
<code>&lt;other&gt;</code>	<code>&lt;global-rollbackdate-as-number&gt;</code>	<code>&lt;empty&gt;</code>	<code>&lt;other&gt;</code>

where `<global-rollbackdate-as-number>` is a date request given via `latexrelease` or if there wasn’t one 0.

```
1254 \def\pkgcls@parse@date@arg #1{%
```

If the argument is empty we use the rollback date from `latexrelease` which has the value of zero if there was no rollback request. The label and the minimal date is made empty in that case.

```
1255 \ifx\@nil#1\@nil
1256 \pkgcls@targetdate\requestedLaTeXdate\relax
1257 \let\pkgcls@targetlabel\@empty
1258 \let\pkgcls@mindate\@empty
```

Otherwise we parse the argument further, checking for a = as the first character. We append a = at the end so that there is at least one such character in the argument.

```
1259 \else
1260 \pkgcls@parse@date@arg#1=\@nil\relax
1261 \fi
1262 }
```

The actual parsing work then happens in `\pkgcls@parse@date@arg@:`

```
1263 \def\pkgcls@parse@date@arg@#1=#2\@nil{%
```

We set `\pkgcls@targetdate` depending on the parsing result; the code is expandable so we can do the parsing as part of the assignment.

```
1264 \pkgcls@targetdate
```

If a = was in first position then #1 will be empty. In that case #2 will be the original argument with a = appended.

This can be parsed with \@parse@version, the trailing character is simply ignored. This macro returns the parsed date as a number (or zero if it wasn't a date) and accepts both YYYY/MM/DD and YYYY-MM-DD formats.

```
1265 \ifx\@nil#1\@nil
1266 \@parse@version0#2//00\@nil\relax
```

Whatever is returned is thus assigned to \pkgcls@targetdate and therefore we can now test its value. If the value is zero we assume that the remaining argument string represents a version and change \pkgcls@targetdate and set \pkgcls@targetlabel to the version name (after stripping off the trailing =.

```
1267 \ifnum \pkgcls@targetdate=\z@
1268 \pkgcls@targetdate\@ne
1269 \def\pkgcls@innerdate{\maxdimen}%
1270 \pkgcls@parse@date@arg@version#2%
1271 \else
1272 \edef\pkgcls@innerdate{\the\pkgcls@targetdate}%
1273 \fi
1274 \let\pkgcls@mindate\@empty
1275 \else
```

If #1 was not empty then there wasn't a = character in first position so we are dealing either with a "minimum date" or with some incorrect data. We assume the former and make the following assignments (the first one finishing the assignment of \pkgcls@targetdate):

```
1276 \requestedLaTeXdate\relax
1277 \let\pkgcls@targetlabel\@empty
1278 \def\pkgcls@innerdate{\maxdimen}%
1279 \def\pkgcls@mindate{#1}%
```

If the min-date is after the requested rollback date (if there is any, i.e., if it is not zero) then we have a conflict and therefore issue a warning.

```
1280 \ifnum \pkgcls@targetdate > \z@
1281 \ifnum \@parse@version0#1//00\@nil > \pkgcls@targetdate
1282 \@latex@warning@no@line{Suspicious rollback/min-date date given\MessageBreak
1283 A minimal date of #1 has been specified for
1284 \@cls@pkg\MessageBreak '\pkgcls@name'.\MessageBreak
1285 But this is in conflict
1286 with a rollback request to \requestedpatchdate}
1287 \fi
1288 \fi
1289 \fi
1290 }
```

Strip off the trailing = and assign the version name to \pkgcls@targetlabel.

```
1291 \def\pkgcls@parse@date@arg@version#1={%
1292 \def\pkgcls@targetlabel{#1}}
```

*(End definition for \pkgcls@parse@date@arg. This function is documented on page ??.)*

**\DeclareRelease** First argument is the "name" of the release and it can be left empty if one doesn't like to give a name to the release. The second argument is that from which on this release was available (or should be used in case of minor updates). The final argument is the external

file name of this release, by convention this should be  $\langle pkg/cls-name \rangle - \langle date \rangle . \langle extension \rangle$  but this is not enforced and through this argument one can overwrite it.

```

1293 \def\DeclareRelease#1#2#3{%
1294   \ifnum\pkgcls@targetdate>z@ % some sort of rollback request
1295   \tracerollback
1296   \pkgcls@debug{---\string\DeclareRelease:}%
1297   \pkgcls@debug{\@spaces 1: #1}%
1298   \pkgcls@debug{\@spaces 2: #2}%
1299   \pkgcls@debug{\@spaces 3: #3}%
1300 }/tracerollback

```

If the date argument #2 is empty we are dealing with a special release that should be only accessible via its name; a typical use case would be a “beta” release. So if we are currently processing a date request we ignore it and otherwise we check if we can match the name and if so load the corresponding release file.

```

1301   \ifx\@nil#2\@nil
1302     \ifnum\pkgcls@targetdate=\@ne % named request
1303     \def\reserved@a{#1}%
1304     \ifx\pkgcls@targetlabel\reserved@a
1305     \pkgcls@use@this@release{#3}{}%
1306   \tracerollback
1307   \else
1308     \pkgcls@debug{Label doesn't match}%
1309   /tracerollback
1310   \fi
1311 \tracerollback
1312 \else
1313   \pkgcls@debug{Date request: ignored}%
1314 /tracerollback
1315 \fi
1316 \else

```

If the value of  $\backslash\text{pkgcls@targetdate}$  is greater than 1 (or in reality greater than something like 19930101) we are dealing with a rollback request to a specific date.

```

1317   \ifnum\pkgcls@targetdate>\@ne % a real request

```

So we parse the date of this release to check if it is before or after the request date.

```

1318   \ifnum\@parse@version#2//00\@nil
1319   >\pkgcls@targetdate

```

If it is after we have to distinguish between two cases: If there was an earlier candidate we use that one because the other is too late, but if there wasn't one (i.e., if current release is the oldest that exists) we use it as the best choice. However in that case something is wrong (as there shouldn't be a rollback to a date where a package used doesn't yet exists. So we make a complained to the user.

```

1320   \ifx\pkgcls@candidate\@empty
1321   \pkgcls@rollbackdate@error{#2}%
1322   \pkgcls@use@this@release{#3}{#2}%
1323   \else
1324   \pkgcls@use@this@release\pkgcls@candidate
1325   \pkgcls@releasedate
1326   \fi
1327   \else

```

Otherwise, if the release date of this version is before the target rollback and we record it as a candidate. But we don't use it yet as there may be another release which is still before the target rollback.

```

1328         \def\pkgcls@candidate{#3}%
1329         \def\pkgcls@releasedate{#2}%
1330 (*tracereollback)
1331         \pkgcls@debug{New candidate: #3}%
1332 (/tracereollback)
1333         \fi
1334     \else

```

If we end up in this branch we have a named version request. So we check if `\pkgcls@targetlabel` matches the current name and if yes we use this release immediately, otherwise we do nothing as a later declaration may match it.

```

1335         \def\reserved@a{#1}%
1336         \ifx\pkgcls@targetlabel\reserved@a
1337         \pkgcls@use@this@release{#3}{#2}%
1338 (*tracereollback)
1339         \else
1340         \pkgcls@debug{Label doesn't match}%
1341 (/tracereollback)
1342         \fi
1343     \fi
1344 \fi
1345 \fi
1346 }

```

(End definition for `\DeclareRelease`. This function is documented on page ??.)

`\pkgcls@use@this@release` If a certain release has been selected (stored in the external file given in #1) we need to input it and afterwards stop reading the current file.

```

1347 \def\pkgcls@use@this@release#1#2{%

```

Before that we record the selection made inside the transcript.

```

1348     \pkgcls@show@selection{#1}{#2}%

```

We then set the `\pkgcls@targetdate` to zero so that any `\DeclareRelease` or `\DeclareCurrentRelease` in the file we now load are bypassed<sup>18</sup> and then we finally load the correct release.

After loading that file we need to stop reading the current file so we issue `\endinput`. Note that the `\relax` before that is essential to ensure that the `\endinput` is only happening after the file has been fully processed, otherwise it would act after the first line of the `\@@input`!

```

1349     \pkgcls@targetdate\z@
1350     \@@input #1\relax
1351     \endinput
1352 }

```

(End definition for `\pkgcls@use@this@release`. This function is documented on page ??.)

<sup>18</sup>The older release may also have such declarations inside if it was a simply copy of the `.sty` or `.cls` file current at that date. Removing these declarations would make the file load a tiny bit faster, but this way it works in any case.

`\pkgcls@show@selection` This command records what selection was made. As that is needed in two places (and it is rather lengthy) it was placed in a separate command. The first argument is the name of the external file that is being loaded and is only needed for debugging. The second argument is the date that corresponds to this file and it is used as part of the message.

```

1353 \def\pkgcls@show@selection#1#2{%
1354   (*traceroollback)
1355   \pkgcls@debug{Result: use #1}%
1356 }/traceroollback)
1357 \GenericInfo
1358 {\@spaces\@spaces\space}{Rollback for
1359   \@cls@pkg\space'\@currname' requested ->
1360   \ifnum\pkgcls@targetdate>\@ne
1361     date
1362     \ifnum\requestedLaTeXdate=\pkgcls@targetdate
1363       \requestedpatchdate
1364     \else
1365       \expandafter\@gobble\pkgcls@arg
1366     \fi.\MessageBreak

```

Instead of “best approximation” we could say that we have been able to exactly match the date (if it is exact), but that would mean extra tests without much gain, so not done.

```

1367   Best approximation is
1368   \else
1369     version '\pkgcls@targetlabel'.\MessageBreak
1370     This corresponds to
1371   \fi
1372   \ifx\@nil#2\@nil
1373     a special release%
1374   \else
1375     the release introduced on #2%
1376   \fi
1377   \@gobble}%
1378 }

```

*(End definition for \pkgcls@show@selection. This function is documented on page ??.)*

`\pkgcls@rollbackdate@error` This is called if the requested rollback date is earlier than the earliest known release of a package or class.

A similar error is given if global rollback date and min-date on a specific package conflict with each other, but that case is happens only once so it is inlined.

```

1379 \def\pkgcls@rollbackdate@error#1{%
1380   \@latex@error{Suspicious rollback date given}%
1381   {The \@cls@pkg\space'\@currname' claims that it
1382     came into existence on #1 which\MessageBreak
1383     is after your requested rollback date --- so
1384     something is wrong here.\MessageBreak
1385     Continue and we use the earliest known release.}}

```

*(End definition for \pkgcls@rollbackdate@error. This function is documented on page ??.)*

`\DeclareCurrentRelease` This declares the date (and possible name) of the current version of a package or class.

```

1386 \def\DeclareCurrentRelease#1#2{%

```

First we test if `\pkgcls@targetdate` is greater than zero, otherwise this code is bypassed (as there is no rollback request).

```

1387 \ifnum\pkgcls@targetdate>\z@ % some sort of rollback request
1388 (*traceroollback)
1389 \pkgcls@debug{---DeclareCurrentRelease}%
1390 \pkgcls@debug{ 1: #1}%
1391 \pkgcls@debug{ 2: #2}%
1392 (/traceroollback)

```

If the value is greater than 1 we have to deal with a date request, so we parse #2 as a date and compare it with `\pkgcls@targetdate`.

```

1393 \ifnum\pkgcls@targetdate>\@ne % a date request
1394 \ifnum\@parse@version#2//00\@nil
1395 >\pkgcls@targetdate

```

If it is greater that means the release date if this file is later than the requested rollback date. Again we have two cases: If there was a previous candidate release we use that one as the current release is too young, but if there wasn't we have to use this release nevertheless as there isn't any alternative.

However this case can only happen if there is a `\DeclareCurrentRelease` but no declared older releases (so basically the use of the declaration is a bit dubious).

```

1396 \ifx\pkgcls@candidate\@empty
1397 \pkgcls@rollbackdate@error{#2}%
1398 \else
1399 \pkgcls@use@this@release\pkgcls@candidate
1400 \pkgcls@releasedate
1401 \fi

```

Otherwise the current file is the right release, so we record that in the transcript and then carry on.

```

1402 \else
1403 \pkgcls@show@selection{current version}{#2}%
1404 \fi
1405 \else % a label request

```

Otherwise we have a rollback request to a named version so we check if that fits the current name and if not give an error as this was the last possible opportunity.

```

1406 \def\reserved@a{#1}%
1407 \ifx\pkgcls@targetlabel\reserved@a
1408 \pkgcls@show@selection{current version}{#2}%
1409 \else
1410 \@latex@error{Requested version '\pkgcls@targetlabel' for
1411 \cls@pkg\space'\@currname' is unknown}\@ehc
1412 \fi
1413 \fi
1414 \fi
1415 }

```

*(End definition for `\DeclareCurrentRelease`. This function is documented on page ??.)*

**`\IfTargetDateBefore`** This enables a simple form of conditional code inside a class or package file. If there is a date request and the request date is earlier than the first argument the code in the second argument is processed otherwise the code in the third argument is processed. If there was no date request then we also execute the third argument, i.e., we will get the “latest” version of the file.

Most often the second argument (before-date-code) will be empty.

```

1416 \DeclareRobustCommand\IfTargetDateBefore[1]{%
1417   \ifnum\pkgcls@innerdate <%
1418     \expandafter\@parse@version\expandafter0#1//00\@nil
1419     \typeout{Exclude code introduced on #1}%
1420     \expandafter\@firstoftwo
1421   \else
1422     \typeout{Include code introduced on #1}%
1423     \expandafter\@secondoftwo
1424   \fi
1425 }
```

(End definition for \IfTargetDateBefore. This function is documented on page ??.)

```

1426 </2ekernel | latexreleasefirst>
```

## 6 After Preamble

Finally we declare a package that allows all the commands declared above to be \Onlypreamble to be used after \begin{document}.

```

1427 <*afterpreamble>
1428 \NeedsTeXFormat{LaTeX2e}
1429 \ProvidesPackage{pkgindoc}
1430   [2020-08-08 v1.3m Package Interface in Document (DPC)]
1431 \def\reserved@a#1\do\@classoptionslist#2\do\filecontents#3\relax{%
1432   \gdef\@preamblecmds{#1#3}}
1433 \expandafter\reserved@a\@preamblecmds\relax
1434 </afterpreamble>
```



# File Q

## ltfilehook.dtx

### Contents

## 1 Introduction

### 1.1 Provided hooks

The code offers a number of hooks into which packages (or the user) can add code to support different use cases. Many hooks are offered as pairs (i.e., the second hook is reversed). Also important to know is that these pairs are properly nested with respect to other pairs of hooks.

There are hooks that are executed for all files of a certain type (if they contain code), e.g., for all “include files” or all “packages”, and there are also hooks that are specific to a single file, e.g., do something after the package `foo.sty` has been loaded.

### 1.2 General hooks for file reading

There are four hooks that are called for each file that is read using document-level commands such as `\input`, `\include`, `\usepackage`, etc. They are not called for files read using internal low-level methods, such as `\@input` or `\openin`.

---

<code>file/before</code>
<code>file/before/...</code>
<code>file/after/...</code>
<code>file/after</code>

---

These are:

**file/before**, **file/before/⟨file-name⟩** These hooks are executed in that order just before the file is loaded for reading. The code of the first hook is used with every file, while the second is executed only for the file with matching *⟨file-name⟩* allowing you to specify code that only applies to one file.

**file/after/⟨file-name⟩**, **file/after** These hooks are after the file with name *⟨file-name⟩* has been fully consumed. The order is swapped (the specific one comes first) so that the **before** and **after** hooks nest properly, which is important if any of them involve grouping (e.g., contain environments, for example). Furthermore both hooks are reversed hooks to support correct nesting of different packages adding code to both */before* and */after* hooks.

So the overall sequence of hook processing for any file read through the user interface commands of L<sup>A</sup>T<sub>E</sub>X is:

```
\UseHook{⟨file/before⟩}
\UseHook{⟨file/before/⟨file name⟩⟩}
  ⟨file contents⟩
\UseHook{⟨file/after/⟨file name⟩⟩}
\UseHook{⟨file/after⟩}
```

The file hooks only refer to the file by its name and extension, so the  $\langle file\ name \rangle$  should be the file name as it is on the filesystem with extension (if any) and without paths. Different from `\input` and similar commands, the `.tex` extension is not assumed in hook  $\langle file\ name \rangle$ , so `.tex` files must be specified with their extension to be recognized. Files within subfolders should also be addressed by their name and extension only.

Extensionless files also work, and should then be given without extension. Note however that  $\text{\TeX}$  prioritizes `.tex` files, so if two files `foo` and `foo.tex` exist in the search path, only the latter will be seen.

When a file is input, the  $\langle file\ name \rangle$  is available in `\CurrentFile`, which is then used when accessing the `file/before/` $\langle file\ name \rangle$  and `file/after/` $\langle file\ name \rangle$ .

---

---

`\CurrentFile`

The name of the file about to be read (or just finished) is available to the hooks through `\CurrentFile` (there is no  $\text{expl3}$  name for it for now). The file is always provided with its extension, i.e., how it appears on your hard drive, but without any specified path to it. For example, `\input{sample}` and `\input{app/sample.tex}` would both have `\CurrentFile` being `sample.tex`.

---

---

`\CurrentFilePath`

The path to the current file (complement to `\CurrentFile`) is available in `\CurrentFilePath` if needed. The paths returned in `\CurrentFilePath` are only user paths, given through `\input@path` (or  $\text{expl3}$ 's equivalent `\l_file_search_path_seq`) or by directly typing in the path in the `\input` command or equivalent. Files located by `kpsewhich` get the path added internally by the  $\text{\TeX}$  implementation, so at the macro level it looks as if the file were in the current folder, so the path in `\CurrentFilePath` is empty in these cases (package and class files, mostly).

---

---

`\CurrentFileUsed`  
`\CurrentFilePathUsed`

In normal circumstances these are identical to `\CurrentFile` and `\CurrentFilePath`. They will differ when a file substitution has occurred for `\CurrentFile`. In that case, `\CurrentFileUsed` and `\CurrentFilePathUsed` will hold the actual file name and path loaded by  $\text{\LaTeX}$ , while `\CurrentFile` and `\CurrentFilePath` will hold the names that were *asked for*. Unless doing very specific work on the file being read, `\CurrentFile` and `\CurrentFilePath` should be enough.

### 1.3 Hooks for package and class files

Commands to load package and class files (e.g., `\usepackage`, `\RequirePackage`, `\LoadPackageWithOptions`, etc.) offer the hooks from section 1.2 when they are used to load a package or class file, e.g., `file/after/array.sty` would be called after the `array` package got loaded. But as packages and classes form as special group of files, there are some additional hooks available that only apply when a package or class is loaded.

<hr/> package/before	These are:
package/after	
package/before/...	<b>package/before, package/after</b> These hooks are called for each package being loaded.
package/after/...	
class/before	<b>package/before/⟨name⟩, package/after/⟨name⟩</b> These hooks are additionally called if
class/after	the package name is ⟨name⟩ (without extension).
class/before/...	
class/after/...	<b>class/before, class/after</b> These hooks are called for each class being loaded.
<hr/>	
	<b>class/before/⟨name⟩, class/after/⟨name⟩</b> These hooks are additionally called if the
	class name is ⟨name⟩ (without extension).

All `/after` hooks are implemented as reversed hooks.

The overall sequence of execution for `\usepackage` and friends is therefore:

```

\UseHook{⟨package/before⟩}
\UseHook{⟨package/before/⟨package name⟩⟩}

  \UseHook{⟨file/before⟩}
  \UseHook{⟨file/before/⟨package name⟩.sty⟩}
    ⟨package contents⟩
  \UseHook{⟨file/after/⟨package name⟩.sty⟩}
  \UseHook{⟨file/after⟩}

  code from \AtEndOfPackage if used inside the package

\UseHook{⟨package/after/⟨package name⟩⟩}
\UseHook{⟨package/after⟩}

```

and similar for class file loading, except that `package/` is replaced by `class/` and `\AtEndOfPackage` by `\AtEndOfClass`.

If a package or class is not loaded (or it was loaded before the hooks were set) none of the hooks are executed!

## 1.4 Hooks for `\include` files

To manage `\include` files, L<sup>A</sup>T<sub>E</sub>X issues a `\clearpage` before and after loading such a file. Depending on the use case one may want to execute code before or after these `\clearpages` especially for the one that is issued at the end.

Executing code before the final `\clearpage`, means that the code is processed while the last page of the included material is still under construction. Executing code after it means that all floats from inside the include file are placed (which might have added further pages) and the final page has finished.

Because of these different scenarios we offer hooks in three places.<sup>19</sup> None of the hooks are executed when an `\include` file is bypassed because of an `\includeonly` declaration. They are, however, all executed if L<sup>A</sup>T<sub>E</sub>X makes an attempt to load the `\include` file (even if it doesn't exist and all that happens is “No file `⟨filename⟩.tex`”).

<sup>19</sup>If you want to execute code before the first `\clearpage` there is no need to use a hook—you can write it directly in front of the `\include`.

---

```

include/before
include/before/...
include/end
include/end/...
include/after
include/after/...

```

---

These are:

**include/before, include/before/⟨name⟩** These hooks are executed (in that order) after the initial `\clearpage` and after `.aux` file is changed to use `⟨name⟩.aux`, but before the `⟨name⟩.tex` file is loaded. In other words they are executed at the very beginning of the first page of the `\include` file.

**include/end/⟨name⟩, include/end** These hooks are executed (in that order) after `ℒTEX` has stopped reading from the `\include` file, but before it has issued a `\clearpage` to output any deferred floats.

**include/after/⟨name⟩, include/after** These hooks are executed (in that order) after `ℒTEX` has issued the `\clearpage` but before it has switched back writing to the main `.aux` file. Thus technically we are still inside the `\include` and if the hooks generate any further typeset material including anything that writes to the `.aux` file, then it would be considered part of the included material and bypassed if it is not loaded because of some `\includeonly` statement.<sup>20</sup>

## 1.5 High-level interfaces for `ℒTEX`

We do not provide any high-level `ℒTEX` commands (like `filehook` or `scrfile` do) but think that for package writers the commands from for hook management are sufficient.

## 1.6 Internal interfaces for `ℒTEX`

---

```

\declare@file@substitution    \declare@file@substitution    {⟨file⟩} {⟨replacement-file⟩}
\undecclare@file@substitution \undecclare@file@substitution {⟨file⟩}

```

---

If `⟨file⟩` is requested for loading replace it with `⟨replacement-file⟩`. `\CurrentFile` remains pointing to `⟨file⟩` but `\CurrentFileUsed` will show the file actually loaded.

The main use case for this declaration is to provide a corrected version of a package that can't be changed (due to its license) but no longer functions because of `ℒTEX` kernel changes, for example, or to provide a version that makes use of new kernel functionality while the original package remains available for use with older releases.

The `\undecclare@file@substitution` declaration undoes a substitution made earlier.

*Please do not misuse this functionality and replace a file with another unless if really needed and only if the new version is implementating the same functionality as the original one!*

---

<sup>20</sup>For that reason another `\clearpage` is executed after these hooks which normally does nothing, but starts a new page if further material got added this way.

---

```
\disable@package@load  {\package}} {\alternate-code}}
\reenable@package@load {\package}}
```

---

If `\package` is requested do not load it but instead run `\alternate-code` which could issue a warning, error or any other code.

The main use case is for classes that want to restrict the set of supported packages or contain code that make the use of some packages impossible. So rather than waiting until the document breaks they can set up informative messages why certain packages are not available.

The function is only implemented for packages not for arbitrary files.

## 1.7 A sample package for structuring the log output

As an application we provide the package `structuredlog` that adds lines to the `.log` when a file is opened and closed for reading keeping track of nesting level as well. For example, for the current document it adds the lines

```
= (LEVEL 1 START) t1lmr.fd
= (LEVEL 1 STOP) t1lmr.fd
= (LEVEL 1 START) supp-pdf.mkii
= (LEVEL 1 STOP) supp-pdf.mkii
= (LEVEL 1 START) nameref.sty
== (LEVEL 2 START) refcount.sty
== (LEVEL 2 STOP) refcount.sty
== (LEVEL 2 START) gettitlestring.sty
== (LEVEL 2 STOP) gettitlestring.sty
= (LEVEL 1 STOP) nameref.sty
= (LEVEL 1 START) ltfilehook-doc.out
= (LEVEL 1 STOP) ltfilehook-doc.out
= (LEVEL 1 START) ltfilehook-doc.out
= (LEVEL 1 STOP) ltfilehook-doc.out
= (LEVEL 1 START) ltfilehook-doc.hd
= (LEVEL 1 STOP) ltfilehook-doc.hd
= (LEVEL 1 START) ltfilehook.dtx
== (LEVEL 2 START) ot1lmr.fd
== (LEVEL 2 STOP) ot1lmr.fd
== (LEVEL 2 START) omllmm.fd
== (LEVEL 2 STOP) omllmm.fd
== (LEVEL 2 START) omslmsy.fd
== (LEVEL 2 STOP) omslmsy.fd
== (LEVEL 2 START) omxlmex.fd
== (LEVEL 2 STOP) omxlmex.fd
== (LEVEL 2 START) umsa.fd
== (LEVEL 2 STOP) umsa.fd
== (LEVEL 2 START) umsb.fd
== (LEVEL 2 STOP) umsb.fd
== (LEVEL 2 START) ts1lmr.fd
== (LEVEL 2 STOP) ts1lmr.fd
== (LEVEL 2 START) t1lmss.fd
== (LEVEL 2 STOP) t1lmss.fd
= (LEVEL 1 STOP) ltfilehook.dtx
```

Thus if you inspect an issue in the .log it is easy to figure out in which file it occurred, simply by searching back for LEVEL and if it is a STOP then remove 1 from the level value and search further for LEVEL with that value which should then be the START level of the file you are in.

## 2 The Implementation

```
1 <*2ekernel>
2 <@@=filehook>
```

### 2.1 Document and package-level commands

**\CurrentFile** User-level macros that hold the current file name and file path. These are used internally as well because the code takes care to protect against a possible redefinition of these macros in the loaded file (it's necessary anyway to make hooks work with nested \input). The versions \...Used hold the *actual* file name and path that is loaded by L<sup>A</sup>T<sub>E</sub>X, whereas the other two hold the name as requested. They will differ in case there's a file substitution.

```
3 </2ekernel>
4 <*2ekernel | latexrelease>
5 <latexrelease>\IncludeInRelease{2020/10/01}%
6 <latexrelease>                {\CurrentFile}{Hook management file}%
7 \ExplSyntaxOn
8 \tl_new:N \CurrentFile
9 \tl_new:N \CurrentFilePath
10 \tl_new:N \CurrentFileUsed
11 \tl_new:N \CurrentFilePathUsed
12 \ExplSyntaxOff
13 </2ekernel | latexrelease>
14 <latexrelease>\EndIncludeInRelease
15 <latexrelease>\IncludeInRelease{0000/00/00}%
16 <latexrelease>                {\CurrentFile}{Hook management file}%
17 <latexrelease>
18 <latexrelease>\let \CurrentFile      \@undefined
19 <latexrelease>\let \CurrentFilePath  \@undefined
20 <latexrelease>\let \CurrentFileUsed  \@undefined
21 <latexrelease>\let \CurrentFilePathUsed \@undefined
22 <latexrelease>
23 <latexrelease>\EndIncludeInRelease
24 <*2ekernel>
```

(End definition for \CurrentFile and others. These functions are documented on page 677.)

### 2.2 expl3 helpers

```
25 </2ekernel>
26 <*2ekernel | latexrelease>
27 <latexrelease>\IncludeInRelease{2020/10/01}%
28 <latexrelease>                {\_filehook_file_parse_full_name:nN}{File helpers}%
29 \ExplSyntaxOn
```

**\\_filehook\_file\_parse\_full\_name:nN** A utility macro to trigger expl3's file-parsing and lookup, and return a normalized representation of the file name. If the queried file doesn't exist, no normalisation takes place.

**\\_filehook\_full\_name:nn**

**\\_filehook\_set\_curr\_file\_assign:nnnN**

The output of `\__filehook_file_parse_full_name:nN` is passed on to the #2—a 3-argument macro that takes the *<path>*, *<base>*, and *<ext>* parts of the file name.

```

30 \cs_new:Npn \__filehook_file_parse_full_name:nN #1
31 {
32   \exp_args:Nf \file_parse_full_name_apply:nN
33   {
34     \exp_args:Nf \__filehook_full_name:nn
35     { \file_full_name:n {#1} } {#1}
36   }
37 }
38 \cs_new:Npn \__filehook_full_name:nn #1 #2
39 {
40   \tl_if_empty:nTF {#1}
41   { \tl_trim_spaces:n {#2} }
42   { \tl_trim_spaces:n {#1} }
43 }

```

(End definition for `\__filehook_file_parse_full_name:nN`, `\__filehook_full_name:nn`, and `\__filehook_set_curr_file_assign:nnnNN`.)

Some actions depend on whether the file extension was explicitly given, and sometimes the extension has to be removed. The macros below use `\__filehook_file_parse_full_name:nN` to split up the file name and either check if *<ext>* (#3) is empty, or discard it.

```

44 \cs_new:Npn \__filehook_if_no_extension:nTF #1
45 {
46   \exp_args:Ne \tl_if_empty:nTF
47   { \file_parse_full_name_apply:nN {#1} \use_iii:nnn }
48 }
49 \cs_new_protected:Npn \__filehook_drop_extension:N #1
50 {
51   \tl_gset:Nx #1
52   {
53     \exp_args:NV \__filehook_file_parse_full_name:nN #1
54     \__filehook_drop_extension_aux:nnn
55   }
56 }
57 \cs_new:Npn \__filehook_drop_extension_aux:nnn #1 #2 #3
58 { \tl_if_empty:nF {#1} { #1 / } #2 }

```

(End definition for `\__filehook_if_no_extension:nTF` and `\__filehook_drop_extension:N`.)

Yet another stack, to keep track of `\CurrentFile` and `\CurrentFilePath` with nested `\inputs`. At the beginning of `\InputIfFileExists`, the current value of `\CurrentFilePath` and `\CurrentFile` is pushed to `\g__filehook_input_file_seq`, and at the end, it is popped and the value reassigned. Some other places don't use `\InputIfFileExists` directly (`\include`) or need `\CurrentFile` earlier (`\@onefilewithoptions`), so these are manually used elsewhere as well.

```

59 \tl_new:N \l__filehook_internal_tl
60 \seq_new:N \g__filehook_input_file_seq
61 \cs_new_protected:Npn \__filehook_file_push:
62 {
63   \seq_gpush:Nx \g__filehook_input_file_seq

```

```

64     {
65         { \CurrentFilePathUsed } { \CurrentFileUsed }
66         { \CurrentFilePath      } { \CurrentFile      }
67     }
68 }
69 \cs_new_protected:Npn \__filehook_file_pop:
70 {
71     \seq_gpop:NNTF \g__filehook_input_file_seq \l__filehook_internal_tl
72     { \exp_after:wN \__filehook_file_pop_assign:nnnn \l__filehook_internal_tl }
73     {
74         \msg_error:nnn { hooks } { should-not-happen }
75         { Tried-to-pop-from-an-empty-file-name-stack. }
76     }
77 }
78 \cs_new_protected:Npn \__filehook_file_pop_assign:nnnn #1 #2 #3 #4
79 {
80     \tl_set:Nn \CurrentFilePathUsed {#1}
81     \tl_set:Nn \CurrentFileUsed     {#2}
82     \tl_set:Nn \CurrentFilePath     {#3}
83     \tl_set:Nn \CurrentFile         {#4}
84 }
85 \ExplSyntaxOff

(End definition for \g__filehook_input_file_seq and others.)

86 </2ekernel|latexrelease>
87 <latexrelease>\EndIncludeInRelease
88 <*2ekernel>
89 <@@=>

```

## 2.3 Declaring the file-related hooks

All hooks starting with `file/` `include/`, `class/` or `package/` are generic and will be allocated if code is added to them. Thus there is no need to explicitly declare any hook in the code below.

Furthermore, those named `.../after` or `.../end` are automatically declared as reversed hooks if filled with code, so this is also automatically taken care of.

## 2.4 Patching L<sup>A</sup>T<sub>E</sub>X's \InputIfFileExists command

Most of what we have to do is adding `\UseHook` into several L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> core commands, because of some circular dependencies in the kernel we do this only now and not in `ltfiles`.

**\InputIfFileExists** `\InputIfFileExists` loads any file if it is available so we have to add the hooks `file/before` and `file/after` in the right places. If the file doesn't exist no hooks should be executed.

```

90 </2ekernel>
91 <latexrelease>\IncludeInRelease{2020/10/01}%
92 <latexrelease>          {\InputIfFileExists}{Hook management (files)}%
93 <*2ekernel|latexrelease>

```



```

94 \let\InputIfFileExists\undefined
95 \DeclareRobustCommand \InputIfFileExists[2]{%
96   \IfFileExists{#1}%
97   {%
98     \@expl@@@filehook@file@push@@
99     \@filehook@set@CurrentFile

```

If the file exists then `\CurrentFile` holds its name. But we can't rely on that still being true after the file has been processed. Thus for using the name in the file hooks we need to preserve the name and then restore it for the `file/after/...` hook.

The hook always refers to the file requested by the user. The hook is *always* loaded for `\CurrentFile` which usually is the same as `\CurrentFileUsed`. In the case of a file replacement, the `\CurrentFileUsed` holds the actual file loaded. In any case the file names are normalized so that the hooks work on the real file name, rather than what the user typed in.

expl3's `\file_full_name:n` normalizes the file name (to factor out differences in the `.tex` extension), and then does a file lookup to take into account a possible path from `\l_file_search_path_seq` and `\input@path`. However only the file name and extension are returned so that file hooks can refer to the file by their name only. The path to the file is returned in `\CurrentFilePath`.

```

100   \edef\reserved@a{\@filef@und
101     \@expl@@@filehook@file@pop@assign@@nnnn
102     {\CurrentFilePathUsed}%
103     {\CurrentFileUsed}%
104     {\CurrentFilePath}%
105     {\CurrentFile}}%
106   \expandafter\@swaptwoargs\expandafter
107   {\reserved@a}%
108   {%
109     #2%
110     \@addtofilelist{#1}%
111     \UseHook{file/before}%

```

The current file name is available in `\CurrentFile` so we use that in the specific hook.

```

112     \UseHook{file/before/\CurrentFile}%
113     \@@input
114   }%

```

And it is restored here so we can use it once more.

```

115     \UseHook{file/after/\CurrentFile}%
116     \UseHook{file/after}%
117     \@expl@@@filehook@file@pop@@
118   }%
119 }
120 \<latexrelease>\EndIncludeInRelease
121 \</2ekernel | latexrelease>

```

Now define `\InputIfFileExists` to input #1 if it seems to exist. Immediately prior to the input, #2 is executed. If the file #1 does not exist, execute '#3'.

```

122 \<latexrelease>\IncludeInRelease{2019/10/01}%
123 \<latexrelease>          {\InputIfFileExists}{Hook management (files)}%
124 \<latexrelease>
125 \<latexrelease>\DeclareRobustCommand \InputIfFileExists[2]{%
126 \<latexrelease>  \IfFileExists{#1}%

```

```

127 <latexrelease>    {%
128 <latexrelease>    \expandafter\@swaptwoargs\expandafter
129 <latexrelease>    {\@filef@und}{#2\@addtofilelist{#1}\@input}}
130 <latexrelease>\EndIncludeInRelease

131 <latexrelease>\IncludeInRelease{0000/00/00}%
132 <latexrelease>    {\InputIfFileExists}{Hook management (files)}%
133 <latexrelease>\long\def \InputIfFileExists#1#2{%
134 <latexrelease>    \IfFileExists{#1}%
135 <latexrelease>    {#2\@addtofilelist{#1}\@input \@filef@und}}
136 <latexrelease>\EndIncludeInRelease
137 <*2ekernel>

```

(End definition for \InputIfFileExists. This function is documented on page ??.)

## 2.5 Declaring a file substitution

```

138 <@@=filehook>
139 </2ekernel>
140 <*2ekernel | latexrelease>
141 <latexrelease>\IncludeInRelease{2020/10/01}%
142 <latexrelease>    {\_filehook_subst_add:n}{Declaring file substitution}%
143 \ExplSyntaxOn

```

\\_filehook\_subst\_add:n \\_filehook\_substitution\_lthooadd:n declares a file substitution by doing a (global) definition of the form \def\@file-subst@<file>{\<replacement>}. The file names are properly sanitised, and normalized with the same treatment done for the file hooks. That is, a file replacement is declared by using the file name (and extension, if any) only, and the file path should not be given. If a file name is empty it is replaced by .tex (the empty csname is used to check that).

```

144 \cs_new_protected:Npn \_filehook_subst_add:n #1 #2
145 {
146   \group_begin:
147     \cs_set:cpx { } { \exp_not:o { \cs:w\cs_end: } }
148     \int_set:Nn \tex_escapechar:D { -1 }
149     \cs_gset:cpx { @file-subst@ \_filehook_subst_file_normalize:n {#1} }
150       { \_filehook_subst_file_normalize:n {#2} }
151   \group_end:
152 }
153 \cs_new_protected:Npn \_filehook_subst_remove:n #1
154 {
155   \group_begin:
156     \cs_set:cpx { } { \exp_not:o { \cs:w\cs_end: } }
157     \int_set:Nn \tex_escapechar:D { -1 }
158     \cs_undefine:c { @file-subst@ \_filehook_subst_file_normalize:n {#1} }
159   \group_end:
160 }
161 \cs_new:Npn \_filehook_subst_file_normalize:n #1
162 {
163   \exp_after:wN \_filehook_subst_empty_name_chk:NN
164   \cs:w \exp_after:wN \cs_end:
165   \cs:w \_filehook_file_parse_full_name:nN {#1} \use_ii_iii:nnn \cs_end:
166 }
167 \cs_new:Npn \_filehook_subst_empty_name_chk:NN #1 #2
168 { \if_meaning:w #1 #2 .tex \else: \token_to_str:N #2 \fi: }

```

(End definition for `\_filehook_subst_add:nn` and others.)

`\use_ii_iii:nnn` A variant of `\use_...` to discard the first of three arguments.

*Todo: this should move to `expl3`*

```
169 \cs_gset:Npn \use_ii_iii:nnn #1 #2 #3 {#2 #3}
```

(End definition for `\use_ii_iii:nnn`.)

```
170 \ExplSyntaxOff
171 </2ekernel | latexrelease>
172 <latexrelease>\EndIncludeInRelease
173 <*2ekernel>
```

`\declare@file@substitution` For two internals we provide L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> names so that we can use them elsewhere in the kernel (and so that they can be used in packages if really needed, e.g., `scrfile`).

```
174 </2ekernel>
175 <*2ekernel | latexrelease>
176 <latexrelease>\IncludeInRelease{2020/10/01}%
177 <latexrelease>          {\declare@file@substitution}{File substitution}%
178 \ExplSyntaxOn
179 \cs_new_eq:NN \declare@file@substitution \_filehook_subst_add:nn
180 \cs_new_eq:NN \undeclare@file@substitution \_filehook_subst_remove:n
181 \ExplSyntaxOff
182 </2ekernel | latexrelease>
183 <latexrelease>\EndIncludeInRelease

184 <latexrelease>\IncludeInRelease{0000/00/00}%
185 <latexrelease>          {\declare@file@substitution}{File substitution}%
186 <latexrelease>
187 <latexrelease>\let \declare@file@substitution \undefined
188 <latexrelease>\let \undeclare@file@substitution \undefined
189 <latexrelease>
190 <latexrelease>\EndIncludeInRelease
191 <*2ekernel>
```

(End definition for `\declare@file@substitution` and `\undeclare@file@substitution`. These functions are documented on page 679.)

```
192 <@@=>
193 \ExplSyntaxOff
```

## 2.6 Selecting a file (`\set@curr@file`)

`\set@curr@file` Now we hook into `\set@curr@file` to resolve a possible file substitution, and add `\@curr@file` `\@expl@@@filehook@set@curr@file@@n` at the end, after `\@curr@file` is set.

`\@curr@file@reqd` A file name is built using `\expandafter\string\csname\filename\endcsname` to avoid expanding utf8 active characters. The `\csname` expands the normalisation machinery and the routine to resolve a file substitution, returning a control sequence with the same name as the file.

It happens that when `\filename` is empty, the generated control sequence is `\csname\endcsname`, and doing `\string` on that results in the file `csnameendcsname.tex`. To guard against that we `\ifx`-compare the generated control sequence with the empty `csname`. To do so, `\csname\endcsname` has to be defined, otherwise it would be equal to

\relax and we would have false positives. Here we define \csname\endcsname to expand to itself to avoid it matching the definition of some other control sequence.

```

194 </2kernel>
195 <*2kernel | latexrelease>
196 <latexrelease>\IncludeInRelease{2020/10/01}%
197 <latexrelease>      {\set@curr@file}{Setting current file name}%
198 \def\set@curr@file#1{%
199   \begingroup
200     \escapechar\m@ne
201     \expandafter\def\csname\expandafter\endcsname
202       \expandafter{\csname\endcsname}%

```

Two file names are set here: \@curr@file@reqd which is the file requested by the user, and \@curr@file which should be the same, except when we have a file substitution, in which case it holds the actual loaded file. \@curr@file is resolved first, to check if a substitution happens. If it doesn't, \@expl@@@filehook@if@file@replaced@@TF short-cuts and just copies \@curr@file, otherwise the full normalisation procedure is executed.

At this stage the file name is parsed and normalized, but if the input doesn't have an extension, the default .tex is *not* added to \@curr@file because for applications other than \input (graphics, for example) the default extension may not be .tex. First check if the input has an extension, then if the input had no extension, call \@expl@@@filehook@drop@extension@@N. In case of a file substitution, \@curr@file will have an extension.

```

203   \@expl@@@filehook@if@no@extension@@nTF{#1}%
204   {\@tempswatrue}{\@tempswafalse}%
205   \@kernel@make@file@csname\@curr@file
206   \@expl@@@filehook@resolve@file@subst@@w {#1}%
207   \@expl@@@filehook@if@file@replaced@@TF
208   {\@kernel@make@file@csname\@curr@file@reqd
209     \@expl@@@filehook@normalize@file@name@@w{#1}%
210     \if@tempswa \@expl@@@filehook@drop@extension@@N\@curr@file@reqd \fi}%
211   {\if@tempswa \@expl@@@filehook@drop@extension@@N\@curr@file \fi
212     \global\let\@curr@file@reqd\@curr@file}%
213   \endgroup}
214 </2kernel | latexrelease>
215 <latexrelease>\EndIncludeInRelease
216 <latexrelease>\IncludeInRelease{2019/10/01}%
217 <latexrelease>      {\set@curr@file}{Setting current file name}%
218 <latexrelease>\def\set@curr@file#1{%
219   <latexrelease>   \begingroup
220   <latexrelease>     \escapechar\m@ne
221   <latexrelease>     \xdef\@curr@file{%
222   <latexrelease>       \expandafter\expandafter\expandafter\unquote@name
223   <latexrelease>       \expandafter\expandafter\expandafter{%
224   <latexrelease>       \expandafter\string
225   <latexrelease>       \csname\@firstofone#1\@empty\endcsname}}%
226   <latexrelease>   \endgroup
227   <latexrelease> }
228 <latexrelease>\EndIncludeInRelease
229 <latexrelease>\IncludeInRelease{0000/00/00}%
230 <latexrelease>      {\set@curr@file}{Setting current file name}%

```

```

231 <latexrelease>\let\set@curr@file\@undefined
232 <latexrelease>\EndIncludeInRelease
233 <*2ekernel>

```

(End definition for \set@curr@file, \curr@file, and \curr@file@reqd. These functions are documented on page ??.)

```

\@filehook@set@CurrentFile      Todo: This should get internalized using @expl@ names
\@kernel@make@file@csname
  \set@curr@file@aux
234 </2ekernel>
235 <*2ekernel | latexrelease>
236 <latexrelease>\IncludeInRelease{2020/10/01}%
237 <latexrelease>          {\@kernel@make@file@csname}{Make file csname}%

238 \def\@kernel@make@file@csname#1#2#3{%
239   \xdef#1{\expandafter\@set@curr@file@aux
240     \csname\expandafter#2\@firstofone#3\@nil\endcsname}}

```

This auxiliary compares \<filename> with \csname\endcsname to check if the empty .tex file was requested.

```

241 \def\@set@curr@file@aux#1{%
242   \expandafter\ifx\csname\endcsname#1%
243   .tex\else\string#1\fi}

```

Then we call \@expl@@@filehook@set@curr@file@@nNN once for \curr@file to set \CurrentFile(Path)Used and once for \curr@file@reqd to set \CurrentFile(Path). Here too the slower route is only used if a substitution happened, but here \@expl@@@filehook@if@file@ can't be used because the flag is reset at the \endgroup above, so we check if \curr@file and \curr@file@reqd differ. This macro is issued separate from \set@curr@file because it changes \CurrentFile, and side-effects would quickly get out of control.

```

244 \def\@filehook@set@CurrentFile{%
245   \@expl@@@filehook@set@curr@file@@nNN{\curr@file}%
246   \CurrentFileUsed\CurrentFilePathUsed
247   \ifx\curr@file@reqd\curr@file
248   \let\CurrentFile\CurrentFileUsed
249   \let\CurrentFilePath\CurrentFilePathUsed
250   \else
251   \@expl@@@filehook@set@curr@file@@nNN{\curr@file@reqd}%
252   \CurrentFile\CurrentFilePath
253   \fi}
254 </2ekernel | latexrelease>
255 <latexrelease>\EndIncludeInRelease
256 <*2ekernel>

```

(End definition for \@filehook@set@CurrentFile, \@kernel@make@file@csname, and \@set@curr@file@aux. These functions are documented on page ??.)

```

\@@_set_curr_file:nNN
\@@_set_curr_file_assign:nmmNN

```

When inputting a file, \set@curr@file does a file lookup (in \input@path and \l\_file\_search\_path\_seq) and returns the actual file name (<base> plus <ext>) in \CurrentFileUsed, and in case there's a file substitution, the requested file in \CurrentFile (otherwise both are the same). Only the base and extension are returned, regardless of the input (both path/to/file.tex and file.tex end up as file.tex in \CurrentFile). The path is returned in \CurrentFilePath, in case it's needed.

```

257 </2ekernel>
258 <*2ekernel | latexrelease>
259 <latexrelease>\IncludeInRelease{2020/10/01}%

```

```

260 <latexrelease>          {@@_set_curr_file:nNN}{Set curr file}%
261 \ExplSyntaxOn
262 <@@=filehook>
263 \cs_new_protected:Npn \__filehook_set_curr_file:nNN #1
264 {
265     \exp_args:Nf \__filehook_file_parse_full_name:nN {#1}
266     \__filehook_set_curr_file_assign:nnnNN
267 }
268 \cs_new_protected:Npn \__filehook_set_curr_file_assign:nnnNN #1 #2 #3 #4 #5
269 {
270     \str_set:Nn #5 {#1}
271     \str_set:Nn #4 {#2#3}
272 }
273 \ExplSyntaxOff
274 </2ekernel|latexrelease>
275 <latexrelease>\EndIncludeInRelease
276 <*2ekernel>

```

(End definition for \@@\_set\_curr\_file:nNN and \@@\_set\_curr\_file\_assign:nnnNN. These functions are documented on page ??.)

## 2.7 Replacing a file and detecting loops

```

\__filehook_resolve_file_subst:w Start by sanitising the file with \__filehook_file_parse_full_name:nN then do \__-
\__filehook_normalize_file_name:w filehook_file_subst_begin:nnn{<path>}{<name>}{<ext>}.
\__filehook_file_name_compose:nnn
277 </2ekernel>
278 <*2ekernel|latexrelease>
279 <latexrelease>\IncludeInRelease{2020/10/01}%
280 <latexrelease>          {\__filehook_resolve_file_subst:w}{Replace files detect loops}%
281 \ExplSyntaxOn
282 \cs_new:Npn \__filehook_resolve_file_subst:w #1 \@nil
283 { \__filehook_file_parse_full_name:nN {#1} \__filehook_file_subst_begin:nnn }
284 \cs_new:Npn \__filehook_normalize_file_name:w #1 \@nil
285 { \__filehook_file_parse_full_name:nN {#1} \__filehook_file_name_compose:nnn }
286 \cs_new:Npn \__filehook_file_name_compose:nnn #1 #2 #3
287 { \tl_if_empty:nF {#1} { #1 / } #2#3 }

```

Since the file replacement is done expandably in a \csname, use a flag to remember if a substitution happened. We use this in \set@curr@file to short-circuit some of it in case no substitution happened (by far the most common case, so it's worth optimising).

```

flag_\__filehook_file_replaced
\__filehook_if_file_replaced:TF
288 \flag_new:n { \__filehook_file_replaced }
289 \cs_new:Npn \__filehook_if_file_replaced:TF #1 #2
290 { \flag_if_raised:nTF { \__filehook_file_replaced } {#1} {#2} }

```

First off, start by checking if the current file (*<name>* + *<ext>*) has a declared substitution. If not, then just put that as the name (including a possible *<path>* in this case): this is the default case with no substitutions, so it's the first to be checked. The auxiliary \\_\_filehook\_file\_subst\_tortoise\_hare:nn sees that there's no replacement for #2#3 and does nothing else.

```

\__filehook_file_subst_begin:nnn
291 \cs_new:Npn \__filehook_file_subst_begin:nnn #1 #2 #3
292 {
293     \__filehook_file_subst_tortoise_hare:nn { #2#3 } { #2#3 }
294     { \__filehook_file_name_compose:nnn {#1} {#2} {#3} }

```

```

295 }
296 \ExplSyntaxOff
297 </2ekernel | latexrelease>
298 <latexrelease>\EndIncludeInRelease
299 <*2ekernel>

```

### 2.7.1 The Tortoise and Hare algorithm

```

\__filehook_file_subst_tortoise_hare:nn
\__filehook_file_subst_loop:NN
\__filehook_file_subst_loop:cc

```

If there is a substitution ( $\langle true \rangle$  in the first `\cs_if_exist:cTF` below), then first check if there is no substitution down the line: this should be the second most common case, of one file replaced by another. In that case just leave the substitution there and the job is done. If any substitution happens, then the `\flag__filehook_file_replaced` is raised (conditionally, because checking if a flag is raised is much faster than raising it over and over again).

If, however there are more substitutions, then we need to check for a possible loop in the substitutions, which would otherwise put  $\text{\TeX}$  in an infinite loop if just an exhaustive expansion was used.

To detect a loop, the *Tortoise and Hare* algorithm is used. The name of the algorithm is an analogy to Aesop's fable, in which the Hare outruns a Tortoise. The two pointers here are the csnames which contains each file replacement, both of which start at the position zero, which is the file requested. In the inner part of the macro below, `\__filehook_file_subst_loop:cc` is called with `\@file-subst@<file>` and `\@file-subst@\@file-subst@<file>`; that is, the substitution of  $\langle file \rangle$  and the substitution of that substitution: the Tortoise walks one step while the Hare walks two.

Within `\__filehook_file_subst_loop:NN` the two substitutions are compared, and if they lead to the same file it means that there is a loop in the substitutions. If there's no loop, `\__filehook_file_subst_tortoise_hare:nn` is called again with the Tortoise at position 1 and the hare at 2. Again, the substitutions are checked ahead of the Hare pointer to check that it won't run too far; in case there is no loop in the declarations, eventually one of the `\cs_if_exist:cTF` below will go  $\langle false \rangle$  and the algorithm will end; otherwise it will run until the Hare reaches the same spot as the tortoise and a loop is detected.

```

300 </2ekernel>
301 <*2ekernel | latexrelease>
302 <latexrelease>\IncludeInRelease{2020/10/01}%
303 <latexrelease>      {\__filehook_file_subst_tortoise_hare:nn}{Tortoise and Hare}%
304 \ExplSyntaxOn
305 \cs_new:Npn \__filehook_file_subst_tortoise_hare:nn #1 #2 #3
306 {
307   \cs_if_exist:cTF { @file-subst@ #2 }
308   {
309     \flag_if_raised:nF { __filehook_file_replaced }
310     { \flag_raise:n { __filehook_file_replaced } }
311     \cs_if_exist:cTF { @file-subst@ \use:c { @file-subst@ #2 } }
312     {
313       \__filehook_file_subst_loop:cc
314       { @file-subst@ #1 }
315       { @file-subst@ \use:c { @file-subst@ #2 } }
316     }
317     { \use:c { @file-subst@ #2 } }
318   }
319   { #3 }

```

```
320 }
```

This is just an auxiliary to check if a loop was found, and continue the algorithm otherwise. If a loop is found, the `.tex` file is used as fallback and `\__filehook_file_subst_cycle_error:cN` is called to report the error.

```
321 \cs_new:Npn \__filehook_file_subst_loop:NN #1 #2
322 {
323   \token_if_eq_meaning:NNTF #1 #2
324   {
325     .tex
326     \__filehook_file_subst_cycle_error:cN { @file-subst@ #1 } #1
327   }
328   { \__filehook_file_subst_tortoise_hare:nn {#1} {#2} {#2} }
329 }
330 \cs_generate_variant:Nn \__filehook_file_subst_loop:NN { cc }
```

Showing this type of error expandably is tricky, as we have a very limited amount of characters to show and a potentially large list. As a work around, several errors are printed, each showing one step of the loop, until all the error messages combined show the loop.

```
331 \cs_new:Npn \__filehook_file_subst_cycle_error:NN #1 #2
332 {
333   \__kernel_msg_expandable_error:nnff { kernel } { file-cycle }
334   {#1} { \use:c { @file-subst@ #1 } }
335   \token_if_eq_meaning:NNTF #1 #2
336   { \__filehook_file_subst_cycle_error:cN { @file-subst@ #1 } #2 }
337 }
338 \cs_generate_variant:Nn \__filehook_file_subst_cycle_error:NN { c }
```

And the error message:

```
339 \__kernel_msg_new:nnn { kernel } { file-cycle }
340 { File~loop!~#1~replaced-by~#2... }
```

(End definition for `\__filehook_resolve_file_subst:w` and others.)

```
341 \ExplSyntaxOff
342 </2ekernel | latexrelease>
343 <latexrelease>\EndIncludeInRelease
344 <*2ekernel>
345 <@@=>
```

## 2.8 Preventing a package from loading

We support the use case of preventing a package from loading but not any other type of files (e.g., classes).

`\disable@package@load` defines `\@pkg-disable@<package>` to expand to some code `#2` instead of loading the package.

```
\disable@package@load
\reenable@package@load
\@disable@packageload@do
346 </2ekernel>
347 <*2ekernel | latexrelease>
348 <latexrelease>\IncludeInRelease{2020/10/01}%
349 <latexrelease>          {\disable@package@load}{Disable packages}%
350 \def\disable@package@load#1#2{%
351   \global\@namedef{@pkg-disable@#1.\@pkgextension}{#2}}
```



```

352 \def\@disable@package@load@do#1#2{%
353   \ifundefined{pkg-disable@#1}{#2}%
354   {\@nameuse{pkg-disable@#1}}}

\reenable@package@load undefines \@pkg-disable@<package> to realow loading
a package.

355 \def\reenable@package@load#1{%
356   \global\expandafter\let
357   \csname @pkg-disable@#1.\@pkgextension \endcsname \@undefined}

358 </2ekernel | latexrelease>
359 <latexrelease>\EndIncludeInRelease
360 <latexrelease>\IncludeInRelease{0000/00/00}%
361 <latexrelease>      {\disable@package@load}{Disable packages}%
362 <latexrelease>
363 <latexrelease>\let\disable@package@load \@undefined
364 <latexrelease>\let\@disable@package@load@do\@undefined
365 <latexrelease>\let\reenable@package@load \@undefined
366 <latexrelease>\EndIncludeInRelease
367 <*2ekernel>

```

(End definition for `\disable@package@load`, `\reenable@package@load`, and `\@disable@package@load@do`. These functions are documented on page 680.)

## 2.9 High-level interfaces for L<sup>A</sup>T<sub>E</sub>X

None so far and the general feeling for now is that the hooks are enough. Packages like `filehook`, etc., may use them to set up their interfaces (samples are given below) but for the now the kernel will not provide any.

## 2.10 Internal commands needed elsewhere

Here we set up a few horrible (but consistent) L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> names to allow for internal commands to be used outside this module (and in parts that still use L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> syntax. We have to unset the `@@` since we want double “at” sign in place of double underscores.

```

368 <@@=>
369 </2ekernel>
370 <*2ekernel | latexrelease>
371 <latexrelease>\IncludeInRelease{2020/10/01}%
372 <latexrelease>      {\@expl@@@filehook@if@no@extension@@nTF}{2e tmp interfaces}%
373 \ExplSyntaxOn

374 \cs_new_eq:NN \@expl@@@filehook@if@no@extension@@nTF
375   \__filehook_if_no_extension:nTF

376 \cs_new_eq:NN \@expl@@@filehook@set@curr@file@@nNN
377   \__filehook_set_curr_file:nNN

378 \cs_new_eq:NN \@expl@@@filehook@resolve@file@subst@@w
379   \__filehook_resolve_file_subst:w

380 \cs_new_eq:NN \@expl@@@filehook@normalize@file@name@@w
381   \__filehook_normalize_file_name:w

382 \cs_new_eq:NN \@expl@@@filehook@if@file@replaced@@TF
383   \__filehook_if_file_replaced:TF

```

```

384 \cs_new_eq:NN \@expl@@@filehook@drop@extension@@N
385         \__filehook_drop_extension:N
386 \cs_new_eq:NN \@expl@@@filehook@file@push@@
387         \__filehook_file_push:
388 \cs_new_eq:NN \@expl@@@filehook@file@pop@@
389         \__filehook_file_pop:
390 \cs_new_eq:NN \@expl@@@filehook@file@pop@assign@@nnnn
391         \__filehook_file_pop_assign:nnnn
392 \ExplSyntaxOff
393 </2ekernel|latexrelease>
394 <latexrelease>\EndIncludeInRelease
395 <*2ekernel>

```

This ends the kernel code in this file.

```

396 </2ekernel>

```

### 3 A sample package for structuring the log output

```

397 <*structuredlog>
398 <@@=filehook>
399 \ProvidesExplPackage
400     {structuredlog}{\ltfilehookdate}{\ltfilehookversion}
401     {Structuring the TeX transcript file}

```

`\g__filehook_nesting_level_int` Stores the current package nesting level.

```

402 \int_new:N \g__filehook_nesting_level_int

```

Initialise the counter with the number of files in the `\@currnamestack` (the number of items divided by 3) minus one, because this package is skipped when printing to the log.

```

403 \int_gset:Nn \g__filehook_nesting_level_int
404     { ( \tl_count:N \@currnamestack ) / 3 - 1 }

```

(End definition for `\g__filehook_nesting_level_int`.)

`\__filehook_log_file_record:n` This macro is responsible for increasing and decreasing the file nesting level, as well as printing to the log. The argument is either `STOPTART` or `STOP` and the action it takes on the nesting integer depends on that.

```

405 \cs_new_protected:Npn \__filehook_log_file_record:n #1
406     {
407     \str_if_eq:nnT {#1} {START} { \int_gincr:N \g__filehook_nesting_level_int }
408     \iow_term:x
409     {
410     \prg_replicate:nn { \g__filehook_nesting_level_int } { = } ~
411     ( LEVEL ~ \int_use:N \g__filehook_nesting_level_int \c_space_tl #1 ) ~
412     \CurrentFileUsed

```

If there was a file replacement, show that as well:

```

413     \str_if_eq:NNF \CurrentFileUsed \CurrentFile
414     { ~ ( \CurrentFile \c_space_tl requested ) }
415     \iow_newline:
416     }
417     \str_if_eq:nnT {#1} {STOP} { \int_gdecr:N \g__filehook_nesting_level_int }
418     }

```

Now just hook the macro above in the generic file/before...

```

419 \AddToHook{file/before}{ \_filehook_log_file_record:n { START } }
...and file/after hooks. We don't want to install the file/after hook immediately,
because that would mean it is the first time executed when the package finishes. We
therefore put the declaration inside \AddToHookNext so that it gets only installed when
we have left this package.
420 \AddToHookNext{file/after}
421   { \AddToHook{file/after}{ \_filehook_log_file_record:n { STOP } } }
(End definition for \_filehook_log_file_record:n.)
422 <@@=>
423 </structuredlog>

```

## 4 Package emulations

### 4.1 Package atveryend emulation

With the new hook management and the hooks in \enddocument all of atveryend is taken care of. We can make an emulation only here after the substitution functionality is available:

```

424 <*2ekernel>
425 \declare@file@substitution{atveryend.sty}{atveryend-ltx.sty}
426 </2ekernel>

```

Here is the package file we point to:

```

427 <*atveryend-ltx>
428 \ProvidesPackage{atveryend-ltx}
429   [2020/08/19 v1.0a
430   Emulation of the original atvery package^^Jwith kernel methods]

```

Here are new definitions for its interfaces now pointing to the hooks in \enddocument

```

431 \newcommand\AfterLastShipout {\AddToHook{enddocument/afterlastpage}}
432 \newcommand\AtVeryEndDocument {\AddToHook{enddocument/afteraux}}

```

Next one is a bit of a fake, but the result should normally be as expected. If not, one needs to add a rule to sort the code chunks in enddocument/info.

```

433 \newcommand\AtEndAfterFileList{\AddToHook{enddocument/info}}
434 \newcommand\AtVeryVeryEnd {\AddToHook{enddocument/end}}

```

**\BeforeClearDocument** This one is the only one we don't implement or rather don't have a dedicated hook in the code.

```

435 \ExplSyntaxOn
436 \newcommand\BeforeClearDocument[1]
437   { \AtEndDocument{#1}
438     \atveryend@DEPRECATED{BeforeClearDocument \tl_to_str:n{#1}}
439   }
440 \cs_new:Npn\atveryend@DEPRECATED #1
441   {\iow_term:x{=====~DEPRECATED~USAGE~#1~=====}}
442 \ExplSyntaxOff

```

(End definition for \BeforeClearDocument. This function is documented on page ??.)

```

443 </atveryend-ltx>

```

# File R

## ltshipout.dtx

### Contents

#### 1 Introduction

The code provides an interface to the `\shipout` primitive of T<sub>E</sub>X which is called when a finished pages is finally “shipped out” to the target output file, e.g., the `.dvi` or `.pdf` file. A good portion of the code is based on ideas by Heiko Oberdiek implemented in his packages `atbegshi` and `atenddvi` even though the interfaces are somewhat different.<sup>21</sup>

##### 1.1 Overloading the `\shipout` primitive

---

`\shipout`

---

With this implementation T<sub>E</sub>X’s `shipout` primitive is no longer available for direct use. Instead `\shipout` is running some (complicated) code that picks up the box to be shipped out regardless of how that is done, i.e., as a constructed `\vbox` or `\hbox` or as a box register.

It then stores it in a named box register. This box can then be manipulated through a set of hooks after which it is shipped out for real.

---

`\ShipoutBox`  
`\l_shipout_box`

---

This box register is called `\ShipoutBox` (alternatively available via the L3 name `\l_shipout_box`).

---

`\l_shipout_box_ht_dim`  
`\l_shipout_box_dp_dim`  
`\l_shipout_box_wd_dim`  
`\l_shipout_box_ht_plus_dp_dim`

---

The `shipout` box dimensions are available in the L3 registers `\l_shipout_box_ht_dim`, etc. (there are no L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> names).<sup>22</sup> These variables can be used inside the hook code for `shipout/before`, `shipout/foreground` and `shipout/background` if needed.

---

<sup>21</sup>Heiko’s interfaces are emulated by the kernel code, if a document requests his packages, so older documents will continue to work.

<sup>22</sup>Might need changing, but HO’s version as strings is not really helpful I think).

## 1.2 Provided hooks

---

`shipout/before`  
`shipout/foreground`  
`shipout/background`  
`shipout/firstpage`  
`shipout/lastpage`

---

The code offers a number of hooks into which packages (or the user) can add code to support different use cases. These are:

**shipout/before** This hook is executed after the finished page has been stored in `\ShipoutBox` / `\l_shipout_box`. It can be used to alter that box content or to discard it completely (see `\DiscardShipoutBox` below).

**shipout/background** This hook adds a picture environment into the background of the page with the (0,0) coordinate in the top-left corner using a `\unitlength` of 1pt. It should therefore only receive `\put` commands or other commands suitable in a `picture` environment and the vertical coordinate values would normally be negative.

Technically this is implemented by adding a zero-sized `\hbox` as the very first item into the `\ShipoutBox` containing that `picture` environment. Thus the rest of the box content will overprint what ever is typeset by that hook.

**shipout/foreground** This hook adds a picture environment into the foreground of the page with the (0,0) coordinate in the top-left corner using a `\unitlength` of 1pt. Technically this is implemented by adding a zero-sized `\hbox` as the very last item into the `\ShipoutBox` and raising it up so that it still has its (0,0) point in the top-left corner. But being placed after the main box content it will be typeset later and thus overprints it (i.e., is in the foreground).

**shipout/firstpage** The material from this hook is executed only once at the very beginning of the first output page that is shipped out (i.e., not discarded at the last minute). It should only contain `\special` or similar commands needed to direct post processors handling the `.dvi` or `.pdf` output.<sup>23</sup>

**shipout/lastpage** The corresponding hook to add `\specials` at the very end of the output file. It is only executed on the very last page — or rather on the page that `LATEX` believes is the last one.

It may not be possible for `LATEX` to correctly determine which page is the last one without several reruns. If this happens and the hook is non-empty then `LATEX` will add an extra page to place the material and also request a rerun to get the correct placement sorted out.

As mentioned above the hook `shipout/before` is executed first and can manipulate the prepared shipout box stored in `\ShipoutBox` or set things up for use in `\write` during the actual shipout. The other hooks are added inside `hboxes` to the box being shipped out in the following order:

---

<sup>23</sup>In `LATEX 2ε` that was already existing, but implemented using a box register with the name `\@begindvibox`.

<code>shipout/firstpage</code>	only on the first page
<code>shipout/background</code>	
<code>&lt;boxed content of \ShipoutBox&gt;</code>	
<code>shipout/foreground</code>	
<code>shipout/lastpage</code>	only on the last page

If any of the hooks has no code then that particular no box is added at that point.

In a document that doesn't produce pages, e.g., only makes `\typeouts`, none of the hooks are executed (as there is no `\shipout`) not even the `shipout/lastpage` hook.

---

`\AtBeginDvi`  
`\AtEndDvi`

---

`\AtBeginDvi` is the existing L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> interface to fill the `shipout/firstpage` hook. This is not really a good name as it is not just supporting `.dvi` but also `.pdf` output or `.dvi`.

`\AtEndDvi` is the counterpart that was not available in the kernel but only through the package `atenddvi`. It fills the `shipout/lastpage` hook.

*Todo: better names? Any suggestions?*

### 1.3 Special commands for use inside the hooks

---

`\DiscardShipoutBox`  
`\shipout_discard_box:`

---

`\AddToHookNext {shipout/before} {...\DiscardShipoutBox...}`

The `\DiscardShipoutBox` declaration (L3 name `\shipout_discard_box:`) requests that on the next shipout the page box is thrown away instead of being shipped to the `.dvi` or `.pdf` file.

Typical applications wouldn't do this unconditionally, but have some processing logic that decides to use or not to use the page.

Note that if this declaration is used directly in the document it may depend on the placement to which page it applies, given that L<sup>A</sup>T<sub>E</sub>X output routine is called in an asynchronous manner!

*Todo: Once we have a new mark mechanism available we can improve on that and make sure that the declaration applies to the page that contains it.*

In the `atbegshi` package there are a number of additional commands for use inside the `shipout/before` hook. They should normally not be needed any more as one can instead simply add code to the hooks `shipout/before`, `shipout/background` or `shipout/foreground`.<sup>24</sup> If `atbegshi` gets loaded then those commands become available as public functions with their original names as given below.

---

<sup>24</sup>If that assumption turns out to be wrong it would be trivial to change them to public functions (right now they are private).

## 1.4 Information counters

---

<code>\ReadonlyShipoutCounter</code>	<code>\ifnum\ReadonlyShipoutCounter=...</code>
<code>\g_shipout_readonly_int</code>	<code>\int_use:N \g_shipout_readonly_int % expl3 usage</code>

---

This integer holds the number of pages shipped out up to now (including the one to be shipped out when inside the output routine). More precisely, it is incremented only after it is clear that a page will be shipped out, i.e., after the `shipout/before` hook (because that might discard the page)!

Just like with the `page` counter its value is only accurate within the output routine. In the body of the document it may be off by one as the output routine is called asynchronously!

Also important: it *must not* be set, only read. There are no provisions to prevent that but if you do, chaos will be the result. To emphasize this fact it is not provided as a  $\text{\LaTeX}$  counter but as a  $\text{\TeX}$  counter (i.e., a command), so `\Alph{\ReadonlyShipoutCounter}` etc, would not work.

---

<code>totalpages</code>	<code>\arabic{totalpages}</code>
<code>\g_shipout_totalpages_int</code>	<code>\int_use:N \g_shipout_totalpage_int % expl3 usage</code>

---

In contrast to `\ReadonlyShipoutCounter`, the `totalpages` counter is a  $\text{\LaTeX}$  counter and incremented for each shipout attempt including those pages that are discarded for one or the other reason. Again `shipout/before` sees the counter before it is incremented).

Furthermore, while it is incremented for each page, its value is never used by  $\text{\LaTeX}$ . It can therefore be freely reset or changed by user code, for example, to additionally count a number of pages that are not build by  $\text{\LaTeX}$  but are added in a later part of the process, e.g., cover pages or picture pages made externally.

Important: as this is a page-related counter its value is only reliable inside the output routine!

---

<code>\PreviousTotalPages</code>	<code>\thetotalpages/\PreviousTotalPages</code>
----------------------------------	-------------------------------------------------

---

Command that expands to the number of total pages from the previous run. If there was no previous run or if used in the preamble it expands to 0. Note that this is a command to a counter, so in order to display the number in, say, Roman numerals you have to assign its value to a counter and then use `\Roman` on that counter.

## 1.5 Debugging shipout code

---

<code>\DebugShipoutsOn</code>	<code>\DebugShipoutsOn</code>
<code>\DebugShipoutsOff</code>	
<code>\shipout_debug_on:</code>	Turn the debugging of shipout code on or off. This displays changes made to the shipout data structures.
<code>\shipout_debug_off:</code>	

---

*Todo: This needs some rationalizing and may not stay this way.*

## 2 Emulating commands from other packages

The packages in this section are no longer necessary but as they are used in other packages they are emulated when they are loaded via `\usepackage` or `\RequirePackage`.

## 2.1 Emulating atbegshi

<u>\AtBeginShipoutUpperLeft</u>	<code>\AddToHook {shipout/before}</code>
<u>\AtBeginShipoutUpperLeftForeground</u>	<code>{... \AtBeginShipoutUpperLeft{&lt;code&gt;}...}</code>

This adds a `picture` environment into the background of the shipout box expecting `<code>` to contain `picture` commands. The same effect can be obtained by simply using kernel features as follows:

`\AddToHook{shipout/background}{<code>}`

There is one technical difference: if `\AtBeginShipoutUpperLeft` is used several times each invocation is put into its own box inside the shipout box whereas all `<code>` going into `shipout/background` ends up all in the same box in the order it is added or sorted based on the rules for the hook chunks.

`\AtBeginShipoutUpperLeftForeground` is similar with the difference that the `picture` environment is placed in the foreground. To model it with the kernel functions use the hook `shipout/foreground` instead.

<u>\AtBeginShipoutAddToBox</u>	<code>\AddToHook {shipout/before} {... \AtBeginShipoutAddToBox{&lt;code&gt;}...}</code>
<u>\AtBeginShipoutAddToBoxForeground</u>	

These work like `\AtBeginShipoutUpperLeft` and `\AtBeginShipoutUpperLeftForeground` with the difference that `<code>` is directly placed into an `\hbox` inside the shipout box and not surrounded by a `picture` environment.

To emulate them using `shipout/background` or `shipout/foreground` you may have to wrap `<code>` into a `\put` statement but if the code is not doing any typesetting just adding it to the hook should be sufficient.

<u>\AtBeginShipoutBox</u>	This is the name of the shipout box as <code>atbegshi</code> knows it.
---------------------------	------------------------------------------------------------------------

<u>\AtBeginShipoutInit</u>	By default <code>atbegshi</code> delayed its action until <code>\begin{document}</code> . This command was forcing it in an earlier place. With the new concept it does nothing.
----------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<u>\AtBeginShipout</u>	<code>\AtBeginShipout{&lt;code&gt;} ≡ \AddToHook{shipout/before}{&lt;code&gt;}</code>
<u>\AtBeginShipoutNext</u>	<code>\AtBeginShipoutNext{&lt;code&gt;} ≡ \AddToHookNext{shipout/before}{&lt;code&gt;}</code>
	This is equivalent to filling the <code>shipout/before</code> hook by either using <code>\AddToHook</code> or <code>\AddToHookNext</code> , respectively.

<u>\AtBeginShipoutFirst</u>	The <code>atbegshi</code> names for <code>\AtBeginDvi</code> and <code>\DiscardShipoutBox</code> .
<u>\AtBeginShipoutDiscard</u>	

## 2.2 Emulating everyshi

<u>\EveryShipout</u>	<code>\EveryShipout{&lt;code&gt;} ≡ \AddToHook{shipout/before}{&lt;code&gt;}</code>
----------------------	-------------------------------------------------------------------------------------

<u>\AtNextShipout</u>	<code>\AtNextShipout{&lt;code&gt;} ≡ \AddToHookNext{shipout/before}{&lt;code&gt;}</code>
-----------------------	------------------------------------------------------------------------------------------



## 2.3 Emulating atenddvi

The atenddvi package implemented only a single command: \AtEndDvi and that is now available out of the box.

## 2.4 Emulating everypage

This page takes over the original \@begindvi hook and replaces it. It should be all covered by the hooks offered here (details need checking) and thus could simply use the provided hooks rather than defining its own.

# 3 The Implementation

```
1 <@@=shipout>
```

At the moment the whole module rolls back in one go, but if we make any modifications in later releases this will then need splitting.

```
2 <*2ekernel|latexrelease>
3 <latexrelease>\IncludeInRelease{2020/10/01}%
4 <latexrelease>          {\shipout}{Hook mangement (shipout)}%
5 \ExplSyntaxOn
```

## 3.1 Debugging

\g\_\_shipout\_debug\_bool Holds the current debugging state.

```
6 \bool_new:N \g__shipout_debug_bool
```

(End definition for \g\_\_shipout\_debug\_bool.)

```
\shipout_debug_on: Turns debugging on and off by redefining \__shipout_debug:n.
\shipout_debug_off:
\__shipout_debug:n
\__shipout_debug_gset:
7 \cs_new_eq:NN \__shipout_debug:n \use_none:n
8 \cs_new_protected:Npn \shipout_debug_on:
9 {
10   \bool_gset_true:N \g__shipout_debug_bool
11   \__shipout_debug_gset:
12 }
13 \cs_new_protected:Npn \shipout_debug_off:
14 {
15   \bool_gset_false:N \g__shipout_debug_bool
16   \__shipout_debug_gset:
17 }
18 \cs_new_protected:Npn \__shipout_debug_gset:
19 {
20   \cs_gset_protected:Npx \__shipout_debug:n ##1
21   { \bool_if:NT \g__shipout_debug_bool {##1} }
22 }
```

(End definition for \shipout\_debug\_on: and others. These functions are documented on page 698.)

```
\ShipoutBox The box filled with the page to be shipped out (both L3 and LATEX 2ε name).
\l_shipout_box
23 \box_new:N \l_shipout_box
24 \cs_set_eq:NN \ShipoutBox \l_shipout_box
```

(End definition for \ShipoutBox and \l\_shipout\_box. These functions are documented on page 695.)

`\__shipout_execute:` This is going to be the code run by `\shipout`. The code follows closely the ideas from `atbegshi`, so not documenting that here for now.

```

25 \cs_set_protected:Npn \__shipout_execute: {
26   \tl_set:Nx \l__shipout_group_level_tl
27   { \int_value:w \tex_currentgrouplevel:D }
28   \tex_afterassignment:D \__shipout_execute_test_level:
29   \tex_setbox:D \l_shipout_box
30 }

```

(End definition for `\__shipout_execute:.`)

**`\shipout`** Overloading the `\shipout` primitive:

```

31 \cs_gset_eq:NN \shipout \__shipout_execute:

```

(End definition for `\shipout`. This function is documented on page 695.)

`\l__shipout_group_level_tl` Helper token list to record the group level at which `\__shipout_execute:` is encountered.

```

32 \tl_new:N \l__shipout_group_level_tl

```

(End definition for `\l__shipout_group_level_tl`.)

`\_shipout_execute_test_level:` If the group level has changed then we are still constructing `\l_shipout_box` and to continue we need to wait until the current group has finished, hence the `\tex_aftergroup:D`.

```

33 \cs_new:Npn \__shipout_execute_test_level: {
34   \int_compare:nNnT
35     \l__shipout_group_level_tl < \tex_currentgrouplevel:D
36     \tex_aftergroup:D
37   \__shipout_execute_cont:
38 }

```

(End definition for `\_shipout_execute_test_level:.`)

`\__shipout_execute_cont:` When we have reached this point the shipout box has been processed and is available in `\l_shipout_box` and ready for real ship out (perhaps)..

First we quickly check if it is void (can't happen in the standard L<sup>A</sup>T<sub>E</sub>X output routine but `\shipout` might be called from a package that has some special processing logic). If it is void we aren't shipping anything out and processing ends.<sup>25</sup>

```

39 \cs_new:Npn \__shipout_execute_cont: {
40   \box_if_empty:NTF \l_shipout_box
41   { \PackageWarning{ltshipout}{Ignoring~ void~ shipout~ box} }
42   {

```

Otherwise we assume that we will ship something and prepare for final adjustments (in particular setting the state of `\protect` while we are running the hook code). We also save the current `\protect` state to restore it later.

```

43     \bool_gset_false:N \g__shipout_discard_bool
44     \cs_set_eq:NN \__shipout_saved_protect: \protect
45     \set@typeset@protect

```

We also store the current shipout box dimension in registers, so that they can be used in the hook code.<sup>26</sup>

```

46     \__shipout_get_box_size:N \l_shipout_box

```

<sup>25</sup>In that case we don't reset the deadcycles, that would be up to the OR processing logic to do.

<sup>26</sup>This is not really necessary as the code could access them via `\box_ht:N`, etc., but it is perhaps convenient.

Then we execute the `shipout/before` hook.

```
47 \hook_use:n {shipout/before}
```

In `\g_shipout_totalpages_int` we count all shipout attempts so we increment that counter already here (the other one is incremented later when we know for sure that we do a `\shipout`).

We increment it after running the above hook so that the values for `\g_shipout_totalpages_int` and `\` are in sync while the hook is executed (in the case that `totalpages` isn't manually altered or through discarding pages that is).

```
48 \int_gincr:N \g_shipout_totalpages_int
```

The above hook might contain code that requests the page to be discarded so we now test for it.

```
49 \bool_if:NTF \g__shipout_discard_bool
50 { \PackageInfo{ltshipout}{Completed~ page~ discarded}
51 \bool_gset_false:N \g__shipout_discard_bool
```

As we are discarding the page box and not shipping anything out, we need to do some house cleaning and reset T<sub>E</sub>X's deadcycles so that it doesn't complain about too many calls to the OR without any shipout.

```
52 \tex_deadcycles:D \c_zero_int
```

*Todo: In atbegshi the box was dropped but is that actually needed? Or the resetting of \protect to its kernel value?*

```
53 % \group_begin:
54 % \box_set_eq_drop:NN \l_shipout_box \l_shipout_box
55 % \group_end:
56 % \cs_set_eq:NN \protect \exp_not:N
57 }
```

Even if there was no explicit request to discard the box it is possible that the code for the hook `shipout/before` has voided the box (by mistake or deliberately). We therefore test once more but this time make it a warning, because the best practice way is to use the request mechanism.

```
58 { \box_if_empty:NTF \l_shipout_box
59 { \PackageWarning{ltshipout}{
60 Shipout~ box~ was~ voided~ by~ hook,\MessageBreak
61 ignoring~ shipout~ box }
62 }
```

Finally, if the box is still non-empty we are nearly ready to ship it out. First we increment the total page counter so that we can later test if we have reached the final page according to our available information.<sup>27</sup>

```
63 {
64 \int_gincr:N \g_shipout_readonly_int
65 \__shipout_debug:n {
66 \typeout{Absolute~ page~ =~ \int_use:N \g_shipout_readonly_int
67 \space (target:~ \@abspage@last)}
68 }
```

---

<sup>27</sup>Doing that earlier would be wrong because we might end up with the last page counted but discard and then we have no place to add the final objects into the output file.

Then we store the box sizes again (as they may have changed) and then look at the hooks `shipout/foreground` and `shipout/background`. If either or both are non-empty we add a `picture` environment to the box (in the foreground and or in the background) and execute the hook code inside that environment.

```

69         \_shipout_get_box_size:N \l_shipout_box
70         \hook_if_empty:nF {shipout/foreground}
71         { \_shipout_add_foreground_picture:n
72           { \hook_use:n {shipout/foreground} } }
73         \hook_if_empty:nF {shipout/background}
74         { \_shipout_add_background_picture:n
75           { \@kernel@before@shipout@background
76             \hook_use:n {shipout/background} } }

```

We then run `\_shipout_execute_firstpage_hook`: that adds the content of the hook `shipout/firstpage` to the start of the first page (if non-empty). It is then redefined to do nothing on later pages.

```

77         \_shipout_execute_firstpage_hook:

```

The we check if we have to add the `shipout/lastpage` hook because we have reached the last page. This test will be false for all but one (and hopefully the correct) page.

```

78         \int_compare:nNnT \@abspage@last = \g_shipout_readonly_int
79         { \hook_if_empty:nF {shipout/lastpage}
80           { \_shipout_debug:n { \typeout{Executing~ lastpage~ hook~
81             on~ page~ \int_use:N \g_shipout_readonly_int } }
82             \_shipout_add_foreground_box:n { \UseHook{shipout/lastpage}
83               \@kernel@after@shipout@lastpage }
84           }
85           \bool_gset_true:N \g__shipout_lastpage_handled_bool
86         }

```

Finally we run the actual T<sub>E</sub>X primitive for `shipout`. As that will expand delayed `\write` statements inside the page in which protected commands should not expand we first change `\protect` to the appropriate definition for that case.

```

87         \cs_set_eq:NN \protect \exp_not:N
88         \tex_shipout:D \box_use:N \l_shipout_box
89     }
90 }

```

Restore the value of `\protect` in case `\shipout` is called outside of the output routine (where it is automatically restored because of the implicit group).

```

91     \cs_set_eq:NN \protect \_shipout_saved_protect:
92 }
93 }

```

(End definition for `\_shipout_execute_cont:`)

`\_shipout_saved_protect`: Remeber the current `\protect` state.

```

94 \cs_new_eq:NN \_shipout_saved_protect: \protect

```

(End definition for `\_shipout_saved_protect:`)

```

shipout/before Declaring all hooks for the shipout code.
shipout/foreground \hook_new:n{shipout/before}
shipout/background \hook_new:n{shipout/foreground}
shipout/firstpage \hook_new:n{shipout/background}
shipout/lastpage

```

```

98 \hook_new:n{shipout/firstpage}
99 \hook_new:n{shipout/lastpage}

```

(End definition for shipout/before and others. These functions are documented on page 696.)

```

\@kernel@after@shipout@lastpage
\@kernel@before@shipout@background

```

And here are the internal kernel hooks going before or after the public ones where needed.

```

100 \let\@kernel@after@shipout@lastpage\@empty
101 \let\@kernel@before@shipout@background\@empty

```

(End definition for \@kernel@after@shipout@lastpage and \@kernel@before@shipout@background. These functions are documented on page ??.)

```

\__shipout_execute_firstpage_hook:

```

This command adds any specials into a box and adds that to the very beginning of the first box shipped out. After that we redefine it to do nothing on later pages.

```

102 \cs_new:Npn \__shipout_execute_firstpage_hook: {

```

Adding something to the beginning means adding it to the background as that layer is done first in the output. Of course that is only needed if the hook actually contains anything.

```

103   \hook_if_empty:nF {shipout/firstpage}
104   { \__shipout_add_background_box:n { \UseHook{shipout/firstpage} } }

```

Once we are here we change the definition to do nothing next time and we also change the command used to implement \AtBeginDvi to become a warning and not add further material to a hook that is never used again.

```

105   \cs_gset_eq:NN \__shipout_execute_firstpage_hook: \prg_do_nothing:
106   \cs_gset:Npn \__shipout_add_firstpage_material:Nn ##1 ##2 {
107     \@latex@warning{
108       First~ page~ is~ already~ shipped~ out,~ ignoring\MessageBreak
109       \string##1 }
110   }
111 }

```

(End definition for \\_\_shipout\_execute\_firstpage\_hook:.)

```

\g_shipout_lastpage_handled_bool

```

A boolean to signal if we have already handled the shipout/lastpage hook.

```

112 \bool_new:N \g_shipout_lastpage_handled_bool

```

(End definition for \g\_shipout\_lastpage\_handled\_bool.)

```

\__shipout_add_firstpage_material:Nn

```

This command adds material to the shipout/firstpage hook. It is used in \AtBeginDvi, etc. The first argument is the command through which it is called. Initially this is ignored but once we are passed the first page it can be used to generate a warning message mentioning the right user command.

```

113 \cs_new:Npn \__shipout_add_firstpage_material:Nn #1#2 {
114   \AddToHook{shipout/firstpage}{#2}
115 }

```

(End definition for \\_\_shipout\_add\_firstpage\_material:Nn.)

```

\__shipout_get_box_size:N

```

Store the box dimensions in dimen registers.

*Todo: This could/should perhaps be generalized to set height depth and width given an arbitrary box.*

```

116 \cs_new:Npn \__shipout_get_box_size:N #1 {
117   \dim_set:Nn \l_shipout_box_ht_dim { \box_ht:N #1 }
118   \dim_set:Nn \l_shipout_box_dp_dim { \box_dp:N #1 }
119   \dim_set:Nn \l_shipout_box_wd_dim { \box_wd:N #1 }
120   \dim_set:Nn \l_shipout_box_ht_plus_dp_dim { \l_shipout_box_ht_dim +
121                                             \l_shipout_box_dp_dim }
122 }

```

(End definition for \\_\_shipout\_get\_box\_size:N.)

`\l_shipout_box_ht_dim` And here are the variables set by \\_\_shipout\_get\_box\_size:N.

```

\l_shipout_box_dp_dim 123 \dim_new:N \l_shipout_box_ht_dim
\l_shipout_box_wd_dim 124 \dim_new:N \l_shipout_box_dp_dim
\l_shipout_box_ht_plus_dp_dim 125 \dim_new:N \l_shipout_box_wd_dim
126 \dim_new:N \l_shipout_box_ht_plus_dp_dim

```

(End definition for \l\_shipout\_box\_ht\_dim and others. These functions are documented on page 695.)

`\g_shipout_discard_bool` Indicate whether or not the current page box should be discarded

```

127 \bool_new:N \g_shipout_discard_bool

```

(End definition for \g\_shipout\_discard\_bool.)

`\l__shipout_tmp_box` We need a box for the background and foreground material and a token register to  
`\l__shipout_saved_badness_tl` remember badness settings as we disable them during the buildup below.

```

128 \box_new:N \l__shipout_tmp_box
129 \tl_new:N \l__shipout_saved_badness_tl

```

(End definition for \l\_\_shipout\_tmp\_box and \l\_\_shipout\_saved\_badness\_tl.)

`\__shipout_add_background_box:n` In standard L<sup>A</sup>T<sub>E</sub>X the shipout box is always a \vbox but here we allow for other usage as well, in case some package has its own output routine.

```

130 \cs_new:Npn \__shipout_add_background_box:n #1
131 { \__shipout_get_box_size:N \l_shipout_box

```

But we start testing for a vertical box as that should be the normal case.

```

132   \box_if_vertical:NTF \l_shipout_box
133   {

```

Save current values of \vfuzz and \vbadness then change them to allow box manipulations without warnings.

```

134       \tl_set:Nx \l__shipout_saved_badness_tl
135       { \vfuzz=\the\vfuzz\relax
136         \vbadness=\the\vbadness\relax }
137       \vfuzz=\c_max_dim
138       \vbadness=\c_max_int

```

Then we reconstruct \l\_shipout\_box ...

```

139       \vbox_set_to_ht:Nnn \l_shipout_box \l_shipout_box_ht_plus_dp_dim
140       {

```

... the material in #1 is placed into a horizontal box with zero dimensions.

```

141           \hbox_set:Nn \l__shipout_tmp_box
142           { \l__shipout_saved_badness_tl #1 }
143           \box_set_wd:Nn \l__shipout_tmp_box \c_zero_dim
144           \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
145           \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim

```

The we typeset that box followed by whatever was in `\l_shipout_box` before (unpacked).

```

146         \skip_zero:N \baselineskip
147         \skip_zero:N \lineskip
148         \skip_zero:N \lineskiplimit
149         \box_use:N \l__shipout_tmp_box
150         \vbox_unpack:N \l_shipout_box

```

The `\kern` ensures that the box has no depth which is afterwards explicitly corrected.

```

151         \kern \c_zero_dim
152     }
153     \box_set_ht:Nn \l_shipout_box \l_shipout_box_ht_dim
154     \box_set_dp:Nn \l_shipout_box \l_shipout_box_dp_dim

```

*Todo: The whole boxing maneuver looks a bit like overkill to me, but for the moment I leave.*

```

155     \l__shipout_saved_badness_tl
156 }
157 {

```

A horizontal box is handled in a similar way. The last case would be a void box in which case we do nothing hence the missing F branch.

```

158     \box_if_horizontal:NT \l_shipout_box
159     {
160         \tl_set:Nx \l__shipout_saved_badness_tl
161         { \hfuzz=\the\hfuzz\relax
162           \hbadness=\the\hbadness\relax }
163         \hfuzz=\c_max_dim
164         \hbadness=\c_max_int
165         \hbox_set_to_wd:Nnn \l_shipout_box \l_shipout_box_wd_dim
166         {
167             \hbox_set:Nn \l__shipout_tmp_box
168             { \l__shipout_saved_badness_tl #1 }
169             \box_set_wd:Nn \l__shipout_tmp_box \c_zero_dim
170             \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
171             \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim
172             \box_move_up:nn
173             \l_shipout_box_ht_dim
174             { \box_use:N \l__shipout_tmp_box }
175             \hbox_unpack:N \l_shipout_box
176         }
177         \l__shipout_saved_badness_tl
178     }
179 }
180 }

```

(End definition for `\__shipout_add_background_box:n`)

`\__shipout_add_foreground_box:n`

Foreground boxes are done in the same way, only the order and placement of boxes has to be done differently.

```

181 \cs_new:Npn \__shipout_add_foreground_box:n #1
182 {
183     \box_if_vertical:NTF \l_shipout_box
184     {
185         \tl_set:Nx \l__shipout_saved_badness_tl

```

```

186         { \vfuzz=\the\vfuzz\relax
187           \vbadness=\the\vbadness\relax }
188 \vfuzz=\c_max_dim
189 \vbadness=\c_max_int
190 \vbox_set_to_ht:Nnn \l_shipout_box \l_shipout_box_ht_plus_dp_dim
191 {
192   \hbox_set:Nn \l__shipout_tmp_box
193     { \l__shipout_saved_badness_tl #1 }
194   \box_set_wd:Nn \l__shipout_tmp_box \c_zero_dim
195   \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
196   \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim
197   \skip_zero:N \baselineskip
198   \skip_zero:N \lineskip
199   \skip_zero:N \lineskiplimit
200   \vbox_unpack:N \l_shipout_box
201   \kern -\l_shipout_box_ht_plus_dp_dim
202   \box_use:N \l__shipout_tmp_box
203   \kern \l_shipout_box_ht_plus_dp_dim
204 }
205 \l__shipout_saved_badness_tl
206 \box_set_ht:Nn \l_shipout_box \l_shipout_box_ht_dim
207 \box_set_dp:Nn \l_shipout_box \l_shipout_box_dp_dim
208 }
209 {
210   \box_if_horizontal:NT \l_shipout_box
211   {
212     \tl_set:Nx \l__shipout_saved_badness_tl
213       { \hfuzz=\the\hfuzz\relax
214         \hbadness=\the\hbadness\relax }
215     \hfuzz=\c_max_dim
216     \hbadness=\c_max_int
217     \hbox_set_to_wd:Nnn \l_shipout_box \l_shipout_box_wd_dim
218     {
219       \hbox_unpack:N \l_shipout_box
220       \kern -\box_wd:N \l_shipout_box
221       \hbox_set:Nn \l__shipout_tmp_box
222         { \l__shipout_saved_badness_tl #1 }
223       \box_set_wd:Nn \l__shipout_tmp_box \c_zero_dim
224       \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
225       \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim
226       \box_move_up:nn { \box_ht:N \l_shipout_box }
227         { \box_use:N \l__shipout_tmp_box }
228       \kern \box_wd:N \l_shipout_box
229     }%
230     \l__shipout_saved_badness_tl
231   }
232 }
233 }

```

(End definition for \\_\_shipout\_add\_foreground\_box:n.)

\\_\_shipout\_init\_page\_origins:  
\c\_\_shipout\_horigin\_tl  
\c\_\_shipout\_vorigin\_tl

Two constants holding the offset of the top-left with respect to the media box.  
Setting the constants this way is courtesy of Bruno.



We delay setting the constants to the last possible place as there might be updates in the preamble or even in the `begindocument` hook that affects their setup.

```

234 \cs_new:Npn \__shipout_init_page_origins: {
235   \tl_const:Nx \c__shipout_horigin_tl
236   {
237     \cs_if_exist_use:NTF \pdfvariable { horigin }
238     { \cs_if_exist_use:NF \pdfhorigin { 1in } }
239   }
240   \tl_const:Nx \c__shipout_vorigin_tl
241   {
242     \cs_if_exist_use:NTF \pdfvariable { vorigin }
243     { \cs_if_exist_use:NF \pdfvorigin { 1in } }
244   }

```

After the constants have been set there is no need to execute this command again, in fact it would raise an error, so we redefine it to do nothing.

```

245   \cs_gset_eq:NN \__shipout_init_page_origins: \prg_do_nothing:
246 }

```

(End definition for `\__shipout_init_page_origins:`, `\c__shipout_horigin_tl`, and `\c__shipout_vorigin_tl`.)

`\__shipout_picture_overlay:n` Put the argument into a `picture` environment that doesn't take up any size and uses 1pt for `\unitlength`.

*Todo: Could perhaps be generalized as it might be useful elsewhere. For now it is not.*

```

247 \cs_new:Npn \__shipout_picture_overlay:n #1 {

```

The very first time this is executed we have to initialize (and freeze) the origins.

```

248   \__shipout_init_page_origins:
249   \kern -\c__shipout_horigin_tl \scan_stop:
250   \vbox_to_zero:n {
251     \kern -\c__shipout_vorigin_tl \scan_stop:
252     \unitlength 1pt \scan_stop:

```

This mimics a simple zero-sized `picture` environment. The `\hss` is needed in case there is horizontal material (without using `\put` with a positive width).

```

253     \hbox_set_to_wd:Nnn \l__shipout_tmp_box \c_zero_dim
254     { \ignorespaces #1 \hss }
255     \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
256     \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim
257     \box_use:N \l__shipout_tmp_box
258     \tex_vss:D
259   }
260 }

```

(End definition for `\__shipout_picture_overlay:n`.)

`\__shipout_add_background_picture:n` Put a `picture` env in the background of the shipout box with its reference point in the top-left corner.

```

261 \cs_new:Npn \__shipout_add_background_picture:n #1 {
262   \__shipout_add_background_box:n { \__shipout_picture_overlay:n {#1} }
263 }

```

(End definition for `\_shipout_add_background_picture:n`.)

`\_shipout_add_foreground_picture:n` Put a `picture` env in the foreground of the shipout box with its reference point in the top-left corner.

```
264 \cs_new:Npn \_shipout_add_foreground_picture:n #1 {
265   \_shipout_add_foreground_box:n { \_shipout_picture_overlay:n {#1} }
266 }
```

(End definition for `\_shipout_add_foreground_picture:n`.)

`\shipout_discard:` Request that the next shipout box should be discarded. At the moment this is just setting a boolean, but we may want to augment this behavior that the position of the call is taken into account (in case L<sup>A</sup>T<sub>E</sub>X looks ahead and is not using the position for on the next page).

```
267 \cs_new_protected:Npn \shipout_discard: {
268   \bool_gset_true:N \g\_shipout_discard_bool
269 }
```

(End definition for `\shipout_discard:`. This function is documented on page ??.)

### 3.2 Handling the end of job hook

At the moment this is partly solved by using the existing hooks. But rather than putting the code into these hooks it should be moved to the right place directly as we shouldn't prefill hooks with material unless it needs to interact with other code.

`\g_shipout_readonly_int` We count every shipout activity that makes a page (but not those that are discarded) in order to know how many pages got produced.

```
270 \int_new:N \g_shipout_readonly_int
```

For L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> it is available as a command (i.e., a T<sub>E</sub>X counter only).

```
271 \cs_new_eq:NN \ReadonlyShipoutCounter \g_shipout_readonly_int
```

(End definition for `\g_shipout_readonly_int` and `\ReadonlyShipoutCounter`. These functions are documented on page 698.)

`\g_shipout_totalpages_int` We count every shipout attempt (even those that are discarded) in tis counter. It is not used in the code but may get used in user code.

`\c@totalpages`

```
272 \int_new:N \g_shipout_totalpages_int
```

For L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> this is offered as a L<sup>A</sup>T<sub>E</sub>X counter so can be easily typeset inside the output routine to display things like “`\thepage/\thetotalpages`”, etc.

```
273 \cs_new_eq:NN \c@totalpages \g_shipout_totalpages_int
274 \cs_new:Npn \thetotalpages { \arabic{totalpages} }
```

(End definition for `\g_shipout_totalpages_int` and `\c@totalpages`. These functions are documented on page 698.)

`\@abspage@last` In `\@abspage@last` record the number of pages from the last run. This is written to the `.aux` and this way made available to the next run. In case there is no `.aux` file or the statement is missing from it we initialize it with the largest possible number in T<sub>E</sub>X. We use this as the default because then we are inserting the `shipout/lastpage` on the last page (or after the last page but not on page 1 for a multipage document).

```
275 \xdef\@abspage@last{\number\maxdimen}
```

(End definition for \@abspage@last. This function is documented on page ??.)

`\enddocument` Instead of using the hooks `enddocument` and `enddocument/afterlastpage` we add this code to private kernel hooks to be 100% when it is executed and to avoid cluttering the hooks with data that is always there.

Inside `\enddocument` there is a `\clearpage`. Just before that we execute this code here. There is a good change that we are on the last page. Therefore, if we don't know the value from the last run, we assume that the current page is the right one. So we set `\@abspage@last` and as a result the next shipout will run the `shipout/lastpage` code. Of course, if there are floats that still need a placement this guess will be wrong but then rerunning the document will give us the correct value next time around.

```
\@kernel@after@enddocument 276 \g@addto@macro \@kernel@after@enddocument {
277   \int_compare:nNtT \@abspage@last = \maxdimen
278   {
We use LATEX 2ε coding as \@abspage@last is not an L3 name.
279   \xdef\@abspage@last{ \int_eval:n {\g_shipout_readonly_int + 1} }
280   }
281 }
```

Once the `\clearpage` has done its work inside `\enddocument` we know for sure how many pages this document has, so we record that in the `.aux` file for the next run.

```
\@kernel@after@enddocument@afterlastpage 282 \g@addto@macro \@kernel@after@enddocument@afterlastpage {
There is one special case: If no output is produced then there is no point in a) recording
the number as 0 will never match the page number of a real page and b) adding an extra
page to run the shipout/lastpage is pointless as well (as it would remain forever). So
we test for this and run the code only if there have been pages.
283   \int_compare:nNf \g_shipout_readonly_int = 0
284   {
```

This ends up in the `.aux` so we use L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> names here.

*Todo: This needs an interface for \nofiles in expl3, doesn't at the moment!*

```
285   \if@filesw
286   \iow_now:Nx \@auxout {
287     \gdef\string\@abspage@last {\int_use:N \g_shipout_readonly_int}}
288   \fi
```

But we may have guessed wrongly earlier and we still have to run the `shipout/lastpage` even though there is no page to place it into. If that is the case we make a trivial extra page and put it there. This temporary page will then vanish again on the next run but helps to keep pdf viewers happy.

```
289   \bool_if:Nf \g__shipout_lastpage_handled_bool
290   {
```

However, making this extra page in case the hook is actually empty would be forcing a rerun without any reason, so we check that condition and also check if `\@kernel@after@shipout@lastpage` contains any code. If both are empty we omit the page generation.

```
291   \bool_lazy_and:nnF
292   { \hook_if_empty_p:n {shipout/lastpage} }
```

```

293         { \tl_if_empty_p:N \@kernel@after@shipout@lastpage }
294         {
295             \tex_shipout:D\vbox to\textheight
296             {
297                 \hbox:n { \UseHook{shipout/lastpage}
298                     \@kernel@after@shipout@lastpage }

```

This extra page could be totally empty except for the hook content, but to help the user understanding why it is there we put some text into it.

```

299             \__shipout_excuse_extra_page:
300             \null
301         }

```

At this point we also signal to L<sup>A</sup>T<sub>E</sub>X's endgame that a rerun is necessary so that an appropriate message can be shown on the terminal. We do this by simply defining a command used as a flag and tested `\enddocument`.

```

302             \cs_gset_eq:NN \@extra@page@added \relax
303         }
304     }
305 }
306 }

```

*(End definition for `\enddocument`, `\@kernel@after@enddocument`, and `\@kernel@after@enddocument@afterlastpage`. These functions are documented on page ??.)*

`\__shipout_excuse_extra_page:` Say mea culpa ...

```

307 \cs_new:Npn \__shipout_excuse_extra_page: {
308     \vfil
309     \begin{center}
310         \bfseries Temporary~ page!
311     \end{center}
312     \LaTeX{}~ was~ unable~ to~ guess~ the~ total~ number~ of~ pages~
313     correctly.~ ~ As~ there~ was~ some~ unprocessed~ data~ that~
314     should~ have~ been~ added~ to~ the~ final~ page~ this~ extra~
315     page~ has~ been~ added~ to~ receive~ it.
316     \par
317     If~ you~ rerun~ the~ document~ (without~ altering~ it)~ this~
318     surplus~ page~ will~ go~ away,~ because~ \LaTeX{}~ now~ knows~
319     how~ many~ pages~ to~ expect~ for~ this~ document.
320     \vfil
321 }

```

*(End definition for `\__shipout_excuse_extra_page:.`)*

**`\PreviousTotalPages`** In the preamble before the aux file was read `\PreviousTotalPages` is always zero.

`\@kernel@before@begindocument` 322 `\def\PreviousTotalPages{0}`

In the aux file there should be an update for `\@abspage@last` recording the number of pages from the previous run. If not that macro holds the value of `\maxdimen`. So we test for it and update `\PreviousTotalPages` if there was a real value. This should happen just before the `begindocument` hook is executed so that the value can be used inside that hook.

```

323 \g@addto@macro\@kernel@before@begindocument
324 { \ifnum\@abspage@last<\maxdimen
325     \xdef\PreviousTotalPages{\@abspage@last}\fi}

```

(End definition for `\PreviousTotalPages` and `\@kernel@before@begindocument`. These functions are documented on page 698.)

## 4 Legacy L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> interfaces

**`\DiscardShipoutBox`** Request that the next shipout box is to be discarded.

```
326 \cs_new_eq:NN \DiscardShipoutBox \shipout_discard:
```

(End definition for `\DiscardShipoutBox`. This function is documented on page 697.)

**`\AtBeginDvi`**

```
327 \cs_new_protected:Npn \AtBeginDvi {\__shipout_add_firstpage_material:Nn \AtBeginDvi}
```

(End definition for `\AtBeginDvi`. This function is documented on page 697.)

**`\DebugShipoutsOn`**

**`\DebugShipoutsOff`**

```
328 \cs_new_eq:NN \DebugShipoutsOn \shipout_debug_on:
```

```
329 \cs_new_eq:NN \DebugShipoutsOff \shipout_debug_off:
```

(End definition for `\DebugShipoutsOn` and `\DebugShipoutsOff`. These functions are documented on page 698.)

## 5 Internal commands needed elsewhere

These internal commands use double and triple @ signs so we need to stop getting them translated to the module name.

```
330 <@@=>
```

```
\@expl@@@shipout@add@firstpage@material@@Nn
\@expl@@@shipout@add@background@box@@n
\@expl@@@shipout@add@foreground@box@@n
\@expl@@@shipout@add@background@picture@@n
\@expl@@@shipout@add@foreground@picture@@n
```

Some internals needed elsewhere.

```
331 \cs_set_eq:NN \@expl@@@shipout@add@firstpage@material@@Nn
```

```
332 \__shipout_add_firstpage_material:Nn
```

```
333 \cs_set_eq:NN \@expl@@@shipout@add@background@box@@n
```

```
334 \__shipout_add_background_box:n
```

```
335 \cs_set_eq:NN \@expl@@@shipout@add@foreground@box@@n
```

```
336 \__shipout_add_foreground_box:n
```

```
337 \cs_set_eq:NN \@expl@@@shipout@add@background@picture@@n
```

```
338 \__shipout_add_background_picture:n
```

```
339 \cs_set_eq:NN \@expl@@@shipout@add@foreground@picture@@n
```

```
340 \__shipout_add_foreground_picture:n
```

(End definition for `\@expl@@@shipout@add@firstpage@material@@Nn` and others. These functions are documented on page ??.)

```
341 \ExplSyntaxOff
```

```
342 </2ekernel | latexrelease>
```

```
343 <latexrelease>\EndIncludeInRelease
```

Rolling back here doesn't undefine the interface commands as they may be used in packages without rollback functionality. So we just make them do nothing which may or may not work depending on the code usage.

```

344 <latexrelease>\IncludeInRelease{0000/00/00}%
345 <latexrelease>          {\shipout}{The hook management (shipout)}%
346 <latexrelease>\expandafter\let\expandafter\shipout\csname tex_shipout:D\endcsname
347 <latexrelease>
348 <latexrelease>\let \ShipoutBox \@undefined
349 <latexrelease>\let \ReadonlyShipoutCounter \@undefined
350 <latexrelease>\let \c@totalpages \@undefined
351 <latexrelease>\let \thetotalpages \@undefined
352 <latexrelease>
353 <latexrelease>\let \DiscardShipoutBox \@undefined
354 <latexrelease>\let \DebugShipoutsOn \@undefined
355 <latexrelease>\let \DebugShipoutsOff \@undefined
356 <latexrelease>
357 <latexrelease>\DeclareRobustCommand \AtBeginDvi [1]{%
358 <latexrelease> \global \setbox \@begindvibox
359 <latexrelease> \vbox{\unvbox \@begindvibox #1}%
360 <latexrelease>}}
361 <latexrelease>
362 <latexrelease>\let \AtBeginShipout \@undefined
363 <latexrelease>\let \AtBeginShipoutNext \@undefined
364 <latexrelease>
365 <latexrelease>\let \AtBeginShipoutFirst \@undefined
366 <latexrelease>
367 <latexrelease>\let \ShipoutBoxHeight \@undefined
368 <latexrelease>\let \ShipoutBoxDepth \@undefined
369 <latexrelease>\let \ShipoutBoxWidth \@undefined
370 <latexrelease>
371 <latexrelease>\let \AtBeginShipoutDiscard \@undefined
372 <latexrelease>
373 <latexrelease>\let \AtBeginShipoutAddToBox \@undefined
374 <latexrelease>\let \AtBeginShipoutAddToBoxForeground \@undefined
375 <latexrelease>\let \AtBeginShipoutUpperLeft \@undefined
376 <latexrelease>\let \AtBeginShipoutUpperLeftForeground \@undefined
377 <latexrelease>

```

We do not undo a substitution when rolling back. As the file support gets undone the underlying data is no longer used (and sufficiently obscure that should not interfere with existing commands) and properly removing it would mean we need to make the `\unclare@...` and its support macros available in all earlier kernel releases which is pointless (and actually worse).

```

378 %\undeclare@file@substitution{everyshi.sty}
379 <latexrelease>
380 <latexrelease>\let \AtEndDvi \@undefined

```

We do not reenale a disabled package load when rolling back. As the file support gets undone the underlying data is no longer checked (and sufficiently obscure that it should not interfere with existing commands) and properly removing it would mean we need to make the `\reenable@package@load` command available in all earlier kernel releases which is pointless (and actually worse).

```

381 %\reenable@package@load{atenddvi}

```

```

382 <latexrelease>
383 <latexrelease>\EndIncludeInRelease
384 <*2ekernel>

```

## 6 Package emulation for compatibility

### 6.1 Package `atenddvi` emulation

`\AtEndDvi` This package has only one public command to simulating it is easy and actually sensible to provide as part of the kernel.

```

385 </2ekernel>
386 <*2ekernel | latexrelease>
387 <latexrelease>\IncludeInRelease{2020/10/01}%
388 <latexrelease>                {\AtEndDvi}{atenddvi emulation}%
389 \ExplSyntaxOn
390 \cs_new_protected:Npn \AtEndDvi {\AddToHook{shipout/lastpage}}
391 \ExplSyntaxOff

```

As the package is integrate we prevent loading (no need to roll that back):

```

392 \disable@package@load{atenddvi}
393 {\PackageWarning{atenddvi}
394   {Functionality of this package is already\MessageBreak
395    provided by LaTeX.\MessageBreak\MessageBreak
396    It is there no longer necessary to load it\MessageBreak
397    and you can safely remove it.\MessageBreak
398   Found on}}
399 </2ekernel | latexrelease>
400 <latexrelease>\EndIncludeInRelease
401 <latexrelease>\IncludeInRelease{0000/00/00}%
402 <latexrelease>                {\AtEndDvi}{atenddvi emulation}%
403 <latexrelease>\let \AtEndDvi \@undefined
404 <latexrelease>\EndIncludeInRelease
405 <*2ekernel>

```

(End definition for `\AtEndDvi`. This function is documented on page 697.)

```

406 </2ekernel>

```

### 6.2 Package `atbegshi` emulation

```

407 <*atbegshi-ltx>
408 \ProvidesPackage{atbegshi-ltx}
409 [2020/08/17 v1.0a
410   Emulation of the original atbegshi package^^Jwith kernel methods]

```

`\AtBeginShipoutBox`

```

411 \let \AtBeginShipoutBox \ShipoutBox

```

(End definition for `\AtBeginShipoutBox`. This function is documented on page 699.)

`\AtBeginShipoutInit` Compatibility only, we aren't delaying ...

```

412 \let \AtBeginShipoutInit \@empty

```

(End definition for `\AtBeginShipoutInit`. This function is documented on page 699.)

<code>\AtBeginShipout</code> <code>\AtBeginShipoutNext</code>	<p>Filling hooks</p> <pre> 413 \protected \def \AtBeginShipout      {\AddToHook{shipout/before}} 414 \protected \def \AtBeginShipoutNext {\AddToHookNext{shipout/before}}  (End definition for \AtBeginShipout and \AtBeginShipoutNext. These functions are documented on page 699.) </pre>
<code>\AtBeginShipoutFirst</code>	<p>Slightly more complex as we need to know the name of the command under which the shipout/firstpage hook is filled.</p> <pre> 415 \protected \def \AtBeginShipoutFirst 416     {\@expl@@@shipout@add@firstpage@material@@Nn \AtBeginShipoutFirst}  (End definition for \AtBeginShipoutFirst. This function is documented on page 699.) </pre>
<code>\AtBeginShipoutDiscard</code>	<p>Just a different name.</p> <pre> 417 \let \AtBeginShipoutDiscard \DiscardShipoutBox  (End definition for \AtBeginShipoutDiscard. This function is documented on page 699.) </pre>
<code>\AtBeginShipoutAddToBox</code> <code>\AtBeginShipoutAddToBoxForeground</code> <code>\AtBeginShipoutUpperLeft</code> <code>\AtBeginShipoutUpperLeftForeground</code>	<p>We don't expose them.</p> <pre> 418 \let \AtBeginShipoutAddToBox 419     \@expl@@@shipout@add@background@box@@n 420 \let \AtBeginShipoutAddToBoxForeground 421     \@expl@@@shipout@add@foreground@box@@n 422 \let \AtBeginShipoutUpperLeft 423     \@expl@@@shipout@add@background@picture@@n 424 \let \AtBeginShipoutUpperLeftForeground 425     \@expl@@@shipout@add@foreground@picture@@n  (End definition for \AtBeginShipoutAddToBox and others. These functions are documented on page 699.) </pre>
<code>\ShipoutBoxHeight</code> <code>\ShipoutBoxWidth</code> <code>\ShipoutBoxDepth</code>	<p>This is somewhat different from the original in atbegshi where <code>\ShipoutBoxHeight</code> etc. only holds the <code>\the\ht&lt;box&gt;</code> value. This may have some implications in some use cases and if that is a problem then it might need changing.</p> <pre> 426 \ExplSyntaxOn 427 \cs_new:Npn \ShipoutBoxHeight { \dim_use:N \l_shipout_box_ht_dim } 428 \cs_new:Npn \ShipoutBoxDepth  { \dim_use:N \l_shipout_box_dp_dim } 429 \cs_new:Npn \ShipoutBoxWidth  { \dim_use:N \l_shipout_box_wd_dim } 430 \ExplSyntaxOff  (End definition for \ShipoutBoxHeight, \ShipoutBoxWidth, and \ShipoutBoxDepth. These functions are documented on page ??.)  431 \&lt;/atbegshi-ltx&gt;  If the package is requested we substitute the one above: 432 \&lt;*2kernel&gt; 433 \declare@file@substitution{atbegshi.sty}{atbegshi-ltx.sty} 434 \&lt;/2kernel&gt; </pre>



### 6.3 Package everyshi emulation

```

435 <*everyshi-ltx>
436 \ProvidesPackage{everyshi-ltx}
437 [2020/08/17 v1.0a
438   Emulation of the original everyshi package^^Jwith kernel methods]

\EveryShipout This package has only two public commands so simulating it is easy:
\AtNextShipout
439 \protected \def \EveryShipout {\AddToHook{shipout/before}}
440 \protected \def \AtNextShipout {\AddToHookNext{shipout/before}}

(End definition for \EveryShipout and \AtNextShipout. These functions are documented on page 699.)

441 % This is one difference between \pkg{everyshi} and the kernel
442 % implementation, the latter does not directly use box 255.
443 %
444 % For usage by ordinary users this makes no difference but of a
445 % package use complicated code together with \pkg{everyshi} and
446 % directly manipulates box 255 then this package needs updating.
447 % In most cases the updates are simple because the kernel offers
448 % hooks that makes such complicated code unnecessary.
449 %
450 % We therefore add a little file into the adjusted package
451 % \begin{macrocode}
452 %%
453 %% In normal circumstances the above emulation is sufficient and in
454 %% all known packages (we know of) that use everyshi it either works or
455 %% the packages have been adjusted.
456 %%
457 %% Code that directly manipulates box 255, however, might fail.
458 %% If that is the case look at the shipout hooks offered now as
459 %% they are normally sufficient to avoid such minpulations (or
460 %% replace box 255 with \ShipoutBox in the code.
461 %%
462 </everyshi-ltx>

    If the package is requested we substitute the one above:
463 <*2kernel>
464 \declare@file@substitution{everyshi.sty}{everyshi-ltx.sty}
465 </2kernel>

    Rather important :-)
466 <@@=>

```

## File S

# ltoutput.dtx

## 1 Output Routine

### 1.1 Floats

The ‘2ekernel’ code ensures that a `\usepackage{autoout1}` is essentially ignored if a ‘full’ format is being used that has the autoloader file mode already in the format.

```
1 <defx>\begingroup
2 <defx>\makeatletter
3 <defx>\nfss@catcodes
4 <2ekernel>\expandafter\let\csname ver@autoout1.sty\endcsname\fmtversion
```

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

```
5 <*2ekernel>
6 \message{output,}

*****
*                               *
*                               *
*****
```

#### PAGE LAYOUT PARAMETERS

<code>\topmargin</code>	: Extra space added to top of page.
<code>@twoside</code>	: boolean. T if two-sided printing
<code>\oddsidemargin</code>	: IF @twoside = T THEN extra space added to left of odd-numbered pages. ELSE extra space added to left of all pages.
<code>\evensidemargin</code>	: IF @twoside = T THEN extra space added to left of even-numbered pages.
<code>\headheight</code>	: height of head
<code>\headsep</code>	: separation between head and text
<code>\footskip</code>	: distance separation between baseline of last line of text and baseline of foot. Note difference between <code>\footSKIP</code> and <code>\headSEP</code> .
<code>\textheight</code>	: height of text on page, excluding head and foot
<code>\textwidth</code>	: width of printing on page
<code>\columnsep</code>	: IF @twocolumn = T THEN width of space between columns
<code>\columnseprule</code>	: IF @twocolumn = T THEN width of rule between columns (0 if none).
<code>\columnwidth</code>	: IF @twocolumn = T THEN $(\text{\textwidth} - \text{\columnsep})/2$ ELSE <code>\textwidth</code> It is set by the <code>\twocolumn</code> and <code>\onecolumn</code> commands.

`\@textbottom` : Command executed at bottom of vbox holding text of page (including figures). The `\raggedbottom` command almost `\let's` this to `\vfil` (actually sets it to `\vskip \z@ plus.0001fil`). Should have depth 0pt.

`\@texttop` : Command executed at top of vbox holding text of page (including figures). Used by letter style; can also be used to produce centered pages. Let to `\relax` by `\raggedbottom` and `\flushbottom`.

Page layout must initialize `\@colht` and `\@colroom` to `\textheight`.

#### PAGE STYLE PARAMETERS:

`\floatsep` : Space left between floats.

`\textfloatsep` : Space between last top float or first bottom float and the text.

`\topfigrule` : Command to place rule (or whatever) between floats at top of page and text. Executed in inner vertical mode right before the `\textfloatsep` skip separating the floats from the text. Must occupy zero vertical space. (See `\footnoterule`.)

`\botfigrule` : Same as `\topfigrule`, but put after the `\textfloatsep` skip separating text from the floats at bottom of page.

`\intextsep` : Space left on top and bottom of an in-text float.

`\dblfloatsep` : Space between double-column floats.

`\dbltextfloatsep` : Space between top double-column floats and text.

`\dblfigrule` : Similar to `\topfigrule`, but for double-column floats.

`\@fptop` : Glue to go at top of float column – must be 0pt + stretch

`\@fpsep` : Glue to go between floats in a float column.

`\@fpbot` : Glue to go at bottom of float column  
– must be 0pt + stretch

`\@dblfpsep`, `\@dblfpbot` : Analogous for double-column float page in two-column format.

FOOTNOTES: As in PLAIN, footnotes use `\insert\footins`.

#### PAGE LAYOUT SWITCHES AND MACROS

`@twocolumn` : Boolean. T if two columns per page globally.

#### PAGE STYLE MACROS AND SWITCHES

```

\@oddhead      : IF @twoside = T
                  THEN macro to generate head of odd-numbered
                  pages.
                  ELSE macro to generate head of all pages.
\@evenhead     : IF @twoside = T
                  THEN macro to generate head of even-numbered
                  pages.
\@oddfoot      : IF @twoside = T
                  THEN macro to generate foot of odd-numbered
                  pages.
                  ELSE macro to generate foot of all pages.
\@evenfoot     : IF @twoside = T
                  THEN macro to generate foot of even-numbered
                  pages.
@specialpage   : boolean. T if current page is to have a special
                  format.
\@specialstyle : If its value is foo then
                  IF @specialpage = T
                  THEN the command \ps@foo is executed to
                  temporarily reset the page style parameters
                  before composing the current page.
                  This command should execute only \def's and
                  \edef's, making only local definitions.

```

## FLOAT PLACEMENT PARAMETERS

The following parameters are set by the macro `\@floatplacement`.  
When `\@floatplacement` is called,

`\@colht` is the height of the page or column being built. I.e.:

- \* For single-column page it equals `\textheight`.
- \* For double-column page it equals `\textheight - height`  
of double-column floats on page.

Note that some are set globally and some locally:

```

\@topnum      :=G Maximum number of floats allowed on the top of a
                  column.
\@toproom     :=G Maximum amount of top of column devoted to floats—
                  excluding \textfloatsep separation below the floats
                  and \floatsep separation between them. For
                  two-column output, should be computed as a function
                  of \@colht.
\@botnum, \@botroom
              : Analogous to above.
\@colnum      :=G Maximum number of floats allowed in a column,
                  including in-text floats.
\@textmin     :=L Minimum amount of text (excluding footnotes) that
                  must appear on a text page.
                %% 27 Sep 85 : made local to
                %% \@addtocurcol and \@addtonextcol
                It is now also used locally in processing double
                floats.

```

`\@fpmin` :=L Minimum height of floats in a float column.

The macro `\@dblfloatplacement` sets the following parameters.

`\@dbltopnum` :=G Maximum number of double-column floats allowed at the top of a two-column page.

`\@dbltoproom` :=G Maximum height of double-column floats allowed at top of two-column page.

`\@fpmin` :=L Minimum height of floats in a float column.

It should also perform the following local assignments where necessary – i.e., where the new value differs from the old one:

`\@fptop` :=L `\@dblfpptop`

`\@fpsep` :=L `\@dblfpsep`

`\@fpbot` :=L `\@dblfpbot`

## OUTPUT ROUTINE VARIABLES

`\@colht` : The total height of the current column. In single column style, it equals `\textheight`. In two-column style, it is `\textheight` minus the height of the double-column floats on the current page. MUST BE INITIALIZED TO `\textheight`.

`\@colroom` : The height available in the current column for text and footnotes. It equals `\@colht` minus the height of all floats committed to the top and bottom of the current column.

`\@textfloatsheight` : The total height of in-text floats on the current page.

`\footins` : Footnote insertion number.

`\@maxdepth` : Saved value of TeX's `\maxdepth`. Must be set when any routine sets `\maxdepth`.

## CALLING THE OUTPUT ROUTINE

---

The output routine is called either by TeX's normal page-breaking mechanism, or by a macro putting a penalty  $<$  or  $= -10000$  in the output list. In the latter case, the penalty indicates why the output routine was called, using the following code.

penalty	reason
-10000	<code>\pagebreak</code> <code>\newpage</code>
-10001	<code>\clearpage</code> ( <code>\penalty -10000 \vbox{}</code> <code>\penalty -10001</code> )
-10002	float insertion, called from horizontal mode
-10003	float insertion, called from vertical mode.
-10004	float insertion.

Note: A float or marginpar puts the following sequence in the output list:

- (i) a penalty of -10004,
- (ii) a null `\vbox`
- (iii) a penalty of -10002 or -10003.

This solves two special problems:

1. If the float comes right after a `\newpage` or `\clearpage`, then the first penalty is ignored, but the second one invokes the output routine.
2. If there is a split footnote on the page, the second 'page' puts out the rest of the footnote.

## THE OUTPUT ROUTINE

---

### FUNCTIONS USED IN THE OUTPUT ROUTINE:

`\@outputpage` : Produces an output page with the contents of box `\@outputbox` as the text part.

Also sets `\@colht :=G \textheight`.

The page style is determined as follows.

IF `@thispagestyle = true`

THEN use `\thispagestyle` style

ELSE use ordinary page style.

`\@tryfcolumn\FLIST` : Tries to form a float column composed of floats from `\FLIST` (if nonempty) with the following parameters:

`\@colht` : height of box

`\@fpmin` : minimum height of floats in the box

`\@fpsep` : interfloat space

`\@fptop` : glue at top of box

`\@fpbot` : glue at bottom of box.

If it succeeds, then it does the following:

\* `\@outputbox :=L` the composed float box.

\* `@fcolmade :=G true`

\* `\FLIST :=G \FLIST` - floats put in box

\* `\@freelist :=G \@freelist +` floats put in box

If it fails, then:

\* `@fcolmade :=G false`

NOTE: BIT MUST BE A SINGLE TOKEN!

`\@makefcolumn \FLIST` : Same as `\@tryfcolumn` except that it fails to make a float column only if `\FLIST` is empty. Otherwise, it makes a float column containing at least the first box in `\FLIST`, disregarding `\@fpmin`.

`\@startcolumn` :

Calls `\@tryfcolumn\@deferlist`. If `\@tryfcolumn` returns with (globally set) `@fcolmade = false`, then:

\* Globally sets `\@toplist` and `\@botlist` to floats

from `\@deferlist` to go at top and bottom of column, deleting them from `\@deferlist`. It does this using `\@colht` as the total height, the page style parameters `\@floatsep` and `\@textfloatsep`, and the float placement parameters `\@topnum`, `\@toproom`, `\@botnum`, `\@botroom`, `\@colnum` and `\textfraction`.

- \* Globally sets `\@colroom` to `\@colht` minus the height of the added floats.

`\@startdblcolum` :

Calls `\@tryfcolum\@dbldeferlist{8}`. If `\@tryfcolum` returns with (globally set) `@fcolmade = false`, then:

- \* Globally sets `\@dbltoplist` to floats from `\@dbldeferlist` to go at top and bottom of column, deleting them from `\@dbldeferlist`. It does this using `\textheight` as the total height, and the parameters `\@dblfloatsep`, etc.
- \* Globally sets `\@colht` to `\textheight` minus the height of the added floats.

`\@combinefloats` : Combines the text from box

`\@outputbox` with the floats from `\@toplist` and `\@botlist`, putting the new box in `\@outputbox`. It uses `\floatsep` and `\textfloatsep` for the appropriate separations. It puts the elements of `\@TOPLIST` and `\@BOTLIST` onto `\@freelist`, and makes those lists null.

`\@makecol` : Makes the contents of `\box255` plus the accumulated footnotes, plus the floats in `\@toplist` and `\@botlist`, into a single column of height `\@colht` (unless the page height has been locally changed), which it puts into box `\@outputbox`. It puts boxes in `\@midlist` back onto `\@freelist` and restores `\maxdepth`.

`\@opcol` : Outputs a column whose text is in box `\@outputbox`

If `@twocolumn = false`, then it calls `\@outputpage`, sets `\@colht :=G \textheight`, and calls `\@floatplacement`.

If `@twocolumn = true`, then:

If `@firstcolumn = true`, then it puts box `\@outputbox` into `\@leftcolumn` and sets `@firstcolumn :=G false`.

If `@firstcolumn = false`, then it puts out the current two-column page, any possible two-column float pages, and determines `\@dbltoplist` for the next page.

## USER COMMANDS THAT CALL OR AFFECT THE OUTPUT ROUTINE

---

```

\newpage == BEGIN \par\vfil\penalty -10000 END

\clearpage == BEGIN \newpage
                \write -1{}      % Part of hack to make sure no
                \vbox{}          % \write's get lost.
                \penalty -10001
            END

\cleardoublepage == BEGIN \clearpage
                        if @twoside = true and c@page is even
                        then \hbox{} \newpage fi
            END

\twocolumn[BOX] : starts a new page, changing to twocolumn setting
and puts BOX in a parbox of width \textwidth across the top.
Useful for full-width titles for double-column pages.
SURPRISE: The stretch from \@dbltextfloatsep will be inserted
between the BOX and the top of the two columns.

```

## FLOAT-HANDLING MECHANISMS

---

The float environment obtains an insertion number B from the `\@freelist` (see below for a description of list manipulation), puts the float into box B and sets `\count B` to a FLOAT SPECIFIER. For a normal (not double-column) float, it then causes a page break in one of the following two ways:

- In outer hmode: `\vadjust{\penalty -10002}`
- In vmode : `\penalty -10003`.

For a double-column float, it puts B onto the `\@dbldeferlist`. The float specifier has two components:

- \* A PLACEMENT SPECIFICATION, describing where the float may be placed.
- \* A TYPE, which is a power of two—e.g., figures might be type 1 floats, tables type 2 floats, programs type 4 floats, etc.

The float specifier is encoded as follows, where bit 0 is the least significant bit.

Bit	Meaning
0	1 iff the float may go where it appears in the text.
1	1 iff the float may go on the top of a page.
2	1 iff the float may go on the bottom of a page.
3	1 iff the float may go on a float page.
4	1 unless the PLACEMENT includes a !
5	1 iff a type 1 float



6        1 iff a type 2 float  
etc.

A negative float specifier is used to indicate a marginal note.

## MACROS AND DATA STRUCTURES FOR PROCESSING FLOATS

---

A FLOAT LIST consisting of the floats in boxes `\boxa ... \boxN` has the form:

```
\@elt \boxa ... \@elt \boxN
where \boxI is defined by
\newinsert\boxI
```

Normally, `\@elt` is `\let` to `\relax`. A test can be performed on the entire float list by locally `\def`'ing `\@elt` appropriately and executing the list.

This is a lot more efficient than looping through the list.

The following macros are used for manipulating float lists.

```
\@next \CS \LIST {NONEMPTY}{EMPTY} == %% NOTE: ASSUME \@elt
= \relax
  BEGIN  assume that \LIST == \@elt \B1 ... \@elt \Bn
        if n = 0
        then  EMPTY
        else  \CS      :=L \B1
              \LIST :=G \@elt \B2 ... \@elt \Bn
              NONEMPTY
        fi
  END
```

`\@bitor\NUM\LIST` : Globally sets switch `@test` to the disjunction for all `I` of bit `log2 \NUM` of the float specifiers of all the floats in `\LIST`.  
I.e., `@test` is set to true iff there is at least one float in `\LIST` having bit `log2 \NUM` of its float specifier equal to 1.

Note: `log2 [(\count I)/32]` is the bit number corresponding to the type of float `I`. To see if there is any float in `\LIST` having the same type as float `I`, you run `\@bitor` with  
`\NUM = [(\count I)/32] * 32`.

```
\@bitor\NUM\LIST ==
BEGIN
  @test :=G false
  { \@elt \CTR == if \NUM <> 0 then
                    if \count\CTR / \NUM is odd
                    then  @test := true          fi fi
```

```

\LIST
}
END

```

`\@cons\LIST\NUM` : Globally sets `\LIST := \LIST * \@elt \NUM`

```

\@cons\LIST\NUM ==
  BEGIN { \@elt == \relax
    \LIST :=G \LIST \@elt \NUM
  }

```

#### BOX LISTS FOR FLOAT-PLACEMENT ALGORITHMS

```

\@freelist      : List of empty boxes for placing new floats.
\@toplist       : List of floats to go at top of current column.
\@midlist       : List of floats in middle of current column.
\@botlist       : List of floats to go at bottom of current column.
\@deferlist     : List of floats to go after current column.
\@dbltoplist    : List of double-col. floats to go at top of current
                  page.
\@dbldeferlist  : List of double-column floats to go on subsequent
                  pages.

```

#### FLOAT-PLACEMENT ALGORITHMS

`\@addtobot` : Tries to put insert `\@currbox` on `\@botlist`.

Called only when:

- \* `\ht BOX < \@colroom`
- \* type of `\@currbox` not on `\@deferlist`
- \* `\@colnum > 0`
- \* `@insert = false`

If it succeeds, then:

- \* sets `@insert true`
- \* decrements `\@botroom` by `\ht BOX`
- \* decrements `\@botnum` and `\@colnum` by 1
- \* decrements `\@colroom` by `\ht BOX + either \floatsep`  
or `\textfloatsep`, as appropriate.
- \* sets `\maxdepth` to 0pt

`\@addtotoporbot` : Tries to put insert `\@currbox` on `\@toplist` or  
`\@botlist`.

Called only under same conditions as `\@addtobot`.

If it succeeds, then:

- \* sets `@insert true`
- \* decrements `\@toproom` or `\@botroom` by `\ht BOX`
- \* decrements `\@colnum` and either `\@topnum` or  
`\@botnum` by 1
- \* decrements `\@colroom` by `\ht BOX + \floatsep`

or `\textfloatsep`, as appropriate.

`\@addtocurcol` : Tries to add `\@currbox` to current column, setting  
    `@insert` true if it succeeds, false otherwise.  
    It will add `\@currbox` to top only if bit 0 of  
    `\count \@currbox` is 0, and to the bottom only if  
    bit 0 = 0 or an earlier float of the same type is  
    put on the bottom.  
    If the float is put in the text, then  
    `\penalty\interlinepenalty` is put  
    right after the float, before the following `\vskip`,  
    and `\outputpenalty :=L 0`.

`\@addtonextcol` : Tries to add `\@currbox` to the next column, setting  
    `@insert` true if it succeeds, false otherwise.

`\@addtodblcol` : Tries to add `\@currbox` to the next double-column page,  
    adding it to `\@dbltoplist` if it succeeds and  
    `\@dbldeferlist` if it fails.

```
\@addmarginpar ==
BEGIN
  if \@currlist nonempty
    then remove \@marbox from \@currlist
      add \@marbox and \@currbox to \@freelist
      %% NOTE: \@currbox = left box
    else LaTeX error: ? %% shouldn't happen
  fi
  \@tempcnta := 1      %% 1 = right, -1 = left
  if @twocolumn = true
    then if @firstcolumn = true
      then \@tempcnta := -1
    fi
    else if @mparswitch = true
      then if count0 odd
        else \@tempcnta := -1
      fi
    fi
    if @reversemargin = true
      then \@tempcnta := -\@tempcnta
    fi
  fi
  if \@tempcnta < 0 then \box\@marbox :=G \box\@currbox
  fi
  \@tempdima :=L maximum(\@mparbottom - \@pageht
                        + ht of \@marbox, 0)
  if \@tempdima > 0 then LaTeX warning: 'marginpar moved' fi
  \@mparbottom :=G \@pageht + \@tempdima + depth of \@marbox
                + \marginparpush
```

```

\@tempdima :=L \@tempdima - ht of \@marbox
\box\@marbox :=G \box\@currbox
\hbox{ \vbox { \vskip \@tempdima
\box\@marbox
}
height of \@marbox :=G depth of \@marbox :=G 0
\kern -\@pagedp
\nointerlineskip
\hbox{ if @tempcnta > 0 then \hskip \columnwidth
\hskip \marginparsep
else \hskip -\marginparsep
\hskip -\marginparwidth
fi
\box\@marbox \hss
}
\nobreak
\nointerlineskip
\hbox{\vrule height 0 width 0 depth \@pagedp}
END

```

Floats and marginpars add a lot of dead cycles.  
*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

```

7 \maxdeadcycles = 100
8 \let\@elt\relax
9 \def\@next#1#2#3#4{\ifx#2\@empty #4\else
10 \expandafter\@xnext #2\@#1#2#3\fi}
11 \def\@xnext \@elt #1#2\@#3#4{\def#3{#1}\gdef#4{#2}}
12 \def\@testfalse{\global\let@if@test\iffalse}
13 \def\@testtrue {\global\let@if@test\iftrue}
14 \@testfalse
15 \def\@bitor#1#2{\@testfalse {\let\@elt\@xbitor
16 \@tempcnta #1\relax #2}}

```

RmS 91/11/22: Added test for \count#1 = 0. Suggested by Chris Rowley.

```

17 \def\@xbitor #1{\@tempcntb \count#1
18 \ifnum \@tempcnta =\z@
19 \else
20 \divide\@tempcntb\@tempcnta
21 \ifodd\@tempcntb \@testtrue\fi
22 \fi}

```

#### DEFINITION OF FLOAT BOXES:

```

23 </2ekernel>
24 <latexrelease>\IncludeInRelease{2015/10/01}%
25 <latexrelease> \bx@ZZ{Extended float list}%
26 <*2ekernel|latexrelease>
27 \let\@elt\newinsert
28 <*2ekernel>
29 \def\@freelist{%

```

```

30 \@elt\bx@A\@elt\bx@B\@elt\bx@C\@elt\bx@D\@elt\bx@E
31 \@elt\bx@F\@elt\bx@G\@elt\bx@H\@elt\bx@I\@elt\bx@J
32 \@elt\bx@K\@elt\bx@L\@elt\bx@M\@elt\bx@N
33 \@elt\bx@O\@elt\bx@P\@elt\bx@Q\@elt\bx@R}
34 \@freelist
35 </2ekernel>
36 \ifx\numexpr\@undefined\else
37 \def\reserved@a{%
38 \@elt\bx@S\@elt\bx@T\@elt\bx@U\@elt\bx@V
39 \@elt\bx@W\@elt\bx@X\@elt\bx@Y\@elt\bx@Z
40 \@elt\bx@AA\@elt\bx@BB\@elt\bx@CC\@elt\bx@DD\@elt\bx@EE
41 \@elt\bx@FF\@elt\bx@GG\@elt\bx@HH\@elt\bx@II\@elt\bx@JJ
42 \@elt\bx@KK\@elt\bx@LL\@elt\bx@MM\@elt\bx@NN
43 \@elt\bx@OO\@elt\bx@PP\@elt\bx@QQ\@elt\bx@RR
44 \@elt\bx@SS\@elt\bx@TT\@elt\bx@UU\@elt\bx@VV
45 \@elt\bx@WW\@elt\bx@XX\@elt\bx@YY\@elt\bx@ZZ}
46 \reserved@a
47 \def\@elt{\noexpand\@elt\noexpand}
48 \edef\@freelist{\@freelist\reserved@a}
49 \fi
50 \let\reserved@a\relax
51 \let\@elt\relax
52 </2ekernel | latexrelease>
53 <latexrelease>\EndIncludeInRelease
54 <latexrelease>\IncludeInRelease{0000/00/00}%
55 <latexrelease> \@elt\bx@ZZ{Extended float list}%
56 <latexrelease>\def\@freelist{%
57 <latexrelease> \@elt\bx@A\@elt\bx@B\@elt\bx@C\@elt\bx@D\@elt\bx@E
58 <latexrelease> \@elt\bx@F\@elt\bx@G\@elt\bx@H\@elt\bx@I\@elt\bx@J
59 <latexrelease> \@elt\bx@K\@elt\bx@L\@elt\bx@M\@elt\bx@N
60 <latexrelease> \@elt\bx@O\@elt\bx@P\@elt\bx@Q\@elt\bx@R}
61 <latexrelease> \insscount=234
62 <latexrelease>\EndIncludeInRelease
63 <*2ekernel>

64 \gdef\@toplist{}
65 \gdef\@botlist{}
66 \gdef\@midlist{}
67 \gdef\@currlist{}
68 \gdef\@deferlist{}
69 \gdef\@dbltoplist{}

```

The new algorithm stores page wide floats together with column floats in a single \@deferlist list. We keep \@dbldeferlist initialised as empty so that packages that are testing for deferred floats can use the same code for old or new float handling.

```

70 \gdef\@dbldeferlist{}
71 PAGE LAYOUT PARAMETERS
72 \newdimen\topmargin
73 \newdimen\oddsidemargin
74 \newdimen\evensidemargin
75 \let\@themargin=\oddsidemargin
76 \newdimen\headheight
77 \newdimen\headsep
78 \newdimen\footskip

```

```

78 \newdimen\textheight
79 \newdimen\textwidth
80 \newdimen\columnwidth
81 \newdimen\columnsep
82 \newdimen\columnseprule
83 \newdimen\marginparwidth
84 \newdimen\marginparsep
85 \newdimen\marginparpush

```

**\AtBeginDvi** We use a box register in which to put stuff that must appear before anything else in the .dvi file.

The stuff in the box should not add any typeset material to the page when it is unboxed.

This interface is no longer used. Instead a new one is inside `ltshipout.dtx`. We only keep the box in case some old code refers to it directly (or we do some rollback).

```

86 \newbox\@begindvibox
87 %\DeclareRobustCommand \AtBeginDvi [1]{%
88 %   \global \setbox \@begindvibox
89 %     \vbox{\unvbox \@begindvibox #1}%
90 %}

```

*(End definition for \AtBeginDvi and \@begindvibox. These functions are documented on page 697.)*

**\@maxdepth** This is not the right place to set this; it needs to be set in a class/style file when `\maxdepth` is set.

Also, many settings to `\maxdepth` should be to `\@maxdepth`, probably?

```

91 \newdimen\@maxdepth
92 \@maxdepth = \maxdepth

```

*(End definition for \@maxdepth. This function is documented on page ??.)*

**\paperheight** New `\paper...` registers.  
**\paperwidth**

```

93 \newdimen\paperheight
94 \newdimen\paperwidth

```

*(End definition for \paperheight and \paperwidth. These functions are documented on page ??.)*

**\if@insert** Local switches first:

**\if@fcolmade** `\newif \if@insert`

**\if@specialpage** These should definitely be global:

```

96 \newif \if@fcolmade
97 \newif \if@specialpage \@specialpagefalse

```

**\if@twocolumn**

**\if@twoside**

**\if@reversemarginpar** These should be global but are not always set globally in other files.

**\if@mparswitch** `\newif \if@firstcolumn \@firstcolumntrue`

**\col@number** `\newif \if@twocolumn \@twocolumnfalse`

Not sure about these: two questions. Should things which must apply to a whole document be local or global (they probably should be ‘preamble only’ commands)? Are these three such things?

```

100 \newif \if@twoside \@twosidefalse
101 \newif \if@reversemargin \@reversemarginfalse
102 \newif \if@mparswitch \@mparswitchfalse

```

This counter has been imported from ‘multicol’.

```
103 \newcount \col@number
104 \col@number \@ne
```

*(End definition for \if@insert and others. These functions are documented on page ??.)*

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

INTERNAL REGISTERS

```
105 \newcount\@topnum
106 \newdimen\@toproom
107 \newcount\@dbltopnum
108 \newdimen\@dbltoproom
109 \newcount\@botnum
110 \newdimen\@botroom
111 \newcount\@colnum
112 \newdimen\@textmin
113 \newdimen\@fpmin
114 \newdimen\@colht
115 \newdimen\@colroom
116 \newdimen\@pageht
117 \newdimen\@pagedp
118 \newdimen\@mparbottom \@mparbottom\z@
119 \newcount\@currtype
120 \newbox\@outputbox
121 \newbox\@leftcolumn
122 \newbox\@holdpg

123 \def\@thehead{\@oddhead} % initialization
124 \def\@thefoot{\@oddfoot}
```

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

**\clearpage** The tests at the beginning are an experimental attempt to avoid a completely empty page after a \twocolumn[...]. This prevents the text from the argument vanishing into a float box, never to be seen again. We hope that it does not produce wrong formatting in other cases.

```
125 \def\clearpage{%
126   \ifvmode
127     \ifnum \@dbltopnum =\m@ne
128       \ifdim \pagetotal <\topskip
129         \hbox{}%
130       \fi
131     \fi
132   \fi
133   \newpage
134   \write\m@ne{}%
135   \vbox{}%
136   \penalty -\@Mi
137 }
```

*(End definition for \clearpage. This function is documented on page ??.)*

`\cleardoublepage`

```

138 \def\cleardoublepage{\clearpage\if@twoside \ifodd\c@page\else
139   \hbox{}\newpage\if@twocolumn\hbox{}\newpage\fi\fi\fi}
140 \endkernel

```

*(End definition for \cleardoublepage. This function is documented on page ??.)*

`\onecolumn`

```

141 \*2ekernel | fltrace)
142 \def\onecolumn{%
143   \clearpage
144   \global\columnwidth\textwidth
145   \global\hsize\columnwidth
146   \global\linewidth\columnwidth
147   \global\@twocolumnfalse
148   \col@number \@one
149   \@floatplacement}

```

*(End definition for \onecolumn. This function is documented on page ??.)*

`\newpage` The two checks at the beginning ensure that an item label or run-in section title immediately before a `\newpage` get printed on the correct page, the one before the page break.

All three tests are largely to make error processing more robust; that is why they all reset the flags explicitly, even when it would appear that this would be done by a `\leavevmode`.

```

150 \endkernel | fltrace)
151 \latexrelease\IncludeInRelease{2017/04/15}%
152 \latexrelease\newpage{Check depth of page}%
153 \*2ekernel | latexrelease | fltrace)
154 \def \newpage {%
155   \if@noskipsec
156     \ifx \@nodocument\relax
157       \leavevmode
158       \global \@noskipsecfalse
159     \fi
160   \fi
161   \if@inlabel
162     \leavevmode
163     \global \@inlabelfalse
164   \fi
165   \if@nobreak \@nobreakfalse \everypar{}\fi
166   \par

```

The `\vfil` at the end of the macro before the break penalty will normally result in the page being run short, even with `\flushbottom` in effect (in contrast to the behavior of `\pagebreak`). However, if there is some explicit stretch on the page, say, a `\vfill`, it has the undesired side-effect, that the last line will not align at its baseline if it contains characters going below the baseline, as the value of `\prevdepth` is no longer taken into account by  $\TeX$ . So we back up by that amount (or by `\maxdepth` if it is really huge), to mimic the normal behavior without the `\newpage`.

```

167   \ifdim\prevdepth>\z@
168     \vskip -%
169     \ifdim\prevdepth>\maxdepth

```



```

170         \maxdepth
171     \else
172         \prevdepth
173     \fi
174 \fi
175 \vfil
176 \penalty -\@M}
177 </2ekernel | latexrelease | fltrace>
178 <latexrelease>\EndIncludeInRelease
179 <latexrelease>\IncludeInRelease{0000/00/00}%
180 <latexrelease>        {\newpage}{Check depth of page}%
181 <latexrelease>\def \newpage {%
182 <latexrelease>  \if@noskipsec
183 <latexrelease>    \ifx \@nodocument\relax
184 <latexrelease>      \leavevmode
185 <latexrelease>      \global \@noskipsecfalse
186 <latexrelease>    \fi
187 <latexrelease>  \fi
188 <latexrelease>  \if@inlabel
189 <latexrelease>    \leavevmode
190 <latexrelease>    \global \@inlabelfalse
191 <latexrelease>  \fi
192 <latexrelease>  \if@nobreak \@nobreakfalse \everypar{}\fi
193 <latexrelease>  \par
194 <latexrelease>  \vfil
195 <latexrelease>  \penalty -\@M}
196 <latexrelease>\EndIncludeInRelease
197 <*2ekernel | fltrace>

```

(End definition for \newpage. This function is documented on page ??.)

\@emptycol It may be better to use an invisible rule rather than an empty box here.

```

198 \def \@emptycol {\vbox{}\penalty -\@M}

```

(End definition for \@emptycol. This function is documented on page ??.)

\twocolumn There are several bug fixes to the two-column stuff here.  
\@topnewpage

```

199 \def \twocolumn {%
200   \clearpage
201   \global\columnwidth\textwidth
202   \global\advance\columnwidth-\columnsep
203   \global\divide\columnwidth\tw@
204   \global\hsize\columnwidth
205   \global\linewidth\columnwidth
206   \global\@twocolumntrue
207   \global\@firstcolumntrue
208   \col@number \tw@

```

There is no reason to put a \@dblfloatplacement here since \@topnewpage ignores these settings. The \@floatplacement is needed in case this comes after some changes.

```

209   \ifnextchar [\@topnewpage\@floatplacement
210 }

```

Note that here, getting a box from the freelist can assume success since this comes just after a `\clearpage`.

```

211 \long\def \@topnewpage [#1]{%
212   \nodocument
213   \@next\@currbox\@freelist{}{}%
214   \global \setbox\@currbox
215     \color@vbox
216     \normalcolor
217     \vbox {%
218       \hsize\textwidth
219       \@parboxrestore
220       \col@number \@ne
221       #1%
222       \vskip -\dbltextfloatsep
223     }%
224   \color@endbox

```

Added size test and warning message; perhaps we should use an error message.

```

225   \ifdim \ht\@currbox>\textheight
226     \ht\@currbox \textheight
227   \fi

```

This next line is not essential but it is more robust to make this value non-zero, in case of weird errors.

This next bit is what is needed from `\@addtodblcol`, plus some extra checks for error trapping.

```

228   \global \count\@currbox \tw@
229   \@tempdima -\ht\@currbox
230   \advance \@tempdima -\dbltextfloatsep
231   \global \advance \@colht \@tempdima
232   \ifx \@dbltoplist \@empty
233   \else
234     \@latexerr{Float(s) lost}\@ehb
235     \let \@dbltoplist \@empty
236   \fi
237   \@cons \@dbltoplist \@currbox

```

This setting of `\@dbltopnum` is used only to change the typesetting in `\@combinedblfloats`.

```

238   \global \@dbltopnum \m@ne
239   \if@trace
240     \fl@trace{dbltopnum set to -1 (= \the \@dbltopnum) (topnewpage)}%
241   \fi

```

At points such as this we need to check that there is still a minimal amount of room left on the page; this uses an arbitrary small value at present; but note that this value is larger than that used when checking that page is too full of normal floats.

If there is little room left we just force a page-break, OK? This involves producing two empty columns. The second empty column may be produced by `\output`, in which case an extra, misleading, warning will be generated, OK? (This happens only when there is too little room left on the page for any float.) Otherwise (i.e. if the size is such that it is allowed as a normal float) the extra `\@emptycol` will be invoked in the second column by the conditional code guarded by the `\if@firstcolumn` test.

I now think that the cut-off point here should be `3\baselineskip`, but we make it a bit less so that 3 lines of text will be allowed, OK?

Since this happens only when there is nothing on the page but the ‘top-box’, the empty box should not cause any problem other than some overfull box messages, which is not entirely misleading.

Here we need two page-ends since both columns need to be empty.

```

242 \ifdim \@colht<2.5\baselineskip
243   \@latex@warning@no@line {Optional argument of \noexpand\twocolumn
244     too tall on page \thepage}%
245   \@emptycol
246   \if@firstcolumn
247   \else
248     \@emptycol
249   \fi
250 \else
251   \global \vsize \@colht
252   \global \@colroom \@colht
253   \@floatplacement
254 \fi
255 }
```

*(End definition for \twocolumn and \@topnewpage. These functions are documented on page ??.)*

`\output` This needs some small adjustments. We cannot guarantee that the float mechanism will  
`\@specialoutput` interact correctly with this stuff, but that mechanism does not always work properly with footnotes already.

RmS 91/09/29:

added reset of `\par` to the output routine. This avoids problems when the output routine is called within a list where `\par` may be a no-op.

```

256 \output {%
257   \let \par \@@par
258   \ifnum \outputpenalty<-\@M
259     \@specialoutput
260   \else
261     \@makecol
262     \@opcol
```

Moved to `\@opcol: \@floatplacement`.

```

263   \@startcolumn
```

This loop could be replaced by an `\expandafter` tail recursion in `\@startcolumn`.

```

264   \@whilesw \if@fcolmade \fi
265   {%
266   < *trace>
267     \fl@trace{PAGE: float \if@twocolumn column \else page \fi
268       completed}%
269   < /trace>
270     \@opcol\@startcolumn}%
271   \fi
272   \ifnum \outputpenalty>-\@Miv
```

At points such as this we need to check that there is still a minimal amount of room left on the page; this uses an arbitrary small value at present. If there is little room left we just force a page-break, OK?

This bit is essential only if a float has just been processed so maybe it should be moved; but this is the natural place at which to set the vsize and a test would need to be done anyway. A check has been added to ensure that there really has been a change in the value of `\@colroom`.

Since this happens only when there is nothing on the page but floats, the empty box should not cause any problem other than some overfull box messages, which is not entirely misleading.

The twocolumn case does not need any extra code here since this is the `\output` itself; in the second column there will still not be enough room left so `\@emptycol` will be executed again when the OR is called by the page builder when it gets to the penalty inserted by the first execution. (The page-builder is never invoked whilst the OR is being executed since it builds a inner vlist; thus any conditional code for the two-column case within `\output` may not get executed with the correct value of `\if@firstcolumn`.

```

273   \ifdim \@colroom<1.5\baselineskip
274     \ifdim \@colroom<\textheight
275       \@latex@warning@no@line {Text page \thepage\space
276                               contains only floats}%
277       \@emptycol
278   %       \if@twocolumn
279   %       \if@firstcolumn
280   %       \else
281   %       \@emptycol
282   %       \fi
283   %       \fi
284   \else
285     \global \vsize \@colroom
286   \fi
287   \else
288     \global \vsize \@colroom
289   \fi
290   \else
291     \global \vsize \maxdimen
292   \fi
293 }

```

*Historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments (not necessarily accurate any more):*

CHANGES TO `\@specialoutput`:

\* `\penalty\z@` changed to `\penalty\interlinepenalty` so `\samepage` works properly with figure and table environments.

(Changed 23 Oct 86)

\* Definition of `\@specialoutput` changed 26 Feb 88 so `\@pageht` and `\@pagedp` aren't changed for a marginal note.

(Change suggested by Chris Rowley.)

*End of historical L<sup>A</sup>T<sub>E</sub>X 2.09 comments.*

```

294 \gdef\@specialoutput{%
295   \ifnum \outputpenalty>-\@Mii
296     \@doclearpage

```

```

297 \else
298 \ifnum \outputpenalty<-\@Miii
299 \ifnum \outputpenalty<-\@MM \deadcycles \z@ \fi
300 \global \setbox\@holdpg \vbox {\unvbox\@cclv}%
301 \else

```

Note that `\boxmaxdepth` should not be set here since we wish to record the natural depth of the holdpg box.

This is changed so as to not lose anything, such as writes and marks, which may get into box 255 and should be returned to the list. This should only happen when the first penalty in the mechanism is discarded and therefore `\@holdpg` should always be void in this case. This can happen because a penalty is discarded whenever there is no box on the list.

It was just: `\setbox\@tempboxa \box \@cclv`.

The last box which is removed is the box put there by the double-penalty mechanism. The `\unskip` then removes the `\topskip` which is put there since the box is the first on the page.

```

302 \global \setbox\@holdpg \vbox{%
303 \unvbox\@holdpg
304 \unvbox\@cclv

```

We must now remove the box added by the float mechanism and the `\topskip` glue therefore added above it by T<sub>E</sub>X.

```

305 \setbox\@tempboxa \lastbox
306 \unskip
307 }%

```

These two are needed as separate dimensions only by `\@addmarginpar`; for other purposes we put the whole size into `\@pageht` (see below).

```

308 \@pagedp \dp\@holdpg
309 \@pageht \ht\@holdpg
310 \unvbox \@holdpg
311 \@next\@currbox\@currlist{%
312 \ifnum \count\@currbox>\z@

```

Putting the whole size into `\@pageht` (see above).

```

313 \advance \@pageht \@pagedp
314 \ifvoid\footins \else
315 \advance \@pageht \ht\footins
316 \advance \@pageht \skip\footins
317 \advance \@pageht \dp\footins
318 \fi
319 \ifvbox \@kludgeins

```

We want to make the adjustment due to this insert only if the non-star form is used. The \*-form will probably not work with floats, but maybe it still could make some adjustment here even so?

```

320 \ifdim \wd\@kludgeins=\z@
321 \advance \@pageht \ht\@kludgeins
322 (*trace)
323 \fl@trace {Extra size added: \the \ht\@kludgeins}%
324 (/trace)
325 \fi
326 \fi

```

This version puts the inserts back just before the additional material; it could be moved earlier, before unboxing the page-so-far. Neither is guaranteed not to put things on the wrong page. This version is similar to the original version.

```

327         \@reinserts
328         \@addtocurcol
329     \else
330         \@reinserts
331         \@addmarginpar
332     \fi
333 } \@latexbug

```

A 2e change: use `\addpenalty` instead of `\penalty` here. Some penalty is needed to create a potential break-point immediately after the reinserts (or the marginal). Otherwise there can be no possibility to break here and this can cause the reinserts or the marginal to appear on the next page (which is often incorrect). However, if the nobreak flag is true, a `\nobreak` must be correct.

```

334     \ifnum \outputpenalty<\z@
335     \if@nobreak
336         \nobreak
337     \else
338         \addpenalty \interlinepenalty
339     \fi
340 \fi
341 \fi
342 \fi
343 }
344 </2ekernel | fltrace>

```

*(End definition for \output and \@specialoutput. These functions are documented on page ??.)*

`\@testwrongwidth` Test if the float box has the wrong width when trying to place it into some area. (Actually the test is for a conventional depth setting rather than for the width of the float. For that reason the box depth was explicitly tailored when the float was created).

`\f@depth`

```

345 <[latexrelease]\IncludeInRelease{2015/01/01}%
346 <[latexrelease]          {\@testwrongwidth}{float order in 2-column}%
347 <*2ekernel | latexrelease | fltrace>

348 \def\@testwrongwidth #1{%
349     \ifdim\dp#1=\f@depth
350     <*trace>
351         \fl@trace{\string#1
352             \ifdim\f@depth=\z@ single \else double \fi
353             column float -- ok}%
354 </trace>
355     \else
356         \global\@testtrue
357     <*trace>
358         \fl@trace{\string#1
359             \ifdim\f@depth=\z@ double \else single \fi
360             column float -- wrong}%
361 </trace>
362     \fi}%

```

Normally looking for single column floats, which have zero depth.

```

363 \let\f@depth\z@

```

```

364 </2ekernel | latexrelease | fltrace>
365 <latexrelease>\EndIncludeInRelease
366 <latexrelease>\IncludeInRelease{0000/00/00}%
367 <latexrelease>{\@testwrongwidth}{float order in 2-column}%
368 <latexrelease>\let\@testwrongwidth\@undefined
369 <latexrelease>\let\f@depth\@undefined
370 <latexrelease>\EndIncludeInRelease

```

(End definition for \@testwrongwidth and \f@depth. These functions are documented on page ??.)

\@docclearpage This is a very much an emergency action, just dumping everything: footnotes first then floats. A more sophisticated version is needed; but even more urgent is a bug-free version (see, for example, pr/3528).

Also, it puts any left-over non-boxes (writes, specials, etc.) back after any float pages created: this is a very bad bug since, for example, a kludge insert will be in quite the wrong place and, worse, be irremovable and uncancellable.

All the remaining changes are replacing the double column defer list or inserting the extra test \@testwrongwidth{<box>} at suitable places. That is at places where a box is taken off the deferlist.

```

371 <latexrelease>\IncludeInRelease{2015/01/01}{\@docclearpage}%
372 <latexrelease>{\float order in 2-column}%
373 <*2ekernel | latexrelease>
374 \def \@docclearpage {%
375     \ifvoid\footins
376         \ifvbox\@kludgeins
377             {\setbox \@tempboxa \box \@kludgeins}%
378 <*trace>
379             \fl@trace {kludgeins box made void}%
380 </trace>
381         \fi
382         \setbox\@tempboxa\vsplit\@cclv to\z@ \unvbox\@tempboxa
383         \setbox\@tempboxa\box\@cclv
384         \xdef\@deferlist{\@toplist\@botlist\@deferlist}%
385         \global \let \@toplist \@empty
386         \global \let \@botlist \@empty
387         \global \@colroom \@colht
388         \ifx \@currlist\@empty
389             \else
390                 \@latexerr{Float(s) lost}\@ehb
391                 \global \let \@currlist \@empty
392             \fi
393         \@makefcolumn\@deferlist
394         \@whilesw\if@fcolmade \fi{\@opcol\@makefcolumn\@deferlist}%
395         \if@twocolumn
396             \if@firstcolumn
397                 \xdef\@deferlist{\@dbltoplist\@deferlist}%
398                 \global \let \@dbltoplist \@empty
399                 \global \@colht \textheight
400                 \begingroup
401                 \@dblfloatplacement

```

```

402             \@makefcolumn\@deferlist
403             \@whilesw\if@fcolmade \fi{\@outputpage
404                                     \@makefcolumn\@deferlist}%
405         \endgroup
406     \else
407         \vbox{}\clearpage
408     \fi
409 \fi

```

the next line is needed to avoid losing floats in certain circumstances a single call to the original `\docclearpage` will now no longer output all floats.

```

410     \ifx\@deferlist\@empty \else\clearpage \fi
411 \else
412     \setbox\@cclv\vbox{\box\@cclv\vfil}%
413     \@makecol\@opcol
414     \clearpage
415 \fi
416 }%
417 </2kernel | latexrelease>
418 <latexrelease>\EndIncludeInRelease
419 <latexrelease>\IncludeInRelease{0000/00/00}{\@docclearpage}%
420 <latexrelease>                                     {float order in 2-column}%
421 <latexrelease>\def \@docclearpage {%
422 <latexrelease>     \ifvoid\footins

```

We empty any left over kludge insert box here; this is a temporary fix. It should perhaps be applied to one page of cleared floats, but who cares? The whole of this stuff needs completely redoing for many such reasons.

```

423 <latexrelease>     \ifvbox\@kludgeins
424 <latexrelease>     {\setbox \@tempboxa \box \@kludgeins}%
425 <*trace>
426 <latexrelease>     \fl@trace {kludgeins box made void}%
427 </trace>
428 <latexrelease>     \fi
429 <latexrelease>     \setbox\@tempboxa\vsplit\@cclv to\z@ \unvbox\@tempboxa
430 <latexrelease>     \setbox\@tempboxa\box\@cclv
431 <latexrelease>     \xdef\@deferlist{\@toplist\@botlist\@deferlist}%
432 <latexrelease>     \global \let \@toplist \@empty
433 <latexrelease>     \global \let \@botlist \@empty
434 <latexrelease>     \global \@colroom \@colht
435 <latexrelease>     \ifx \@currlist\@empty
436 <latexrelease>     \else
437 <latexrelease>         \@latexerr{Float(s) lost}\@ehb
438 <latexrelease>     \global \let \@currlist \@empty
439 <latexrelease>     \fi
440 <latexrelease>     \@makefcolumn\@deferlist
441 <latexrelease>     \@whilesw\if@fcolmade \fi
442 <latexrelease>         {\@opcol\@makefcolumn\@deferlist}%
443 <latexrelease>     \if@twocolumn
444 <latexrelease>         \if@firstcolumn
445 <latexrelease>             \xdef\@dbldeferlist{\@dbltoplist\@dbldeferlist}%

```



```

446 <latexrelease>          \global \let \@dbltoplist \@empty
447 <latexrelease>          \global \@colht \textheight
448 <latexrelease>          \begingroup
449 <latexrelease>          \dblfloatplacement
450 <latexrelease>          \@makefcolumn\@dbldeferlist
451 <latexrelease>          \@whiles\if@fcolmade \fi
452 <latexrelease>          {\@outputpage\@makefcolumn\@dbldeferlist}%
453 <latexrelease>          \endgroup
454 <latexrelease>          \else
455 <latexrelease>          \vbox{}\clearpage
456 <latexrelease>          \fi
457 <latexrelease>          \fi
458 <latexrelease>          \else
459 <latexrelease>          \setbox\@cclv\vbox{\box\@cclv\vfil}%
460 <latexrelease>          \@makecol\@opcol
461 <latexrelease>          \clearpage
462 <latexrelease>          \fi
463 <latexrelease>    }%
464 <latexrelease>\EndIncludeInRelease

```

(End definition for \@doclearpage. This function is documented on page ??.)

**\@opcol** Several changes in detail here.

```

465 <*2ekernel | fltrace>
466 \def \@opcol {%
467   \if@twocolumn
468     \outputdblcol
469   \else
470     \outputpage
471 <*trace>
472   \fl@trace{PAGE: one column (float? see above) page completed}%
473 </trace>

```

Not needed since it comes after \@outputpage:

```

474 %   \global\@colht\textheight
475   \fi

```

These do not need to be done every time \@opcol is used: they should be grouped together since they all need to be done at the end of the non-special output routine, or at the end of a clearpage one.

```

476   \global \@mparbottom \z@ \global \@textfloatsheight \z@
477   \floatplacement
478 }
479 </2ekernel | fltrace>

```

(End definition for \@opcol. This function is documented on page ??.)

**\@makecol** We must rewrite this macro to allow for variations in page-makeup required by changes in page-length.

This uses a different macro if a special-length column is being produced.

```

480 <*2ekernel>
481 \gdef \@makecol {%
482   \ifvoid\footins
483     \setbox\@outputbox \box\@cclv
484   \else
485     \setbox\@outputbox \vbox {%

```

This `\boxmaxdepth` setting is to ensure that deep footnotes do not overwrite the footer (on account of the negative skip added later): it should use `\@maxdepth` otherwise the change is pointless when there are footnotes.

But see also its use when combining floats.

```

486      \boxmaxdepth \@maxdepth

487 %      \@tempdima\dp\@cclv
488      \unvbox \@cclv
489 %      \vskip-\@tempdima
490      \vskip \skip\footins

491      \color@begingroup
492      \normalcolor
493      \footnoterule
494      \unvbox \footins
495      \color@endgroup
496    }%
497  \fi

```

The h floats have now been finally committed to this page so we can reset their list. The top and bottom floats are then added to the page.

```

498  \let\@elt\relax
499  \xdef\@freelist{\@freelist\@midlist}%

500  \global \let \@midlist \@empty
501  \@combinefloats

```

The variations start here in case `\enlargethispage` has been used.

```

502  \ifvbox\@kludgeins
503    \@makespecialcolbox
504  \else

```

This extra reboxing is only needed to add the `\@texttop` and `\@textbottom` but this could be done earlier, when the floats are added.

The `\boxmaxdepth` resetting here will have no effect unless `\@textbottom` ends with a box or rule. So is this (or possibly `\@maxdepth`) the correct value?

The `\vskip -\dimen@` ensures that the visible depth of the box does not affect the placement of anything on the page. Thus very deep pages will overprint the footer; but these should have been prevented by suitable settings of the maxdepths at appropriate times.

If `\@textbottom` ends with a box or rule of non-zero depth then this skip adjustment should be done again after it.

I think that the final boxing of the main text page could have a common ending which may make it simpler to see what is going on.

This needs further investigation, especially in the ‘special case’.

Also, the `\boxmaxdepth` setting here affects what happens within `\@texttop` and `\@textbottom`, should it? Is it needed at all?

RmS 91/10/22: Replaced `\dimen128` by `\dimen@`.

```

505  \setbox\@outputbox \vbox to\@colht {%
506 %      \boxmaxdepth \maxdepth           %??
507      \@texttop
508      \dimen@ \dp\@outputbox
509      \unvbox \@outputbox

```

```

510     \vskip -\dimen@
511     \@textbottom
512   }%
513 \fi
514 \global \maxdepth \@maxdepth
515 }

```

(End definition for \makecol. This function is documented on page ??.)

**\@reinserts** This is the code which reinserts the inserts. It puts them all in one place; this can make some of them come out on the wrong page. It has been put into a separate macro to expedite experimentation.

```

516 \gdef \@reinserts{%
517   \ifvoid\footins\else\insert\footins{\unvbox\footins}\fi
518   \ifvbox\@kludgeins\insert\@kludgeins
519     {\unvbox\@kludgeins}\fi
520 }
521 </2ekernel>

```

(End definition for \@reinserts. This function is documented on page ??.)

**\@makespecialcolbox** This implements certain variations in page-makeup.

```

522 <*2ekernel | fltrace>
523 \gdef \@makespecialcolbox {%
524 <*trace>
525   \fl@trace{Kludgeins ht \the\ht\@kludgeins\space
526                                     dp \the\dp\@kludgeins\space
527                                     wd \the\wd\@kludgeins}%
528 </trace>

```

First we find the natural height of the column.

See above for discussion of what is happening here.

This needs further investigation, especially in this ‘special case’.

```

529 \setbox\@outputbox \vbox {%
530   \@texttop
531   \dimen@ \dp\@outputbox
532   \unvbox\@outputbox
533   \vskip-\dimen@
534 }%
535 \@tempdima \@colht
536 \ifdim \wd\@kludgeins>\z@

```

Note that in this case (the \*-version), the height of the \@kludgeins box is not used since its value is somewhat arbitrary: it need only be big enough to ensure that the page-break is not taken prematurely.

Here we calculate how much vertical space needs to be added in order to enable the column to fit into a box of size \@colht using the best information we have about the amount of shrink available (another thing which is known internally about a box, but cannot be accessed at the T<sub>E</sub>X level!).

This needs T<sub>E</sub>X3 otherwise \pageshrink is zero anyway; it may not be exactly the figure we wish as it is the total available from the all the material collected before the page-break decision is made. It will, we think, always be an overestimate of the actual shrink in the box; therefore this should always force the shortest possible column with the possibility of an overfull box.

This should work for both flush- and ragged-bottom setting since it makes the contents no smaller than the size (`\@colht`) of the box into which they are put.

Their should perhaps be an upper limit, of 0pt?, on the extra space added to force shrinking.

See above for a discussion of the `\boxmaxdepth` setting here.

```

537     \advance \@tempdima -\ht\@outputbox
538     \advance \@tempdima \pageshrink
539   <*trace>
540     \fl@trace {Natural ht of col: \the \ht\@outputbox}%
541     \fl@trace {\string \@colht: \the \@colht}%
542     \fl@trace {Pageshrink added: \the \pageshrink}%
543     \fl@trace {Hence, space added: \the \@tempdima}%
544   </trace>
545     \setbox\@outputbox \vbox to \@colht {%
546   %       \boxmaxdepth \maxdepth
547       \unvbox\@outputbox
548       \vskip \@tempdima
549       \@textbottom
550     }%

```

For the unstarred version, the final size of the page is precisely specified. Therefore, at least for the flush-bottom case, we need to ensure that, visually, it has this size exactly.

Thus we calculate this size and set the material in a box of this size, which is then put into a box of size `\@colht` with `\vss` at the bottom.

```

551   \else
552     \advance \@tempdima -\ht\@kludgeins
553   <*trace>
554     \fl@trace {Natural ht of col: \the \ht\@outputbox}%
555     \fl@trace {\string \@colht: \the \@colht}%
556     \fl@trace {Extra size added: -\the \ht \@kludgeins}%
557     \fl@trace {Hence, height of inner box: \the \@tempdima}%
558     \fl@trace {Max? pageshrink available: \the \pageshrink}%
559   </trace>

```

This type of final packaging could be done always; this may simplify all of this page-makeup.

It is not necessary to set `\boxmaxdepth` here since the `\@outputbox` ends with glue.

```

560     \setbox \@outputbox \vbox to \@colht {%
561       \vbox to \@tempdima {%
562         \unvbox\@outputbox
563         \@textbottom}%
564     \vss}%
565   \fi

```

Finally we need to explicitly make the insert box void.

```

566     {\setbox \@tempboxa \box \@kludgeins}%
567   <*trace>
568     \fl@trace {kludgeins box made void}%
569   </trace>
570 }
571 </2ekernel | fltrace>

```

*(End definition for \@makespecialcolbox. This function is documented on page ??.)*

`\@texttop` These do nothing as a default.  
`\@textbottom` 572 `\kernel`  
573 `\let \@texttop \relax`  
574 `\let \@textbottom \relax`

*(End definition for \@texttop and \@textbottom. These functions are documented on page ??.)*

`\@resetactivechars` RmS 93/09/06: added hook to protect against certain active characters in the output  
`\@activechar@info` routine. Default checks are for active space and end-of-line.

575 `\def \@activechar@info #1{%`  
576 `\@latex@info@no@line {Active #1 character found while`  
577 `output routine is active`  
578 `\MessageBreak`  
579 `This may be a bug in a package file`  
580 `you are using}%`  
581 `}`

Do not put any spaces in this next bit!

582 `\begingroup`  
583 `\obeylines\obeyspaces%`  
584 `\catcode'\'\active%`  
585 `\gdef \@resetactivechars{%`  
586 `\def ^M{\@activechar@info{EOL}\space}%`  
587 `\def {\@activechar@info{space}\space}%`  
588 `\let'\active@math@prime}%`  
589 `\endgroup`

*(End definition for \@resetactivechars and \@activechar@info. These functions are documented on page ??.)*

`\@outputpage` The `\color@hbox` hooks here are used to avoid putting just a colour special into an  
`\@shipoutsetup` otherwise empty box (in a header or footer). These boxes are often set to be completely  
`\@writesetup` empty and so adding a special produces a very underfull box message.

There has been extensive tidying up of the old code here; including the removal of a level of grouping.

The setting of `\protect` immediately before the `\shipout` is needed so that protected commands within `\writes` are handled correctly.

Within shipout's vbox it is reset to its default value, `\relax`.

Resetting it to its default value after the shipout has been completed (and the contents of the writes have been expanded) must be done by use of `\aftergroup`. This is because it must have the value `\relax` before macros coming from other uses of `\aftergroup` within this box are expanded.

Putting this into the `\aftergroup` token list does not affect the definition used in expanding the `\writes` because the `aftergroup` token list is only constructed when popping the save-stack, it is not expanded until after the shipout is completed.

Question: should things from an `\aftergroup` within the shipped out box be executed in the environment set up for the writes, or after it finishes?

A lot of this code has been in-lined to prevent mis-use of internal commands as hooks.

590 `\kernel`  
591 `\latexrelease\IncludeInRelease{2017/04/15}%`  
592 `\latexrelease {\@outputpage}{Reset language for hyphenation}%`  
593 `\kernel | latexrelease`  
594 `\def \@outputpage{%`

The `\endgroup` is put in by `\aftergroup`.

```
595 \begingroup
```

Now all the set-up stuff has been in-lined for Frank.

First the stuff for the writes.

From here ... was in the command `\@writesetup`.

```
596 \let \protect \noexpand
```

RmS 93/08/19: Redefined accents to allow changes in font encoding; but exactly why was this needed?

Reset `\language` to the value current at `\begin{document}`. In particular this ensures that a pagebreak in `verbatim` does not prevent hyphenation in the page head.

```
597 \language\document@default@language
```

The `\catcode'\ = 10` was removed as it was considered useless (presumably because nothing gets tokenised during shipout).

This was put in as some error produced active spaces in a mark, I think.

Why was the hyphen reset?

```
598 \@resetactivechars
```

If a page break happens between the start of a list and its first item the `@newlist` will be true and this will mess up any list that is used in the header or footer of the page. So we have to reset that flag.

```
599 \global\let\@@if@newlist\if@newlist
```

```
600 \global\@newlistfalse
```

This next hook replaces the following:

```
\let\-\@dischyph
```

```
\let'\@acci\let'\@accii\let\=\@acciii
```

```
\let\\\@normalcr
```

```
\let\par\@par %% 15 Sep 87 (this was once inside the box)
```

and it does more than they did; in particular it sets:

```
\parindent\z@
```

```
\parskip\z@skip
```

```
\everypar{}
```

```
\leftskip\z@skip
```

```
\rightskip\z@skip
```

```
\parfillskip\@flushglue
```

```
\lineskip\normallineskip
```

```
\baselineskip\normalbaselineskip
```

```
\sloppy
```

```
601 \@parboxrestore
```

... to here was in the command `\@writesetup`.

```
602 \shipout \vbox{%
```

```
603 \set@typeset@protect
```

```
604 \aftergroup \endgroup
```

Correct? or just restore by ending the group?

```
605 \aftergroup \set@typeset@protect
```

This first bit has been moved inside the shipped out box.

Now the setup inside the shipped out box; this should contain all the stuff that could only affect typesetting; other stuff may need to be reset for the writes also.

From here ... was in the command \@shipoutsetup.

```
606 \if@specialpage
607 \global\@specialpagefalse\@nameuse{ps@\@specialstyle}%
608 \fi
609 \if@twoside
610 \ifodd\count\z@ \let\@thehead\@oddhead \let\@thefoot\@oddfoot
611 \let\@themargin\oddsidemargin
612 \else \let\@thehead\@evenhead
613 \let\@thefoot\@evenfoot \let\@themargin\evensidemargin
614 \fi
615 \fi
```

The rest was always inside the box.

RmS 91/08/15: aded this line:

```
616 \reset@font
```

RmS 93/08/06 Added \lineskiplimit=0pt to guard against it being nonzero: e.g. by \offinterlineskip being in effect.

There are probably lots of other things that may need resetting.

```
617 \normalsize
```

Reset the space factors.

```
618 \normalsfcodes
```

Reset these here (previously reset separately for head and foot)

```
619 \let\label\@gobble
620 \let\index\@gobble
621 \let\glossary\@gobble
622 \baselineskip\z@skip \lineskip\z@skip \lineskiplimit\z@
```

... to here was in the command \@shipoutsetup.

```
623 \@beginndvi
624 \vskip \topmargin
625 \moveright\@themargin \vbox {%
626 \setbox\@tempboxa \vbox to\headheight{%
627 \vfil
628 \color@hbox
629 \normalcolor
630 \hb@xt@\textwidth{\@thehead}%
631 \color@endbox
```

22 Feb 87

```
632 }%
633 \dp\@tempboxa \z@
634 \box\@tempboxa
635 \vskip \headsep
636 \box\@outputbox
637 \baselineskip \footskip
638 \color@hbox
639 \normalcolor
640 \hb@xt@\textwidth{\@thefoot}%
641 \color@endbox
```

```

642     }%
643 }%
\endgroup now inserted by \aftergroup
  Restore \if@newlist
644   \global\let\if@newlist\@if@newlist
645   \global \colht \textheight
646   \stepcounter{page}%

```

It is now clear that this does something useful, thanks to Piet van Oostrum. It is needed because a float page is made without using TeX's page-builder; thus the output routine is never called so the marks are not updated.

```

647   \let\firstmark\botmark
648 }
649 </2ekernel | latexrelease>
650 <latexrelease>\EndIncludeInRelease
651 <latexrelease>\IncludeInRelease{0000/00/00}%
652 <latexrelease> {\@outputpage}{Reset language for hyphenation}%
653 <latexrelease>\def\@outputpage{%
654 <latexrelease>\begingroup
655 <latexrelease> \let \protect \noexpand
656 <latexrelease> \@resetactivechars
657 <latexrelease> \global\let\@if@newlist\if@newlist
658 <latexrelease> \global\@newlistfalse
659 <latexrelease> \@parboxrestore
660 <latexrelease> \shipout \vbox{%
661 <latexrelease> \set@typeset@protect
662 <latexrelease> \aftergroup \endgroup
663 <latexrelease> \aftergroup \set@typeset@protect
664 <latexrelease> \if@specialpage
665 <latexrelease> \global\@specialpagefalse\@nameuse{ps@\@specialstyle}%
666 <latexrelease> \fi
667 <latexrelease> \if@twoside
668 <latexrelease> \ifodd\count\z@
669 <latexrelease> \let\@thehead\@oddhead \let\@thefoot\@oddfoot
670 <latexrelease> \let\@themargin\oddsidemargin
671 <latexrelease> \else \let\@thehead\@evenhead
672 <latexrelease> \let\@thefoot\@evenfoot \let\@themargin\evensidemargin
673 <latexrelease> \fi
674 <latexrelease> \fi
675 <latexrelease> \reset@font
676 <latexrelease> \normalsize
677 <latexrelease> \normalsfcodes
678 <latexrelease> \let\label\@gobble
679 <latexrelease> \let\index\@gobble
680 <latexrelease> \let\glossary\@gobble
681 <latexrelease> \baselineskip\z@skip \lineskip\z@skip \lineskiplimit\z@
682 <latexrelease> \@begindvi
683 <latexrelease> \vskip \topmargin
684 <latexrelease> \moveright\@themargin \vbox {%
685 <latexrelease> \setbox\@tempboxa \vbox to\headheight{%
686 <latexrelease> \vfil
687 <latexrelease> \color\hbox
688 <latexrelease> \normalcolor

```



```

689 <latexrelease>          \hb@xt@\textwidth{\@thehead}%
690 <latexrelease>          \color@endbox
691 <latexrelease>          }%
692 <latexrelease>          \dp\@tempboxa \z@
693 <latexrelease>          \box\@tempboxa
694 <latexrelease>          \vskip \headsep
695 <latexrelease>          \box\@outputbox
696 <latexrelease>          \baselineskip \footskip
697 <latexrelease>          \color@hbox
698 <latexrelease>          \normalcolor
699 <latexrelease>          \hb@xt@\textwidth{\@thefoot}%
700 <latexrelease>          \color@endbox
701 <latexrelease>          }%
702 <latexrelease>          }%
703 <latexrelease>          \global\let\if@newlist\@if@newlist
704 <latexrelease>          \global \colht \textheight
705 <latexrelease>          \stepcounter{page}%
706 <latexrelease>          \let\firstmark\botmark
707 <latexrelease>          }
708 <latexrelease>\EndIncludeInRelease
709 (*2ekernel)

```

(End definition for \@outputpage, \@shipoutsetup, and \@writesetup. These functions are documented on page ??.)

**\@begindivi** This unboxes stuff that must appear before anything else in the .dvi file, then returns that box register to the free list and cancels itself.

The stuff in the box should not add any typeset material to the page.

```

710 \def \@begindivi{%
711   \unvbox \@begindivibox
712   \global\let \@begindivi \@empty
713 }

```

(End definition for \@begindivi. This function is documented on page ??.)

**\@combinefloats** The \boxmaxdepth setting here was not made local to a box so was dangerous. It is needed only within the box made by \@cflt (and not normally even there), so it has been moved there; this also agrees with the original pseudocode.

```

714 \def \@combinefloats {%
715   % \boxmaxdepth \maxdepth
716   \ifx \@toplist\@empty \else \@cflt \fi
717   \ifx \@botlist\@empty \else \@cflb \fi
718 }

719 \def \@cflt{%
720   \let \@elt \@comflelt
721   \setbox\@tempboxa \vbox{%
722     \@toplist
723     \setbox\@outputbox \vbox{%
724       \boxmaxdepth \maxdepth
725       \unvbox\@tempboxa
726       \vskip -\floatsep
727       \topfigrule
728       \vskip \textfloatsep

```

```

729             \unvbox\@outputbox
730         }%
731     \let\@elt\relax
732     \xdef\@freelist{\@freelist\@toplist}%
733     \global\let\@toplist\@empty
734 }
735 \def \@cflb {%
736     \let\@elt\@comflelt
737     \setbox\@tempboxa \vbox{}%
738     \@botlist
739     \setbox\@outputbox \vbox{%
740         \unvbox\@outputbox
741         \vskip \textfloatsep
742         \botfigrule
743         \unvbox\@tempboxa
744         \vskip -\floatsep
745     }%
746     \let\@elt\relax
747     \xdef\@freelist{\@freelist\@botlist}%
748     \global \let \@botlist\@empty
749 }

```

(End definition for \@combinefloats, \@cflt, and \@cflb. These functions are documented on page ??.)

```

\@comflelt
\@comdblflelt
\@combinedblfloats
750 \def\@comflelt#1{\setbox\@tempboxa
751     \vbox{\unvbox\@tempboxa\box #1\vskip\floatsep}}
752 \def\@comdblflelt#1{\setbox\@tempboxa
753     \vbox{\unvbox\@tempboxa\box #1\vskip\dblfloatsep}}
754 \def \@combinedblfloats{%
755     \ifx \@dbltoplist \@empty
756     \else
757         \setbox\@tempboxa \vbox{}%
758         \let \@elt \@comdblflelt
759         \@dbltoplist
760         \let \@elt \relax
761         \xdef \@freelist {\@freelist\@dbltoplist}%
762         \global\let \@dbltoplist \@empty
763         \setbox\@outputbox \vbox to\textheight

```

The setting of \boxmaxdepth here has no effect since the \@outputbox should already have depth zero. Even so, it would have no effect on the layout of the page.

```

764         {\boxmaxdepth\maxdepth    %% probably not needed, CAR
765         \unvbox\@tempboxa\vskip-\dblfloatsep

```

Here we need different typesetting if the top float comes from \@topnewpage.

```

766         \ifnum \@dbltopnum>\m@ne
767         \dblfigrule
768         \fi
769         \vskip \dbltextfloatsep

```

If pdf links are present in the galley and those links get broken across pages they have to end up being on the same level of boxing (even if not actually in the same structure) due to some engine restrictions in pdf<sub>TEX</sub> and Lua<sub>TEX</sub>. We therefore unbox `\@outputbox` here (which only contains a single `\hbox`) so that this case has the same boxing level as a normal twocolumn page without top floats.

```

770         \unvbox\@outputbox
771     }%
772 \fi
773 }
774 \endkernel

```

(End definition for `\@comfleft`, `\@comdblleft`, and `\@combinedblfloats`. These functions are documented on page ??.)

`\@startcolumn` We could combine (most of) these two into `\@startcol <list>`. Note that `\@xstartcol` was only used once (i.e. in `\@startcolumn`); it has therefore been removed. This is not quite as efficient but it now has the same structure as `\@startdblcolumn`.

The empty-list test has been moved to `\@tryfcolumn`.

```

775 \begin{kernel} \ftrace
776 \def \@startcolumn {%
777     \global \colroom \@colht
778     \@tryfcolumn \@deferlist
779     \if@fcolmade
780 \ftrace
781     \ftrace{PAGE: float \if@twocolumn column \else page \fi
782         completed}%
783 \end{kernel}
784 \else
785     \begin{group}
786         \let \reserved@b \@deferlist
787         \global \let \@deferlist \@empty
788         \let \@elt \@scolelt
789         \reserved@b
790     \end{group}
791 \fi
792 }

```

This one does not need to set `\@colht`.

```

793 \end{kernel} \ftrace
794 \latexrelease \ftrace \IncludeInRelease{2015/01/01}%
795 \latexrelease \ftrace {\@startdblcolumn}{float order in 2-column}%
796 \begin{kernel} \latexrelease \ftrace
797 \def \@startdblcolumn {%
798     \@tryfcolumn \@deferlist
799     \if@fcolmade
800 \ftrace
801     \ftrace{PAGE: double float page completed}%
802     \else
803     \begin{group}
804         \let \reserved@b \@deferlist
805         \global \let \@deferlist \@empty
806         \let \@elt \@sdblcolelt
807         \reserved@b
808     \end{group}

```

```

808 \fi
809 }%
810 </2ekernel | latexrelease | fltrace>
811 <latexrelease | fltrace>\EndIncludeInRelease
812 <latexrelease | fltrace>\IncludeInRelease{0000/00/00}%
813 <latexrelease | fltrace> {\@startdblcolumn}{float order in 2-column}%
814 <latexrelease | fltrace>\def \@startdblcolumn {%
Not needed since this always comes after \@outputpage:
815 <latexrelease | fltrace>% \global \@colht \textheight
816 <latexrelease | fltrace> \@tryfcolumn \@dbldeferlist
817 <latexrelease | fltrace> \if@fcolmade
818 <*trace>
819 <latexrelease | fltrace> \fl@trace{PAGE: double float page completed}%
820 </trace>
821 <latexrelease | fltrace> \else
822 <latexrelease | fltrace> \begingroup
823 <latexrelease | fltrace> \let \reserved@b \@dbldeferlist
824 <latexrelease | fltrace> \global \let \@dbldeferlist \@empty
825 <latexrelease | fltrace> \let \@elt \@sdblcolelt
826 <latexrelease | fltrace> \reserved@b
827 <latexrelease | fltrace> \endgroup
828 <latexrelease | fltrace> \fi
829 <latexrelease | fltrace>}%
830 <latexrelease | fltrace>\EndIncludeInRelease
831 <*2ekernel | fltrace>

```

*(End definition for \@startcolumn and \@startdblcolumn. These functions are documented on page ??.)*

**\@tryfcolumn** Now tests if its list is empty before any further exertion.

```

832 \def \@tryfcolumn #1{%
833 \global \@fcolmadefalse
834 \ifx #1\@empty
835 \else
836 <*trace>
837 \fl@trace{PAGE: try float \if@twocolumn column/page\else page\fi
838 ---\string #1}%
839 \fl@trace{----- \string #1: #1}%
840 </trace>
841 \xdef\@trylist{#1}%
842 \global \let \@failedlist \@empty
843 \begingroup
844 \let \@elt \@xtryfc \@trylist
845 \endgroup
846 \if@fcolmade
847 \@vtryfc #1%
848 \fi
849 \fi
850 }
851 </2ekernel | fltrace>

```

*(End definition for \@tryfcolumn. This function is documented on page ??.)*

```

852 <*2ekernel>

```

\@scolelt

```
853 \def\@scolelt#1{\def\@currbox{#1}\@addtonextcol}
```

(End definition for \@scolelt. This function is documented on page ??.)

\@sdblcolelt

```
854 \def\@sdblcolelt#1{\def\@currbox{#1}\@addtodblcol}
```

(End definition for \@sdblcolelt. This function is documented on page ??.)

\@vtryfc

```
855 \def\@vtryfc #1{%
856   \global\setbox\@outputbox\vbox{%
857     \let\@elt\@wtryfc
858     \@flsucceed
859     \global\setbox\@outputbox \vbox to\@colht{%
860       \vskip \@fptop
861       \vskip -\@fpsep
862       \unvbox \@outputbox
863       \vskip \@fpbot}%
864   \let\@elt\relax
865   \xdef #1{\@failedlist\@flfail}%
866   \xdef\@freelist{\@freelist\@flsucceed}}
```

(End definition for \@vtryfc. This function is documented on page ??.)

\@wtryfc

```
867 \def\@wtryfc #1{%
868   \global\setbox\@outputbox\vbox{%
869     \unvbox\@outputbox
870     \vskip\@fpsep
871     \box #1}}
```

(End definition for \@wtryfc. This function is documented on page ??.)

\@xtryfc

```
872 \</2kernel>
873 \<latexrelease>\IncludeInRelease{2015/01/01}{\@xtryfc}%
874 \<latexrelease>                                {float order in 2-column}%
875 \<*2kernel | latexrelease>
876 \def\@xtryfc #1{%
877   \@next\reserved@a\@trylist{ }{ }%
878   \@currtype \count #1%
879   \divide\@currtype\@xxxii
880   \multiply\@currtype\@xxxii
881   \@bitor \@currtype \@failedlist
882   \@testfp #1%
883   \@testwrongwidth #1%
884   \ifdim \ht #1>\@colht
885     \@testtrue
886   \fi
887   \if@test
888     \@cons\@failedlist #1%
889   \else
```

```

890 \ytryfc #1%
891 \fi}%
892 </2ekernel | latexrelease>
893 <latexrelease>\EndIncludeInRelease
894 <latexrelease>\IncludeInRelease{0000/00/00}{\@xtryfc}%
895 <latexrelease> {float order in 2-column}%
896 <latexrelease>\def\@xtryfc #1{%
897 <latexrelease> \@next\reserved@a\@trylist{}{}%
898 <latexrelease> \currtype \count #1%
899 <latexrelease> \divide\@currtype\@xxxii
900 <latexrelease> \multiply\@currtype\@xxxii
901 <latexrelease> \bitor \currtype \@failedlist
902 <latexrelease> \@testfp #1%
903 <latexrelease> \ifdim \ht #1>\@colht
904 <latexrelease> \@testtrue
905 <latexrelease> \fi
906 <latexrelease> \if@test
907 <latexrelease> \@cons\@failedlist #1%
908 <latexrelease> \else
909 <latexrelease> \ytryfc #1%
910 <latexrelease> \fi}%
911 <latexrelease>\EndIncludeInRelease
912 <*2ekernel>

```

(End definition for \@xtryfc. This function is documented on page ??.)

\@ytryfc

```

913 \def\@ytryfc #1{%
914 \begingroup
915 \gdef\@flsucceed{\@elt #1}%
916 \global\let\@flfail\@empty
917 \@tempdima\ht #1%
918 \let\@elt\@ztryfc
919 \@trylist
920 \ifdim \@tempdima >\@fpmin
921 \global\@fcolmadetrue
922 \else
923 \@cons\@failedlist #1%
924 \fi
925 \endgroup
926 \if@fcolmade
927 \let\@elt\@gobble
928 \fi}

```

(End definition for \@ytryfc. This function is documented on page ??.)

\@ztryfc

```

929 </2ekernel>
930 <latexrelease>\IncludeInRelease{2015/01/01}{\@ztryfc}%
931 <latexrelease> {float order in 2-column}%
932 <*2ekernel | latexrelease>
933 \def\@ztryfc #1{%
934 \@tempcnta\count #1%
935 \divide\@tempcnta\@xxxii
936 \multiply\@tempcnta\@xxxii

```

```

937 \@bitor \@tempcnta {\@failedlist \@flfail}%
938 \@testfp #1%
not in fixfloats?
939 \@testwrongwidth #1%
940 \@tempdimb\@tempdima
941 \advance\@tempdimb\ht #1%
942 \advance\@tempdimb\@fpsep
943 \ifdim \@tempdimb >\@colht
944 \@testtrue
945 \fi
946 \if@test
947 \@cons\@flfail #1%
948 \else
949 \@cons\@flsucceed #1%
950 \@tempdima\@tempdimb
951 \fi}%
952 \</2ekernel | latexrelease>
953 \<latexrelease>\EndIncludeInRelease
954 \<latexrelease>\IncludeInRelease{0000/00/00}{\@ztryfc}%
955 \<latexrelease> {float order in 2-column}%
956 \<latexrelease>\def\@ztryfc #1{%
957 \<latexrelease> \@tempcnta \count#1%
958 \<latexrelease> \divide\@tempcnta\@xxxii
959 \<latexrelease> \multiply\@tempcnta\@xxxii
960 \<latexrelease> \@bitor \@tempcnta {\@failedlist \@flfail}%
961 \<latexrelease> \@testfp #1%
962 \<latexrelease> \@tempdimb\@tempdima
963 \<latexrelease> \advance\@tempdimb \ht#1%
964 \<latexrelease> \advance\@tempdimb\@fpsep
965 \<latexrelease> \ifdim \@tempdimb >\@colht
966 \<latexrelease> \@testtrue
967 \<latexrelease> \fi
968 \<latexrelease> \if@test
969 \<latexrelease> \@cons\@flfail #1%
970 \<latexrelease> \else
971 \<latexrelease> \@cons\@flsucceed #1%
972 \<latexrelease> \@tempdima\@tempdimb
973 \<latexrelease> \fi}%
974 \<latexrelease>\EndIncludeInRelease

```

*(End definition for \@ztryfc. This function is documented on page ??.)*

The major changes for float suppression and the changes to the float mechanism to make it conform to the documentation are in these next macros.

**\@addtobot** Lots of changes.

```

975 \<*2ekernel | fltrace>
976 \def \@addtobot {%
977 \<*trace>
978 \fl@trace{***Start addtobot}%
979 \</trace>
980 \@getfpsbit 4\relax
981 \<*trace>
982 \fl@trace{fpstype \ifodd \@tempcnta OK \else not \fi bot:

```

```

983                                     \the \@fpstype}%
984 </trace>
985     \ifodd \@tempcnta
986         \@flsetnum \@botnum
987         \ifnum \@botnum>\z@
988             \@tempswafalse
989             \@flcheckspace \@botroom \@botlist
990             \if@tempswa

```

This next line means that this page is produced with box 255 having depth zero, rather than the normal maxdepth: is this needed, useful?

```

991         \global \maxdepth \z@
992         \@flupdates \@botnum \@botroom \@botlist
993 <*trace>
994         \fl@trace{colroom (after-bot) = \the \@colroom}%
995         \fl@trace{colnum (after-bot) = \the \@colnum}%
996         \fl@trace{botnum (after-bot) = \the \@botnum}%
997         \fl@trace{***Success: bot}%
998 </trace>
999         \@inserttrue
1000     \fi
1001 <*trace>
1002     \else
1003         \fl@trace{Fail: botnum = \the \@botnum:
1004                                     fpstype \the \@fpstype=ORD?}%
1005         \ifnum \@fpstype<\sixt@n
1006             \fl@trace{ERROR: !b float not successful (addtobot)}%
1007         \fi
1008 </trace>
1009     \fi
1010 \fi
1011 }

```

(End definition for \@addtobot. This function is documented on page ??.)

\@addtotoporbot Lots of changes.

```

1012 \def \@addtotoporbot {%
1013 <*trace>
1014     \fl@trace{***Start addtotoporbot}%
1015 </trace>
1016     \@getfpsbit \tw@
1017 <*trace>
1018     \fl@trace{fpstype \ifodd \@tempcnta OK \else not \fi top:
1019                                     \the \@fpstype}%
1020 </trace>
1021     \ifodd \@tempcnta
1022         \@flsetnum \@topnum
1023         \ifnum \@topnum>\z@
1024             \@tempswafalse
1025             \@flcheckspace \@toproom \@toplist
1026             \if@tempswa
1027                 \@bitor\@currtype{\@midlist\@botlist}%
1028 <*trace>
1029         \fl@trace{(mid+bot)list: \@midlist, \@botlist:

```



```

1030                                     (addtotoporbot-before)}}%
1031 </trace>
1032     \if@test
1033 <*trace>
1034     \fl@trace{type already on list: mid or bot---sent to addtobot}%
1035 </trace>
1036     \else
1037     \@flupdates \@topnum \@toproom \@toplist
1038 <*trace>
1039     \fl@trace{colroom (after-top) = \the \@colroom}%
1040     \fl@trace{colnum (after-top) = \the \@colnum}%
1041     \fl@trace{topnum (after-top) = \the \@topnum}%
1042     \fl@trace{***Success: top}%
1043 </trace>
1044     \@inserttrue
1045     \fi
1046 \fi
1047 <*trace>
1048     \else
1049     \fl@trace{Fail: topnum = \the \@topnum: fpstype
1050                                     \the \@fpstype=ORD?}%
1051     \ifnum \@fpstype<\sist@n
1052     \fl@trace{ERROR: !t float not successful (addtotoporbot)}}%
1053     \fi
1054 </trace>
1055     \fi
1056 \fi
1057 \if@insert
1058 \else
1059 <*trace>
1060     \fl@trace{sent to addtobot (addtotoporbot)}}%
1061 </trace>
1062     \@addtobot
1063 \fi
1064 }
1065 </2ekernel | fltrace>

```

(End definition for \@addtotoporbot. This function is documented on page ??.)

\@addtocurcol Lots of changes.

```

1066 <latexrelease | fltrace | flafter>\IncludeInRelease{2015/01/01}%
1067 <latexrelease | fltrace | flafter> {\@addtocurcol}{float order in 2-column}%
1068 <*2ekernel | latexrelease | fltrace | flafter>
1069 \def \@addtocurcol {%
1070 <*trace>
1071     \fl@trace{***Start addtocurcol}%
1072 </trace>
1073     \@insertfalse
1074     \@setfloattypescounts
1075     \ifnum \@fpstype=8
1076 <*trace>
1077     \fl@trace{fpstype !p only (addtocurcol): \the \@fpstype = 8?}%
1078 </trace>
1079     \else

```

```

1080     \ifnum \@fpstype=24
1081     <*trace>
1082         \fl@trace{fpstype p only (addtocurcol): \the \@fpstype = 24?}%
1083     </trace>
1084     \else
1085         \@flsettextmin

```

This is a new adjustment which is quite a major change in functionality; but it implements the documentation. Note that `\@reqcolroom` will include the whole of the page-so-far, and hence includes `\@textfloatsheight` of floats, so before comparing it with `\@textmin`, we add this to `\@textmin` also.

```

1086 <*trace>
1087     \fl@trace{textfloatsheight (before) = \the \@textfloatsheight}%
1088 </trace>
1089     \advance \@textmin \@textfloatsheight
1090     \@reqcolroom \@pageht

```

This line must be removed since `\@specialoutput` changed.

```

1091 %         \advance \@reqcolroom \@pagedp
1092 <*trace>
1093     \fl@trace{textmin + textfloatsheight: \the \@textmin}%
1094     \fl@trace{page-so-far: \the \@reqcolroom}%
1095 </trace>
1096     \ifdim \@textmin>\@reqcolroom
1097         \@reqcolroom \@textmin
1098 <*trace>
1099     \fl@trace{ORD? textmin being used}%
1100 </trace>
1101     \fi
1102     \advance \@reqcolroom \ht\@currbox
1103 <*trace>
1104     \fl@trace{float size = \the \ht \@currbox (addtocurcol)}%
1105     \fl@trace{colroom = \the \@colroom (addtocurcol)}%
1106     \fl@trace{reqcolroom = \the \@reqcolroom (addtocurcol)}%
1107 </trace>
1108     \ifdim \@colroom>\@reqcolroom
1109         \@flsetnum \@colnum
1110         \ifnum \@colnum>\z@
1111             \@bitor\@currtype\@deferlist

```

We need to defer the float also if its width doesn't fit.

```

1112     \@testwrongwidth\@currbox
1113 <*trace>
1114     \fl@trace{deferlist: \@deferlist: (addtocurcol-before)}%
1115 </trace>
1116     \if@test
1117 <*trace>
1118     \fl@trace{type already on list: defer (addtocurcol)}%
1119 </trace>
1120     \else
1121         \@bitor\@currtype\@botlist
1122 <*trace>
1123     \fl@trace{botlist: \@botlist: (addtocurcol-before)}%
1124 </trace>

```

```

1125         \if@test
1126     < *trace>
1127         \fl@trace{type already on list: bot---sent to addtobot}%
1128     < /trace>
1129         \@addtobot
1130     \else
1131     < *trace>
1132         \fl@trace{fpstype \ifodd \@tempcnta OK \else not \fi
1133             here: \the \@fpstype}%
1134     < /trace>
1135         \ifodd \count\@currbox
1136             \advance \@reqcolroom \intextsep
1137             \ifdim \@colroom>\@reqcolroom
1138                 \global \advance \@colnum \m@ne
1139                 \global \advance \@textfloatsheight \ht\@currbox

```

This may sometimes give an overestimate.

```

1140             \global \advance \@textfloatsheight 2\intextsep
1141             \@cons \@midlist \@currbox
1142     < *trace>
1143         \fl@trace{***Success: here}%
1144         \fl@trace{textfloatsheight (after-here) =
1145             \the \@textfloatsheight}%
1146         \fl@trace{colnum (after-here) = \the \@colnum}%
1147     < /trace>

```

CHANGE TO \@addtocurcol:

\penalty\z@ changed to \penalty\interlinepenalty so \samepage works properly with figure and table environments. (Changed 23 Oct 86)

There is also an \addpenalty\interlinepenalty above.

Since in 2e \samepage is no longer supported, these could be removed.

Although it is best to use \addvspace in case two h floats come together, this makes other spacing more difficult to adjust; whereas if a user specifies two h floats together then they can more easily get the spacing correct by ad hoc commands.

It is necessary to adjust for the addition of \parskip here in case the float is added between paragraphs (i.e. when in vertical mode).

If the nobreak switch is true we need to reset it and clear \everypar since the float may not reset the flag and cannot reset the \everypar globally.

Typesetting starts here (we are in vertical mode).

```

1148         \if@nobreak
1149             \nobreak
1150             \@nobreakfalse
1151             \everypar{}%
1152         \else
1153             \addpenalty \interlinepenalty
1154             \fi
1155             \vskip \intextsep
1156             \box\@currbox
1157             \penalty\interlinepenalty
1158             \vskip\intextsep
1159             \ifnum\outputpenalty <-\@Mii \vskip -\parskip\fi

```

Typesetting ends here.

```

1160         \outputpenalty \z@

```

```

1161             \@inserttrue
1162 <*trace>
1163             \else
1164             \fl@trace{Fail---no room at 2nd test of colroom
1165                     (addtocurcol \string\intextsep)}%
1166 </trace>
1167             \fi
1168             \fi
1169             \if@insert
1170             \else

```

Next set of docstrip guards are a bit weird, essentially \@addtotoporbot ends up inside the kernel and the fltrace package and \@addtobot shows up in the flafter package. Guess that could have been done a bit more obvious :-)

```

1171 <*2ekernel | fltrace | latexrelease>
1172 <*trace>
1173             \fl@trace{not here: sent to addtotoporbot}%
1174 </trace>
1175             \@addtotoporbot
1176 </2ekernel | fltrace | latexrelease>
1177 <*!2ekernel&!fltrace&!latexrelease>
1178 <*trace>
1179             \fl@trace{not here: sent to addtobot}%
1180 </trace>
1181             \@addtobot
1182 </!2ekernel&!fltrace&!latexrelease>
1183             \fi
1184             \fi
1185             \fi
1186 <*trace>
1187             \else
1188             \fl@trace{Fail: colnum = \the \@colnum:
1189                     fpstype \the \@fpstype=ORD?}%
1190             \ifnum \@fpstype<\sist@n
1191             \fl@trace{ERROR: BANG float not successful (addtocurcol)}%
1192             \fi
1193 </trace>
1194             \fi
1195 <*trace>
1196             \else
1197             \fl@trace{Fail---no room: fl box ht: \the \ht \@currbox
1198                     (addtocurcol)}%
1199 </trace>
1200             \fi
1201             \fi
1202             \fi
1203             \if@insert
1204             \else
1205             \@resetfyps
1206 <*trace>
1207             \fl@trace{put on deferlist (addtocurcol)}%
1208 </trace>
1209             \@cons\@deferlist\@currbox
1210 <*trace>

```

```

1211 \fl@trace{deferlist: \@deferlist: (addtocurcol-after)}%
1212 </trace>
1213 \fi
1214 }%
1215 </2ekernel | latexrelease | fltrace | flafter>
1216 <latexrelease | fltrace | flafter>\EndIncludeInRelease
1217 <latexrelease | fltrace | flafter>\IncludeInRelease{0000/00/00}%
1218 <latexrelease | fltrace | flafter> {\@addtocurcol}{float order in 2-column}%
1219 <latexrelease | fltrace | flafter>\def \@addtocurcol {%
1220 *trace>
1221 <latexrelease | fltrace | flafter> \fl@trace{***Start addtocurcol}%
1222 </trace>
1223 <latexrelease | fltrace | flafter> \@insertfalse
1224 <latexrelease | fltrace | flafter> \@setfloattypescounts
1225 <latexrelease | fltrace | flafter> \ifnum \@fpstype=8
1226 *trace>
1227 <latexrelease | fltrace | flafter> \fl@trace{fpstype !p only (addtocurcol):
1228 <latexrelease | fltrace | flafter> \the \@fpstype = 8?}%
1229 </trace>
1230 <latexrelease | fltrace | flafter> \else
1231 <latexrelease | fltrace | flafter> \ifnum \@fpstype=24
1232 *trace>
1233 <latexrelease | fltrace | flafter> \fl@trace{fpstype p only (addtocurcol):
1234 <latexrelease | fltrace | flafter> \the \@fpstype = 24?}%
1235 </trace>
1236 <latexrelease | fltrace | flafter> \else
1237 <latexrelease | fltrace | flafter> \@flsettextmin

```

This is a new adjustment which is quite a major change in functionality; but it implements the documentation. Note that \@reqcolroom will include the whole of the page-so-far, and hence includes \@textfloatsheight of floats, so before comparing it with \@textmin, we add this to \@textmin also.

```

1238 *trace>
1239 <latexrelease | fltrace | flafter> \fl@trace{textfloatsheight (before) =
1240 <latexrelease | fltrace | flafter> \the \@textfloatsheight}%
1241 </trace>
1242 <latexrelease | fltrace | flafter> \advance \@textmin \@textfloatsheight
1243 <latexrelease | fltrace | flafter> \@reqcolroom \@pageht

```

This line must be removed since \@specialoutput changed.

```

1244 % \advance \@reqcolroom \@pagedp
1245 *trace>
1246 <latexrelease | fltrace | flafter> \fl@trace{textmin + textfloatsheight:
1247 <latexrelease | fltrace | flafter> \the \@textmin}%
1248 <latexrelease | fltrace | flafter> \fl@trace{page-so-far: \the \@reqcolroom}%
1249 <latexrelease | fltrace | flafter>
1250 </trace>
1251 <latexrelease | fltrace | flafter> \ifdim \@textmin>\@reqcolroom
1252 <latexrelease | fltrace | flafter> \@reqcolroom \@textmin
1253 *trace>
1254 <latexrelease | fltrace | flafter> \fl@trace{ORD? textmin being used}%
1255 </trace>
1256 <latexrelease | fltrace | flafter> \fi
1257 <latexrelease | fltrace | flafter> \advance \@reqcolroom \ht\@currbox
1258 *trace>

```

```

1259 <latexrelease | fltrace | flafter> \fl@trace{float size =
1260 <latexrelease | fltrace | flafter> \the \ht \@currbox (addtocurcol)}}%
1261 <latexrelease | fltrace | flafter> \fl@trace{colroom =
1262 <latexrelease | fltrace | flafter> \the \@colroom (addtocurcol)}}%
1263 <latexrelease | fltrace | flafter> \fl@trace{reqcolroom =
1264 <latexrelease | fltrace | flafter> \the \@reqcolroom (addtocurcol)}}%
1265 </trace>
1266 <latexrelease | fltrace | flafter> \ifdim \@colroom>\@reqcolroom
1267 <latexrelease | fltrace | flafter> \@flsetnum \@colnum
1268 <latexrelease | fltrace | flafter> \ifnum \@colnum>\z@
1269 <latexrelease | fltrace | flafter> \@bitor\@currtype\@deferlist
1270 <*trace>
1271 <latexrelease | fltrace | flafter> \fl@trace{deferlist:
1272 <latexrelease | fltrace | flafter> \@deferlist: (addtocurcol-before)}}%
1273 </trace>
1274 <latexrelease | fltrace | flafter> \if@test
1275 <*trace>
1276 <latexrelease | fltrace | flafter> \fl@trace{type already on list:
1277 <latexrelease | fltrace | flafter> defer (addtocurcol)}}%
1278 </trace>
1279 <latexrelease | fltrace | flafter> \else
1280 <latexrelease | fltrace | flafter> \@bitor\@currtype\@botlist
1281 <*trace>
1282 <latexrelease | fltrace | flafter> \fl@trace{botlist: \@botlist:
1283 <latexrelease | fltrace | flafter> (addtocurcol-before)}}%
1284 </trace>
1285 <latexrelease | fltrace | flafter> \if@test
1286 <*trace>
1287 <latexrelease | fltrace | flafter> \fl@trace{type already on list:
1288 <latexrelease | fltrace | flafter> bot---sent to addtobot}}%
1289 </trace>
1290 <latexrelease | fltrace | flafter> \@addtobot
1291 <latexrelease | fltrace | flafter> \else
1292 <*trace>
1293 <latexrelease | fltrace | flafter> \fl@trace{fpstype
1294 <latexrelease | fltrace | flafter> \ifodd \@tempcnta OK \else not \fi
1295 <latexrelease | fltrace | flafter> here: \the \@fpstype}}%
1296 </trace>
1297 <latexrelease | fltrace | flafter> \ifodd \count\@currbox
1298 <latexrelease | fltrace | flafter> \advance \@reqcolroom \intextsep
1299 <latexrelease | fltrace | flafter> \ifdim \@colroom>\@reqcolroom
1300 <latexrelease | fltrace | flafter> \global \advance \@colnum \m@ne
1301 <latexrelease | fltrace | flafter> \global \advance
1302 <latexrelease | fltrace | flafter> \@textfloatsheight\ht\@currbox

This may sometimes give an overestimate.
1303 <latexrelease | fltrace | flafter> \global \advance
1304 <latexrelease | fltrace | flafter> \@textfloatsheight 2\intextsep
1305 <latexrelease | fltrace | flafter> \@cons \@midlist \@currbox
1306 <*trace>
1307 <latexrelease | fltrace | flafter> \fl@trace{***Success: here}}%
1308 <latexrelease | fltrace | flafter> \fl@trace{textfloatsheight
1309 <latexrelease | fltrace | flafter> (after-here) =
1310 <latexrelease | fltrace | flafter> \the \@textfloatsheight}}%
1311 <latexrelease | fltrace | flafter> \fl@trace{colnum (after-here) =

```

```

1312 <latexrelease | fltrace | flafter>                \the \@colnum}%
1313 </trace>

```

CHANGE TO \@addtocurcol:

\penalty\z@ changed to \penalty\interlinepenalty so \samepage works properly with figure and table environments. (Changed 23 Oct 86)

There is also an \addpenalty\interlinepenalty above.

Since in 2e \samepage is no longer supported, these could be removed.

Although it is best to use \addvspace in case two h floats come together, this makes other spacing more difficult to adjust; whereas if a user specifies two h floats together then they can more easily get the spacing correct by ad hoc commands.

It is necessary to adjust for the addition of \parskip here in case the float is added between paragraphs (i.e. when in vertical mode).

If the nobreak switch is true we need to reset it and clear \everypar since the float may not reset the flag and cannot reset the \everypar globally.

Typesetting starts here (we are in vertical mode).

```

1314 <latexrelease | fltrace | flafter>                \if@nobreak
1315 <latexrelease | fltrace | flafter>                \nobreak
1316 <latexrelease | fltrace | flafter>                \@nobreakfalse
1317 <latexrelease | fltrace | flafter>                \everypar{}%
1318 <latexrelease | fltrace | flafter>                \else
1319 <latexrelease | fltrace | flafter>                \addpenalty\interlinepenalty
1320 <latexrelease | fltrace | flafter>                \fi
1321 <latexrelease | fltrace | flafter>                \vskip \intextsep
1322 <latexrelease | fltrace | flafter>                \box\@currbox
1323 <latexrelease | fltrace | flafter>                \penalty\interlinepenalty
1324 <latexrelease | fltrace | flafter>                \vskip\intextsep
1325 <latexrelease | fltrace | flafter>                \ifnum\outputpenalty
1326 <latexrelease | fltrace | flafter>                <-\@Mii \vskip
1327 <latexrelease | fltrace | flafter>                -\parskip\fi

```

Typesetting ends here.

```

1328 <latexrelease | fltrace | flafter>                \outputpenalty \z@
1329 <latexrelease | fltrace | flafter>                \@inserttrue
1330 <*trace>
1331 <latexrelease | fltrace | flafter>                \else
1332 <latexrelease | fltrace | flafter>                \fl@trace{Fail---no room at 2nd test of colroom
1333 <latexrelease | fltrace | flafter>                (addtocorcol \string\intextsep)}%
1334 </trace>
1335 <latexrelease | fltrace | flafter>                \fi
1336 <latexrelease | fltrace | flafter>                \fi
1337 <latexrelease | fltrace | flafter>                \if@insert
1338 <latexrelease | fltrace | flafter>                \else

```

Next set of docstrip guards are a bit weird, essentially \@addtotoporbot ends up inside the kernel and the fltrace package and \@addtotoporbot shows up in the flafter package. Guess that could have been done a bit more obvious :-)

```

1339 <*2ekernel | fltrace>
1340 <*trace>
1341 <latexrelease | fltrace | flafter>                \fl@trace{not here: sent to addtotoporbot}%
1342 </trace>
1343 <latexrelease | fltrace | flafter>                \@addtotoporbot
1344 </2ekernel | fltrace>
1345 <!*2ekernel&!autoload&!fltrace>

```

```

1346 <*trace>
1347 <latexrelease | fltrace | flafter>          \fl@trace{not here: sent to addtobot}%
1348 </trace>
1349 <latexrelease | fltrace | flafter>          \@addtobot
1350 </!2ekernel&!autoload&&!fltrace>
1351 <latexrelease | fltrace | flafter>          \fi
1352 <latexrelease | fltrace | flafter>          \fi
1353 <latexrelease | fltrace | flafter>          \fi
1354 <*trace>
1355 <latexrelease | fltrace | flafter>          \else
1356 <latexrelease | fltrace | flafter>          \fl@trace{Fail: colnum = \the \@colnum:
1357 <latexrelease | fltrace | flafter>          fpstype \the \@fpstype=ORD?}%
1358 <latexrelease | fltrace | flafter>          \ifnum \@fpstype<\sist@n
1359 <latexrelease | fltrace | flafter> \fl@trace{ERROR: BANG float not successful
1360 <latexrelease | fltrace | flafter>          (addtocurcol)}}%
1361 <latexrelease | fltrace | flafter>          \fi
1362 </trace>
1363 <latexrelease | fltrace | flafter>          \fi
1364 <*trace>
1365 <latexrelease | fltrace | flafter>          \else
1366 <latexrelease | fltrace | flafter>          \fl@trace{Fail---no room: fl box ht:
1367 <latexrelease | fltrace | flafter>          \the \ht \@currbox (addtocurcol)}}%
1368 </trace>
1369 <latexrelease | fltrace | flafter>          \fi
1370 <latexrelease | fltrace | flafter>          \fi
1371 <latexrelease | fltrace | flafter>          \fi
1372 <latexrelease | fltrace | flafter>          \if@insert
1373 <latexrelease | fltrace | flafter>          \else
1374 <latexrelease | fltrace | flafter>          \@resetfps
1375 <*trace>
1376 <latexrelease | fltrace | flafter>          \fl@trace{put on deferlist (addtocurcol)}}%
1377 </trace>
1378 <latexrelease | fltrace | flafter>          \@cons\@deferlist\@currbox
1379 <*trace>
1380 <latexrelease | fltrace | flafter>          \fl@trace{deferlist: \@deferlist:
1381 <latexrelease | fltrace | flafter>          (addtocurcol-after)}}%
1382 </trace>
1383 <latexrelease | fltrace | flafter>          \fi
1384 <latexrelease | fltrace | flafter>          }%
1385 <latexrelease | fltrace | flafter>\EndIncludeInRelease

```

(End definition for \@addtocurcol. This function is documented on page ??.)

\@addtonextcol Lots of changes.

```

1386 <latexrelease | fltrace>\IncludeInRelease{2015/01/01}
1387 <latexrelease | fltrace> {\@addtonextcol}{float order in 2-column}%
1388 <*2ekernel | latexrelease | fltrace>
1389 \def\@addtonextcol{%
1390   \begingroup
1391   <*trace>
1392     \fl@trace{***Start addtonextcol}%
1393   </trace>
1394   \@insertfalse
1395   \@setfloattypecounts

```



```

1396 \ifnum \@fpstype=8
1397 <*trace>
1398 \fl@trace{fpstype not curcol: \the \@fpstype = 8?}%
1399 </trace>
1400 \else
1401 \ifnum \@fpstype=24
1402 <*trace>
1403 \fl@trace{fpstype not curcol: \the \@fpstype = 24?}%
1404 </trace>
1405 \else
1406 \@flsettextmin
1407 <*trace>
1408 \fl@trace{text-so-far: Opt (top of col)}%
1409 </trace>
1410 \@reqcolroom \ht\@currbox
1411 <*trace>
1412 \fl@trace{float size: \the \@reqcolroom (addtonextcol)}%
1413 </trace>
1414 \advance \@reqcolroom \@textmin
1415 <*trace>
1416 \fl@trace{colroom = \the \@colroom (addtonextcol)}%
1417 \fl@trace{reqcolroom = \the \@reqcolroom (addtonextcol)}%
1418 </trace>
1419 \ifdim \@colroom>\@reqcolroom
1420 \@flsetnum \@colnum
1421 \ifnum\@colnum>\z@
1422 \@bitor\@currtype\@deferlist
1423 <*trace>
1424 \fl@trace{deferlist: \@deferlist: (addtonextcol-before)}%
1425 </trace>
1426
1427 \@testwrongwidth\@currbox
1428 \if@test
1429 <*trace>
1430 \fl@trace{type already on list: defer (addtonextcol)}%
1431 </trace>
1432 \else
1433 <*trace>
1434 \fl@trace{sent to addtotoporbot (addtonextcol)}%
1435 </trace>
1436 \@addtotoporbot
1437 \fi
1438 <*trace>
1439 \else
1440 \fl@trace{Fail---no room: fl box ht: \the \ht \@currbox
1441 (addtonextcol)}%
1442 </trace>
1443 \fi
1444 \fi
1445 \fi
1446 \if@insert
1447 \else
1448 <*trace>

```

```

1449     \fl@trace{put back on deferlist (addtonextcol)}%
1450 \>/trace>
1451     \@cons\@deferlist\@currbox
1452 \>*trace>
1453     \fl@trace{deferlist: \@deferlist: (addtonextcol-after)}%
1454 \>/trace>
1455     \fi
1456 \>*trace>
1457     \fl@trace{End of addtonextcol -- locally counts:}%
1458     \fl@trace{col: \the\@colnum. top: \the \@topnum. bot: \the \@botnum.}%
1459 \>/trace>
1460     \endgroup
1461 \>*trace>
1462     \fl@trace{End of addtonextcol -- globally counts:}%
1463     \fl@trace{col: \the\@colnum. top: \the \@topnum. bot: \the \@botnum.}%
1464 \>/trace>
1465 }%
1466 \>/2ekernel | latexrelease | fltrace>
1467 \<latexrelease | fltrace>\EndIncludeInRelease
1468 \<latexrelease | fltrace>\IncludeInRelease{0000/00/00}%
1469 \<latexrelease | fltrace> {\@addtonextcol}{float order in 2-column}%
1470 \<latexrelease | fltrace>\def\@addtonextcol{%
1471 \<latexrelease | fltrace> \beginngroup
1472 \>*trace>
1473 \<latexrelease | fltrace> \fl@trace{***Start addtonextcol}%
1474 \>/trace>
1475 \<latexrelease | fltrace> \@insertfalse
1476 \<latexrelease | fltrace> \@setfloattypecounts
1477 \<latexrelease | fltrace> \ifnum \@fpstype=8
1478 \>*trace>
1479 \<latexrelease | fltrace> \fl@trace{fpstype not curcol:
1480 \<latexrelease | fltrace> \the \@fpstype = 8?}%
1481 \>/trace>
1482 \<latexrelease | fltrace> \else
1483 \<latexrelease | fltrace> \ifnum \@fpstype=24
1484 \>*trace>
1485 \<latexrelease | fltrace> \fl@trace{fpstype not curcol:
1486 \<latexrelease | fltrace> \the \@fpstype = 24?}%
1487 \>/trace>
1488 \<latexrelease | fltrace> \else
1489 \<latexrelease | fltrace> \@flsettextmin
1490 \>*trace>
1491 \<latexrelease | fltrace> \fl@trace{text-so-far: Opt (top of col)}%
1492 \>/trace>
1493 \<latexrelease | fltrace> \@reqcolroom \ht\@currbox
1494 \>*trace>
1495 \<latexrelease | fltrace> \fl@trace{float size:
1496 \<latexrelease | fltrace> \the \@reqcolroom (addtonextcol)}%
1497 \<latexrelease | fltrace>
1498 \>/trace>
1499 \<latexrelease | fltrace> \advance \@reqcolroom \@textmin
1500 \>*trace>
1501 \<latexrelease | fltrace> \fl@trace{colroom =
1502 \<latexrelease | fltrace> \the \@colroom (addtonextcol)}%

```

```

1503 <latexrelease | fltrace> \fl@trace{reqcolroom =
1504 <latexrelease | fltrace> \the \@reqcolroom (addtonextcol)}%
1505 </trace>
1506 <latexrelease | fltrace> \ifdim \@colroom>\@reqcolroom
1507 <latexrelease | fltrace> \@flsetnum \@colnum
1508 <latexrelease | fltrace> \ifnum \@colnum>\z@
1509 <latexrelease | fltrace> \@bitor \@currtype \@deferlist
1510 <*trace>
1511 <latexrelease | fltrace> \fl@trace{deferlist: \@deferlist:
1512 <latexrelease | fltrace> (addtonextcol-before)}%
1513 </trace>
1514 <latexrelease | fltrace> \if@test
1515 <*trace>
1516 <latexrelease | fltrace> \fl@trace{type already on list:
1517 <latexrelease | fltrace> defer (addtonextcol)}%
1518 </trace>
1519 <latexrelease | fltrace> \else
1520 <*trace>
1521 <latexrelease | fltrace> \fl@trace{sent to addtotoporbot
1522 <latexrelease | fltrace> (addtonextcol)}%
1523 </trace>
1524 <latexrelease | fltrace> \@addtotoporbot
1525 <latexrelease | fltrace> \fi
1526 <latexrelease | fltrace> \fi
1527 <*trace>
1528 <latexrelease | fltrace> \else
1529 <latexrelease | fltrace> \fl@trace{Fail---no room: fl box ht:
1530 <latexrelease | fltrace> \the \ht \@currbox (addtonextcol)}%
1531 </trace>
1532 <latexrelease | fltrace> \fi
1533 <latexrelease | fltrace> \fi
1534 <latexrelease | fltrace> \fi
1535 <latexrelease | fltrace> \if@insert
1536 <latexrelease | fltrace> \else
1537 <*trace>
1538 <latexrelease | fltrace> \fl@trace{put back on deferlist
1539 <latexrelease | fltrace> (addtonextcol)}%
1540 </trace>
1541 <latexrelease | fltrace> \@cons \@deferlist \@currbox
1542 <*trace>
1543 <latexrelease | fltrace> \fl@trace{deferlist: \@deferlist:
1544 <latexrelease | fltrace> (addtonextcol-after)}%
1545 </trace>
1546 <latexrelease | fltrace> \fi
1547 <*trace>
1548 <latexrelease | fltrace> \fl@trace{End of addtonextcol --
1549 <latexrelease | fltrace> locally counts:}%
1550 <latexrelease | fltrace> \fl@trace{col: \the \@colnum.
1551 <latexrelease | fltrace> top: \the \@topnum. bot: \the \@botnum.}%
1552 </trace>
1553 <latexrelease | fltrace> \endgroup
1554 <*trace>
1555 <latexrelease | fltrace> \fl@trace{End of addtonextcol --
1556 <latexrelease | fltrace> globally counts:}%

```

```

1557 <latexrelease | fltrace> \fl@trace{col: \the \@colnum.
1558 <latexrelease | fltrace> top: \the \@topnum. bot: \the \@botnum.}%
1559 </trace>
1560 <latexrelease | fltrace>}%
1561 <latexrelease | fltrace>\EndIncludeInRelease

```

(End definition for \@addtonextcol. This function is documented on page ??.)

\@addtodblcol Lots of changes.

```

1562 <latexrelease | fltrace>\IncludeInRelease{2015/01/01}%
1563 <latexrelease | fltrace> {\@addtodblcol}{float order in 2-column}%
1564 <*2ekernel | latexrelease | fltrace>
1565 \def\@addtodblcol{%
1566   \begingroup
1567   <*trace>
1568   \fl@trace{***Start addtodblcol}%
1569 </trace>
1570   \@insertfalse
1571   \@setfloattypescounts
1572   \@getfpsbit \tw@
1573   <*trace>
1574   \fl@trace{fpstype \ifodd \@tempcnta OK \else not \fi dbltop:
1575                                           \the \@fpstype}%
1576 </trace>
1577   \ifodd\@tempcnta
1578     \@flsetnum \@dbltopnum
1579     \ifnum \@dbltopnum>\z@
1580       \@tempswafalse
1581       \ifdim \@dbltoproom>\ht\@currbox
1582         \@tempswatrue
1583   <*trace>
1584     \fl@trace{Space OK: \@dbltoproom =
1585               \the \@dbltoproom > \the \ht \@currbox
1586               (dbltoproom)}%
1587 </trace>
1588   \else
1589   <*trace>
1590     \fl@trace{fpstype: \the \@fpstype (addtodblcol)}%
1591 </trace>
1592     \ifnum \@fpstype<\sist@@n
1593   <*trace>
1594     \fl@trace{BANG float ignoring \@dbltoproom}%
1595     \fl@trace{\@spaces \@dbltoproom = \the \@dbltoproom.
1596               Ht float: \the \ht \@currbox-BANG}%
1597 </trace>

```

Need to check that there is room on the page, using the local value of \@textmin to make the necessary adjustment to \@dbltoproom.

```

1598   \advance \@dbltoproom \@textmin
1599 <*trace>
1600   \fl@trace{Local value of texmin: \the\@textmin}%
1601   \fl@trace{\@spaces space on page = \the \@dbltoproom.
1602             Ht float: \the \ht \@currbox-BANG}%
1603 </trace>

```

```

1604         \ifdim \@dbltoproom>\ht\@currbox
1605             \@tempwattrue
1606     \*trace>
1607         \fl@trace{Space OK BANG: space on page =
1608             \the \@dbltoproom > \the \ht \@currbox}%
1609     \else
1610         \fl@trace{fpstype: \the \@fpstype}%
1611         \fl@trace{Fail---no room dbltoproom-BANG?:}%
1612         \fl@trace{\@spaces space on page = \the \@dbltoproom.
1613             Ht float: \the \ht \@currbox}%
1614     \*trace>
1615     \fi
1616     \advance \@dbltoproom -\@textmin
1617 \*trace>
1618     \else
1619         \fl@trace{fpstype: \the \@fpstype}%
1620         \fl@trace{Fail---no room dbltoproom-ORD?:}%
1621         \fl@trace{\@spaces \@dbltoproom = \the \@dbltoproom.
1622             Ht float: \the \ht \@currbox}%
1623     \*trace>
1624     \fi
1625     \fi
1626     \if@tempswa
1627         \@bitor \@currtype \@deferlist
1628 \*trace>
1629         \fl@trace{(dbl)deferlist: \@deferlist: (before)}%
1630 \*trace>
1631     not in fixfloats?
1632     \@testwrongwidth\@currbox
1633     \if@test
1634 \*trace>
1635         \fl@trace{type already on list: (dbl)defer}%
1636 \*trace>
1637     \else
1638         \@tempdima -\ht\@currbox
1639         \advance\@tempdima
1640             -\ifx \@dbltoplist\@empty \dbltextfloatsep \else
1641                 \dblfloatsep \fi
1642         \global \advance \@dbltoproom \@tempdima
1643         \global \advance \@colht \@tempdima
1644         \global \advance \@dbltopnum \m@ne
1645         \@cons \@dbltoplist \@currbox
1646 \*trace>
1647         \fl@trace{dbltopnum (after) = \the \@dbltopnum}%
1648         \fl@trace{***Success: dbltop}%
1649     \*trace>
1650         \@inserttrue
1651     \fi
1652 \*trace>
1653     \else
1654         \fl@trace{Fail: dbltopnum = \the \@dbltopnum: fpstype
1655             \the \@fpstype=ORD?:}%

```

```

1656         \ifnum \@fpstype<\sist@n
1657         \fl@trace{ERROR: !t float not successful (addtodblcol)}%
1658         \fi
1659     </trace>
1660     \fi
1661     \fi
1662     \if@insert
1663     \else
1664     <*trace>
1665         \fl@trace{put on deferlist}%
1666     </trace>
1667     \@cons\@deferlist\@currbox
1668     <*trace>
1669         \fl@trace{(dbl)deferlist: \@deferlist: (after)}%
1670     </trace>
1671     \fi
1672     <*trace>
1673         \fl@trace{End of addtodblcol -- locally count:}%
1674         \fl@trace{ dbltop: \the \@dbltopnum.}%
1675     </trace>
1676     \endgroup
1677     <*trace>
1678         \fl@trace{End of addtodblcol -- globally count:}%
1679         \fl@trace{dbltop: \the \@dbltopnum.}%
1680     </trace>
1681     }%
1682     </2ekernel | latexrelease | fltrace>
1683     <latexrelease | fltrace>\EndIncludeInRelease
1684     <latexrelease | fltrace>\IncludeInRelease{0000/00/00}%
1685     <latexrelease | fltrace> {\@addtodblcol}{float order in 2-column}%
1686     <latexrelease | fltrace>\def\@addtodblcol{%
1687     <latexrelease | fltrace> \begingroup
1688     <*trace>
1689     <latexrelease | fltrace> \fl@trace{***Start addtodblcol}%
1690     </trace>
1691     <latexrelease | fltrace> \@insertfalse
1692     <latexrelease | fltrace> \@setfloattypescounts
1693     <latexrelease | fltrace> \@getfpsbit \tw@
1694     <*trace>
1695     <latexrelease | fltrace> \fl@trace{fpstype \ifodd \@tempcnta OK
1696     <latexrelease | fltrace> \else not \fi dbltop: \the \@fpstype}%
1697     </trace>
1698     <latexrelease | fltrace> \ifodd\@tempcnta
1699     <latexrelease | fltrace> \@flsetnum \@dbltopnum
1700     <latexrelease | fltrace> \ifnum \@dbltopnum>\z@
1701     <latexrelease | fltrace> \@tempswafalse
1702     <latexrelease | fltrace> \ifdim \@dbltoproom>\ht\@currbox
1703     <latexrelease | fltrace> \@tempswatrue
1704     <*trace>
1705     <latexrelease | fltrace> \fl@trace{Space OK: \@dbltoproom =
1706     <latexrelease | fltrace> \the \@dbltoproom > \the \ht \@currbox
1707     <latexrelease | fltrace> (dbltoproom)}%
1708     </trace>
1709     <latexrelease | fltrace> \else

```

```

1710 <*trace>
1711 <latexrelease | fltrace> \fl@trace{fpstype: \the \@fpstype (addtodblcol)}%
1712 </trace>
1713 <latexrelease | fltrace> \ifnum \@fpstype<\sist@n
1714 <*trace>
1715 <latexrelease | fltrace> \fl@trace{BANG float ignoring \@dbltoproom}%
1716 <latexrelease | fltrace> \fl@trace{\@spaces \@dbltoproom =
1717 <latexrelease | fltrace> \the \@dbltoproom.
1718 <latexrelease | fltrace> Ht float: \the \ht \@currbox-BANG}%
1719 </trace>

```

Need to check that there is room on the page, using the local value of \@textmin to make the necessary adjustment to \@dbltoproom.

```

1720 <latexrelease | fltrace> \advance \@dbltoproom \@textmin
1721 <*trace>
1722 <latexrelease | fltrace> \fl@trace{Local value of texmin: \the \@textmin}%
1723 <latexrelease | fltrace> \fl@trace{\@spaces space on page =
1724 <latexrelease | fltrace> \the \@dbltoproom.
1725 <latexrelease | fltrace> Ht float: \the \ht \@currbox-BANG}%
1726 </trace>
1727 <latexrelease | fltrace> \ifdim \@dbltoproom>\ht\@currbox
1728 <latexrelease | fltrace> \@tempswatrue
1729 <*trace>
1730 <latexrelease | fltrace> \fl@trace{Space OK BANG: space on page =
1731 <latexrelease | fltrace> \the\@dbltoproom > \the\ht\@currbox}%
1732 <latexrelease | fltrace> \else
1733 <latexrelease | fltrace> \fl@trace{fpstype: \the \@fpstype}%
1734 <latexrelease | fltrace> \fl@trace{Fail---no room dbltoproom-BANG?:}%
1735 <latexrelease | fltrace> \fl@trace{\@spaces space on page =
1736 <latexrelease | fltrace> \the \@dbltoproom.
1737 <latexrelease | fltrace> Ht float: \the \ht \@currbox}%
1738 </trace>
1739 <latexrelease | fltrace> \fi
1740 <latexrelease | fltrace> \advance \@dbltoproom -\@textmin
1741 <*trace>
1742 <latexrelease | fltrace> \else
1743 <latexrelease | fltrace> \fl@trace{fpstype: \the \@fpstype}%
1744 <latexrelease | fltrace> \fl@trace{Fail---no room dbltoproom-ORD?:}%
1745 <latexrelease | fltrace> \fl@trace{\@spaces \@dbltoproom =
1746 <latexrelease | fltrace> \the \@dbltoproom.
1747 <latexrelease | fltrace> Ht float: \the \ht \@currbox}%
1748 </trace>
1749 <latexrelease | fltrace> \fi
1750 <latexrelease | fltrace> \fi
1751 <latexrelease | fltrace> \if@tempswa
1752 <latexrelease | fltrace> \@bitor \@currtype \@dbldeferlist
1753 <*trace>
1754 <latexrelease | fltrace> \fl@trace{dbldeferlist:
1755 <latexrelease | fltrace> \@dbldeferlist: (before)}%
1756 </trace>
1757 <latexrelease | fltrace> \if@test
1758 <*trace>
1759 <latexrelease | fltrace> \fl@trace{type already on list: dbldefer}%
1760 </trace>

```

```

1761 <latexrelease | fltrace> \else
1762 <latexrelease | fltrace> \@tempdima -\ht\@currbox
1763 <latexrelease | fltrace> \advance\@tempdima
1764 <latexrelease | fltrace> -\ifx \@dbltoplist\@empty
1765 <latexrelease | fltrace> \dbltextfloatsep
1766 <latexrelease | fltrace> \else \dblfloatsep \fi
1767 <latexrelease | fltrace> \global \advance \@dbltoproom \@tempdima
1768 <latexrelease | fltrace> \global \advance \@colht \@tempdima
1769 <latexrelease | fltrace> \global \advance \@dbltopnum \m@ne
1770 <latexrelease | fltrace> \@cons \@dbltoplist \@currbox
1771 <*trace>
1772 <latexrelease | fltrace> \fl@trace{dbltopnum (after) =
1773 <latexrelease | fltrace> \the \@dbltopnum}%
1774 <latexrelease | fltrace> \fl@trace{***Success: dbltop}%
1775 </trace>
1776 <latexrelease | fltrace> \@inserttrue
1777 <latexrelease | fltrace> \fi
1778 <latexrelease | fltrace> \fi
1779 <*trace>
1780 <latexrelease | fltrace> \else
1781 <latexrelease | fltrace> \fl@trace{Fail: dbltopnum = \the \@dbltopnum:
1782 <latexrelease | fltrace> fpstype \the \@fpstype=ORD?}%
1783 <latexrelease | fltrace> \ifnum \@fpstype<\sist@n
1784 <latexrelease | fltrace> \fl@trace{ERROR: !t float not successful
1785 <latexrelease | fltrace> (addtodblcol)}}%
1786 <latexrelease | fltrace> \fi
1787 </trace>
1788 <latexrelease | fltrace> \fi
1789 <latexrelease | fltrace> \fi
1790 <latexrelease | fltrace> \if@insert
1791 <latexrelease | fltrace> \else
1792 <*trace>
1793 <latexrelease | fltrace> \fl@trace{put on dbldeferlist}%
1794 </trace>
1795 <latexrelease | fltrace> \@cons\@dbldeferlist\@currbox
1796 <*trace>
1797 <latexrelease | fltrace> \fl@trace{dbldeferlist: \@dbldeferlist: (after)}%
1798 </trace>
1799 <latexrelease | fltrace> \fi
1800 <*trace>
1801 <latexrelease | fltrace> \fl@trace{End of addtodblcol -- locally count:}%
1802 <latexrelease | fltrace> \fl@trace{ dbltop: \the \@dbltopnum.}%
1803 </trace>
1804 <latexrelease | fltrace> \endgroup
1805 <*trace>
1806 <latexrelease | fltrace> \fl@trace{End of addtodblcol -- globally count:}%
1807 <latexrelease | fltrace> \fl@trace{dbltop: \the \@dbltopnum.}%
1808 </trace>
1809 <latexrelease | fltrace>}%
1810 <latexrelease | fltrace>\EndIncludeInRelease

```

*(End definition for \@addtodblcol. This function is documented on page ??.)*

\@addmarginpar



```

1811 (*2ekernel)
1812 \def\@addmarginpar{\@next\@marbox\@currlist{\@cons\@freelist\@marbox
1813 \@cons\@freelist\@currbox}\@latexbug\@tempcnta\@ne
1814 \if@twocolumn
1815 \if@firstcolumn \@tempcnta\m@ne \fi
1816 \else
1817 \if@mparswitch
1818 \ifodd\c@page \else\@tempcnta\m@ne \fi
1819 \fi
1820 \if@reversemargin \@tempcnta -\@tempcnta \fi
1821 \fi
1822 \ifnum\@tempcnta <\z@ \global\setbox\@marbox\box\@currbox \fi
1823 \@tempdima\@mparbottom
1824 \advance\@tempdima -\@pageht
1825 \advance\@tempdima\ht\@marbox
1826 \ifdim\@tempdima >\z@
1827 \latexwarning@no@line {Marginpar on page \thepage\space moved}%
1828 \else
1829 \@tempdima\z@
1830 \fi
1831 \global\@mparbottom\@pageht
1832 \global\advance\@mparbottom\@tempdima
1833 \global\advance\@mparbottom\dp\@marbox
1834 \global\advance\@mparbottom\marginparpush
1835 \advance\@tempdima -\ht\@marbox

```

Putting box movement inside the ‘marbox’:

```

1836 \global\setbox \@marbox
1837 \vbox {\vskip \@tempdima
1838 \box \@marbox}%
1839 \global \ht\@marbox \z@
1840 \global \dp\@marbox \z@

```

Sticking (rather than gluing:-) the ‘marbox’ to the line above, changed vskip to kern:

```

1841 \kern -\@pagedp
1842 \nointerlineskip
1843 \hb@xt@\columnwidth
1844 {\ifnum \@tempcnta >\z@
1845 \hskip\columnwidth \hskip\marginparsep
1846 \else
1847 \hskip -\marginparsep \hskip -\marginparwidth
1848 \fi
1849 \box\@marbox \hss}%

```

For this reason the following code can vanish:

```

\ nobreak %% No longer needed. CAR92/12
\ vskip -\@tempdima %% No longer needed. CAR92/12

1850 \nointerlineskip
1851 \hbox{\vrule \@height\z@ \@width\z@ \@depth\@pagedp}}

```

(End definition for \@addmarginpar. This function is documented on page ??.)

### 1.1.1 Kludgeins

This part of the file is part of the implementation of the following two new commands for L<sup>A</sup>T<sub>E</sub>X2e.

`\enlargethispage{<dim>}`

Adds <dim> to the height of the current column only. On the printed page the bottom of this column is extended downwards by exactly <dim> without having any effect on the placement of the footer; this may result in an overprinting.

`\enlargethispage*{<dim>}`

Similar to `\enlargethispage` but it tries to squeeze the column to be printed in as small a space as possible, ie it uses any shrinkability in the column. If the column was not explicitly broken (e.g. with `\pagebreak`) this may result in an overfull box message but except for this it will come out as expected (if you know what to expect).

The star form of this command is dedicated to Leslie Lamport, the other we need for ourselves (FMi, CAR).

These commands may well have unwanted effects if used soon before a `\clearpage`: please give keep them clear of such places.

`\@kludgeins` The insert which makes T<sub>E</sub>X do a lot of the necessary work. All we need to put into it is the amount by which the pagegoal should be changed.

```
1852 \newinsert \@kludgeins
1853 \global\dimen\@kludgeins \maxdimen
1854 \global\count\@kludgeins 1000
```

*(End definition for \@kludgeins. This function is documented on page ??.)*

`\enlargethispage` The user command.

```
\enlargethispage* 1855 \gdef \enlargethispage {%
1856     \ifstar
1857     {%
1858     <*trace>
1859     \fl@trace{Enlarging page height * }%
1860     </trace>
1861     \@enlargepage{\hbox{\kern\p@}}}%
1862     {%
1863     <*trace>
1864     \fl@trace{Enlarging page height exactly---}%
1865     </trace>
1866     \@enlargepage\@empty}%
1867 }
```

*(End definition for \enlargethispage and \enlargethispage\*. These functions are documented on page ??.)*

`\@enlargepage` This actually inserts the insert, after checking for extreme values of the change.

```
1868 \gdef\@enlargepage#1#2{%
1869 <*trace>
1870 \fl@trace{\@spaces\@spaces by #2}%
1871 </trace>
1872 \@tempkipa#2\relax
```

```

1873 \ifdim \@tempskipa>.5\maxdimen
1874 \latexerr{Suggested\space extra\space height\space
1875 (\the\@tempskipa)\space dangerously\space
1876 large}\@eha
1877 \else
1878 \ifdim \vsize<.5\maxdimen
1879 <*trace>
1880 \fl@trace {Kludgeins added--pagegoal before: \the\pagegoal}%
1881 </trace>
1882 \@bsphack
1883 \insert\@kludgeins{#1\vskip-\@tempskipa}%
1884 \@esphack
This next bit is for tracing only:
1885 <*trace>
1886 \ifvmode \par
1887 \fl@trace {Kludgeins added--pagegoal after: \the \pagegoal}%
1888 \fi
1889 </trace>
1890 \else
1891 \latexerr{Page\space height\space already\space
1892 too\space large}\@eha
1893 \fi
1894 \fi
1895 }
1896 </2ekernel>

```

(End definition for `\@enlargepage`. This function is documented on page ??.)

### 1.1.2 Float control

This part implements controllable floats and other changes to the float mechanism.

It provides, at the document level, the following command for inclusion in L<sup>A</sup>T<sub>E</sub>X2<sub>ε</sub>.

`\suppressfloats`

This suppresses all further floats on the current page.

With an optional argument it suppresses only floats only in certain positions on the current page.

[t] suppresses only floats at the top of the page [b] suppresses only floats at the bottom of the page

It also enables the use of an extra specifier, `!`, in the location optional argument of a float. If this is present then, just for this particular float, whenever it is processed by the float mechanism the followinghg are ignored:

- all restrictions on the number of floats which can appear;
- all explicit restrictions on the amount of space which should (not) be occupied by floats and/or text.

The mechanism will still attempt to ensure that pages are not overfull.

These specifiers override, for the single float, the suppression commands described above.

In its current form, it also supplies a reasonably exhaustive, and somewhat baroque, means of tracing some aspects of the float mechanism.

More tracing.

<code>\fl@trace</code> <code>\tracefloatsoff</code> <code>\tracefloats</code> <code>\fl@traceval</code> <code>\tracefloatvals</code> <code>\fl@tracemessage</code>	Set-up tracing for floats independent of other tracing as it produces mega-output. Default is no tracing. 1897 <code>&lt;*\fltrace&gt;</code> 1898 <code>\def \fl@tracemessage #1{{\let\@elt\@empty\typeout{LaTeX2e: #1}}}</code> 1899 <code>\def \tracefloats{\let \fl@trace \fl@tracemessage}</code> 1900 <code>\def \tracefloatsoff {\let \fl@trace \@gobble}</code> 1901 <code>\tracefloatsoff</code> 1902 <code>\def \fl@traceval #1{\fl@trace{\string #1 = \the #1}}</code> 1903 <code>\IncludeInRelease{2015/01/01}{\tracefloatvals}%</code> 1904 <code style="padding-left: 100px;">{trace float vals}%</code> 1905 <code>\def \tracefloatvals{%</code>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

As `\@dblfloatplacement` sets `\f@depth` it needs to be run inside a group, otherwise the float placement will test for the wrong value.<sup>28</sup>

```

1906 \begingroup
1907 \@dblfloatplacement
1908 \@floatplacement
1909 \fl@trace{***Float placement parameters:}%
1910 \fl@traceval\@colnum
1911 \fl@traceval\@colroom
1912 \fl@traceval\@topnum
1913 \fl@traceval\@toproom
1914 \fl@traceval\@botnum
1915 \fl@traceval\@botroom
1916 \fl@traceval\@fpmin
1917 \fl@trace{\string\textfraction = \textfraction}%
1918 \fl@traceval\@dbltopnum
1919 \fl@traceval\@dbltoproom
1920 \fl@trace{\string\textfraction = \textfraction}%
1921 \fl@trace{toplist: \@toplist}%
1922 \fl@trace{botlist: \@botlist}%
1923 \fl@trace{midlist: \@midlist}%
1924 \fl@trace{deferlist: \@deferlist}%
1925 \fl@trace{dbltoplist: \@dbltoplist}%
1926 %Fmi \fl@trace{dbldeferlist: \@dbldeferlist}%
1927 \endgroup
1928 }
1929 \EndIncludeInRelease
1930 \IncludeInRelease{0000/00/00}{\tracefloatvals}%
1931 style="padding-left: 100px;">{trace float vals}%
1932 \def \tracefloatvals{%
1933 \begingroup
1934 \@dblfloatplacement
1935 \@floatplacement
1936 \fl@trace{***Float placement parameters:}%

```

---

<sup>28</sup>This is a somewhat questionable design.

```

1937 \fl@traceval\@colnum
1938 \fl@traceval\@colroom
1939 \fl@traceval\@topnum
1940 \fl@traceval\@toproom
1941 \fl@traceval\@botnum
1942 \fl@traceval\@botroom
1943 \fl@traceval\@fpmin
1944 \fl@trace{\string\textfraction = \textfraction}%
1945 \fl@traceval\@dbltopnum
1946 \fl@traceval\@dbltoproom
1947 \fl@trace{\string\textfraction = \textfraction}%
1948 \fl@trace{toplist: \@toplist}%
1949 \fl@trace{botlist: \@botlist}%
1950 \fl@trace{midlist: \@midlist}%
1951 \fl@trace{deferlist: \@deferlist}%
1952 \fl@trace{dbltoplist: \@dbltoplist}%
1953 % next line only in old releases
1954 \fl@trace{dbldeferlist: \@dbldeferlist}%
1955 \endgroup
1956 }
1957 \EndIncludeInRelease

```

We need to make sure that `fltrace` comes before `flafter` to make the tracing work.

```

1958 \ifpackageloaded{flafter}
1959 { \PackageWarningNoLine
1960   {fltrace}{Load 'fltrace' before 'flafter'\MessageBreak
1961     Attempting to recover by reloading 'flafter'}%

```

Hide the fact that `flafter` was already loaded and then request it anew.

```

1962 \expandafter\let\csname ver@flafter.sty\endcsname\relax
1963 \def\reserved@a#1{%
1964   \expandafter\let\csname\string#1+flafter+IIR\endcsname\relax}%
1965 \reserved@a\@addtocurcol
1966 \reserved@a\@addtonextcol
1967 \RequirePackage{flafter}}{}
1968 </fltrace>

```

As the code for `flafter` will contain tracing calls so that it works in conjunction with `fltrace` we need to provide a dummy definition for `\fl@trace` in that package.

```

1969 <*flafter>
1970 \providecommand\fl@trace[1]{}
1971 </flafter>

```

*(End definition for \fl@trace and others. These functions are documented on page ??.)*

`\suppressfloats` Float suppression commands: these set the relevant counter globally to zero. Thus they  
`\@flstop` are overridden for a particular float by an `!` specifier.

```

1972 <*2ekernel>
1973 \def \suppressfloats {%
1974   \@ifnextchar [%
1975     \@flstop
1976     {\global \@colnum \z@}%
1977 }

```

Maybe this should be a loop over #1?

```

1978 \def \@flstop [#1]{%
1979     \if t#1%
1980         \global \@topnum \z@
1981     \fi
1982     \if b#1%
1983         \global \@botnum \z@
1984     \fi
1985 }
```

(End definition for `\suppressfloats` and `\@flstop`. These functions are documented on page ??.)

Manipulation of float placement and type; both their strings and the corresponding count registers.

`\@fpstype` First a new count register to go with `\@currtype`.  
`\@reqcolroom` Then a new skip register, for information needed to remove the `\@maxsep` conservatism: it is possible that this could use a temporary register.  
`\@textfloatsheight`

Finally a dimension register to hold the total height of in-text floats on the current page. This is needed to implement a major change in the functionality of `\@addtocurcol` which is, nevertheless, a bug fix. It is not local and therefore cannot be a temporary register.

```

1986 \newcount \@fpstype
1987 \newdimen \@reqcolroom
1988 \newdimen \@textfloatsheight
1989 \</2ekernel>
```

(End definition for `\@fpstype`, `\@reqcolroom`, and `\@textfloatsheight`. These functions are documented on page ??.)

`\@fpsadddefault` Adds the default placement to what is already there.  
 Should not need to change this, but could do it as follows:

```

def \@fpsadddefault {%
    \@temptokena \expandafter\expandafter\expandafter
        {\csname fps@\@captype \endcsname}%
    \edef \reserved@a {\the\@temptokena}%
    \@onelevel@sanitize \reserved@a
    \edef \@fps {\@fps\reserved@a}%

1990 \<2ekernel|fltrace>
1991 \def \@fpsadddefault {%
1992 \<*trace>
1993     \fl@trace{fps changed from: \@fps}%
1994 \</trace>
1995     \edef \@fps {\@fps\csname fps@\@captype \endcsname}%
1996     \@latex@warning {%
1997         No positions in optional float specifier.\MessageBreak
1998         Default added (so using '\@fps')}%
1999 }
```

(End definition for `\@fpsadddefault`. This function is documented on page ??.)

`\@setfloattypescounts` Sets counters `\@fpstype` and `\@currtype`.  
 $\text{BANG} == \text{bit4 of } \backslash\text{count}\backslash\text{@currbox} = 0.$

```

2000 \def \@setfloattypescounts {%
2001   \@currtype \count\@currbox
2002   \@fpstype \count\@currbox
2003   \divide\@currtype\@xxxii \multiply\@currtype\@xxxii
2004   \advance \@fpstype -\@currtype
2005   (*trace)
2006   \fl@trace{(mod 32) fpstype: \the \@fpstype}%
2007   \fl@trace{(mult of 32) currtype: \the \@currtype}%
2008   % Tracing only: but some should be changed into real errors/warnings?
2009   \ifnum \@fpstype<\sist@n
2010     \ifnum \@fpstype=\z@
2011       \fl@trace{ERROR: no PLACEMENT, fpstype = \the \@fpstype = 0?}%
2012     \fi
2013     \ifnum \@fpstype=\@ne
2014       \fl@trace{WARNING: only h, fpstype = \the \@fpstype = 1?}%
2015     \fi
2016     \fl@trace{BANG float}%
2017   \else
2018     \ifnum \@fpstype=\sist@n
2019       \fl@trace{ERROR: no PLACEMENT, fpstype = \the \@fpstype = 16?}%
2020     \fi
2021     \ifnum \@fpstype=17
2022       \fl@trace{WARNING: only h, fpstype = \the \@fpstype = 17?}%
2023     \fi
2024     \fl@trace{ORD float}%
2025   \fi
2026   (/trace)
2027 }
2028 (/2ekernel | fltrace)

```

*(End definition for \@setfloattypescounts. This function is documented on page ??.)*

Macros for getting, testing and setting bits of the fps.

`\@getfpsbit` Sets `\@tempcnta` to required bit of `\count\@currbox`.

```

2029 (*2ekernel)
2030 \def \@getfpsbit {%
2031   \@boxfpsbit \@currbox
2032 }

```

*(End definition for \@getfpsbit. This function is documented on page ??.)*

`\@boxfpsbit` Used above.

```

2033 \def \@boxfpsbit #1#2{%
2034   \@tempcnta \count#1%
2035   \divide \@tempcnta #2\relax
2036 }

```

*(End definition for \@boxfpsbit. This function is documented on page ??.)*

`\@testfp` New definition of the float page test.

```

2037 \def \@testfp #1{%
2038   \@boxfpsbit #18\relax % Really ‘#1 8’ for human readers!

```

```

2039 \ifodd \@tempcnta
2040 \else
2041 \@testtrue
2042 \fi
2043 }

```

*(End definition for \@testfp. This function is documented on page ??.)*

**\@setfpsbit** Sets required bit of \@tempcnta (to 1).

```

2044 \def \@setfpsbit #1{%
2045 \tempcntb \@tempcnta
2046 \divide \tempcntb #1\relax
2047 \ifodd \tempcntb
2048 \else
2049 \advance \tempcnta #1\relax
2050 \fi
2051 }
2052 </2ekernel>

```

*(End definition for \@setfpsbit. This function is documented on page ??.)*

**\@resethfps** Globally adds t as a possible location for an h or !h only placement: this must be done using the count.

Although it will leave \@fpstype set to 17 even if it was originally 1, this does not matter since it is the last thing in \@addtocurcol.

```

2053 <*2ekernel|fltrace>
2054 \def \@resethfps {%
2055 \let\reserved@a\@empty
2056 \ifnum \@fpstype=\@ne
2057 \def \reserved@a {!}%
2058 \@fpstype 17
2059 \fi
2060 \ifnum \@fpstype=17
2061 \global \advance \count\currbox \tw@
2062 \@latex@warning@no@line {%
2063 '\reserved@a h' float specifier changed to '\reserved@a ht'}%
2064 <*trace>
2065 \fl@trace{%
2066 't' added to '\reserved@a h'- new Count: \the \count\currbox}%
2067 </trace>
2068 \fi
2069 }

```

*(End definition for \@resethfps. This function is documented on page ??.)*

Special stuff for BANG floats.

**\@flsetnum** Ignores any zero float counter value in case BANG.

It uses a local assignment to the normally global counter: a bit naughty, perhaps?

These assignments are safe so long as the counter involved is only consulted once (i.e. only for the 'bang float') with the changed value. This is the case within \@addtocurcol because it is used only once within a call of the output routine (which forms a group).

For \@addtonextcol this is achieved by putting a group around its code; this is needed because it is called (by \@startcolumn) for each float which was on the deferlist.



Almost identical considerations pertain to \@addtodblcol. There may be more efficient ways to handle this, but the group seems to be the simplest.

```

2070 \def \@flsetnum #1{%
2071 \< *trace>
2072 \fl@trace{fpstype: \the \@fpstype (flsetnum \string#1)}%
2073 \< /trace>
2074 \ifnum \@fpstype<\sist@@n
2075 \ifnum #1=\z@
2076 \< *trace>
2077 \fl@trace{BANG float resetting \string#1 to 1}%
2078 \< /trace>
2079 #1\@ne
2080 \fi
2081 \fi
2082 \< *trace>
2083 \fl@trace{#1 (before) = \the #1}%
2084 \< /trace>
2085 }

```

*(End definition for \@flsetnum. This function is documented on page ??.)*

**\@flsettextmin** This ignores \textfraction space restriction in case BANG.

```

2086 \def \@flsettextmin {%
2087 \< *trace>
2088 \fl@trace{fpstype: \the \@fpstype (flsettextmin)}%
2089 \< /trace>
2090 \ifnum \@fpstype<\sist@@n
2091 \< *trace>
2092 \fl@trace{BANG ignoring textmin}%
2093 \< /trace>
2094 \@textmin \z@
2095 \else
2096 \@textmin \textfraction\@colht
2097 \< *trace>
2098 \fl@trace{ORD textmin = \the \@textmin}%
2099 \< /trace>
2100 \fi
2101 }

```

*(End definition for \@flsettextmin. This function is documented on page ??.)*

**\@flcheckspace** This ignores space restriction in case BANG; this is still slightly conservative since it does not allow for the fact that, if there is no text in the column then \textfloatsep is not needed. Sets @tempwa true if there is room for \@currbox.

```

2102 \def \@flcheckspace #1#2{%
2103 \advance \@reqcolroom
2104 \ifx #2\@empty \textfloatsep \else \floatsep \fi
2105 \< *trace>
2106 \fl@trace{colroom = \the \@colroom
2107 \< /trace> (flcheckspace \string#1 \string#2)}%
2108 \fl@trace{reqcolroom = \the \@reqcolroom
2109 \< /trace> (flcheckspace \string#1 \string#2)}%
2110 \< /trace>

```

```

2111 \ifdim \@colroom>\@reqcolroom
2112 \ifdim #1>\ht\@currbox
2113 \@tempwattrue
2114 <*trace>
2115 \fl@trace{Space OK: #1 = \the #1 > \the \ht \@currbox
2116 (flcheckspace \string#1 \string#2)}%
2117 </trace>
2118 \else
2119 <*trace>
2120 \fl@trace{fpstype: \the \@fpstype
2121 (flcheckspace \string#1 \string#2)}%
2122 </trace>
2123 \ifnum \@fpstype<\sixt@n
2124 <*trace>
2125 \fl@trace{BANG float ignoring #1
2126 (flcheckspace \string#1 \string#2):}%
2127 \fl@trace{\@spaces #1 = \the #1. Ht float: \the \ht \@currbox
2128 BANG}%
2129 </trace>
2130 \@tempwattrue
2131 <*trace>
2132 \else
2133 \fl@trace{Fail---no room (flcheckspace \string#1 \string#2)
2134 (fpstype \the \@fpstype=ORD?):}%
2135 \fl@trace{\@spaces #1 = \the #1. Ht float: \the \ht \@currbox
2136 ORD?}%
2137 </trace>
2138 \fi
2139 \fi
2140 <*trace>
2141 \else
2142 \fl@trace{Fail---no room at 2nd test of colroom
2143 (flcheckspace \string#1 \string#2)}%
2144 </trace>
2145 \fi
2146 }
2147 </2ekernel | fltrace>

```

(End definition for \@flcheckspace. This function is documented on page ??.)

**\@flupdates** This updates everything when a float is placed.

```

2148 <*2ekernel>
2149 \def \@flupdates #1#2#3{%
2150 \global \advance #1\m@ne
2151 \global \advance \@colnum \m@ne
2152 \@tempdima -\ht\@currbox
2153 \advance \@tempdima
2154 -\ifx #3\@empty \textfloatsep \else \floatsep \fi
2155 \global \advance #2\@tempdima
2156 \global \advance \@colroom \@tempdima
2157 \@cons #3\@currbox
2158 }
2159 </2ekernel>

```

(End definition for `\flupdates`. This function is documented on page ??.)

Interesting facts about float mechanisms past and present, together with a summary of various features, some unresolved:

1. The value `\textfraction` does not affect the processing of doublecol floats: this seems sensible, but should be documented.
2. `\twocolumn floatplacement` was wrong: `dbl` not needed, `ord` needed.
3. `\floatplacement` was not called after `\startdblcol` or `\topnewpage`. This has been changed; it is clearly a bug fix.
4. The use `\topnewpage` when `\dblfigrule` is non-trivial produced a rule in the wrong place. This has been fixed by not using `\dblfigrule` when processing the ‘float’ from `\topnewpage`.
5. If the specifier was just `h` and the float could not be put here, it went on the deferlist and stayed there until a `clearpage`. It now gets changed to a ‘th’: this is only an error-recovery action, putting just `h` or `!h` should be deprecated.
6. `\dblmaxsep` was ‘the maximum of `\dblfloatsep` and `\dbltextfloatsep`’. But it was never used! Now gone completely, like `\maxsep`.
7. After an `h` float is put on a page, it was counted as text when applying the `\textfraction` test; this is possibly too big a change although it is a bug fix?
8. Two consecutive `h` floats are separated by twice `\intertextsep`: this could be changed to one by use of `\addvspace`, OK? Note that it would also mean that less space is put in if an `h` float immediately follows other spaces. This is also possibly too big a change, at least for compatibility mode? Or it may be simply wrong! It has not been changed.
9. Now `\addtocurcol` checks first for just `p` fps. I think that this is an increase in efficiency, but maybe the coding should be made even more efficient.
10. `\tryfcolumn` now tests if the list is empty first, otherwise lots of wasted time! Thus this test has been removed from `\startcolumn`. As Frank pointed out, this makes `\startcolumn` less efficient. But it is now the same as `\startdblcolumn`: I can see no reason why they should be different, but which is best?
11. Why is `\colroom` set in `\doclearpage`?
12. Footnotes. Check what `\clearpage` does when footnotes are left over. Footnotes are not put on float pages and, also, `\addtonextcol` ignores the existence of held-over footnotes in deciding what floats can go on the page. Not changed.
13. `\clearpage` can still lose non-boxes, at least when floats are involved. It also moves some to the ‘wrong page’, but this may be a coding problem.
14. The `!` option makes it necessary to check in `\output` that there is enough room left on the page after adding a float. (This would have been necessary anyway if anyone set `\textmin` too close to zero! A similar danger existed also if the text in a `\twocolumn[text]` entity gets too large.) The current implementation of this also makes the normal case a little less efficient, OK? Not enough room means, at present, less than `\baselineskip`, with a warning: is this OK? Should it be made generic (another parameter)?

15. There are four possibilities for supporting this:

```
\twocolumn[\maketitle more text]
```

One is to change `\maketitle` slightly to allow this. Another is to change `\@topnewpage` so that more than one `\twocolumn[]` command is allowed; in this case `\maketitle\twocolumn[more text]` will work. The former is more robust from the user's viewpoint, but makes the code for `\maketitle` rather ad hoc (maybe it is already?). Another is to misuse the global `twocolumn` flag locally within `\@topnewpage`. Yet another is to move the column count register from the `multicol` package into the kernel. This has been done.

16. Where should the reinserts be put to maximise the probability that footnotes come out on the correct page? Or should we go for as much compatibility as possible (but see next item)?
17. Should we continue to support (as much as possible) `\samepage`? Some of its intended functionality is now advertised as being provided by `\enlargethispage`. Use of either is likely to result in wrongly placed footnotes, marginals, etc. Which should have priority: obeying the pagination instructions, or correct placement of notes/marginalia?
18. Is the adjustment of space to cause shrinking in the kludge-\* case correct? Should it be limited to 0pt?
19. Is the setting of `\boxmaxdepth` in `makecol` and friends needed? It only has any effect if `\@textbottom` ends with a box or rule, in which case the `vskip` to allow for its depth should also be added. If it is kept, it should probably be the last thing in the box. It has now been removed.
- It would perhaps be better to document that `\@textbottom` and `\@texttop` must have natural height 0pt.
20. I cannot see why the `vskip` adjustment for the depth is needed if `boxmaxdepth` is used to ensure that there is never a too deep box.
21. The value of `\boxmaxdepth` should be explicitly set whenever necessary: it is too risky to assume that it has any particular value. Care is needed in deciding what to set it to.
- It is interesting to note that the value of `\boxmaxdepth` is unique in being read before the local settings for the box group are reset; all other parameter settings which affect the box construction use their values outside the box group.
22. Should `\@maxdepth` store the setting of `\maxdepth` from `lplain`? Or should we provide a proper interface to class files for setting these?

An analysis of various other macros.

`\@opcol` should do `\@floatplacement`, but where? Right at the end, since it always occurs at the start of a column.

```
\def\@opcol{%
% Why is this done first?
\global \@mparbottom \z@
\if@twocolumn
```

```

\@outputdblcol
\else
\@outputpage
% This is not needed since it is done at the end of
% |\@outputpage|:
\global \colht \textheight
\fi}

Only tracing has been added to these.
2160 <latexrelease|fltrace>\IncludeInRelease{2017/01/01}%
2161 <latexrelease|fltrace> {\@makefcolumn}{negative height floats}%
2162 <*2ekernel|fltrace|latexrelease>
2163 \def\@makefcolumn #1{%
2164 \begingroup

2165 \@fpmin -\maxdimen
2166 \let \@testfp \@gobble
2167 \@tryfcolumn #1%
2168 \endgroup
2169 <*trace>
2170 \if@fcolmade
2171 \fl@trace{PAGE: in \string\clearpage
2172 \if@twocolumn ---twocolumn\fi---}%
2173 \fl@trace{----- float column/page completed from \string#1}%
2174 \fi
2175 </trace>
2176 }

2177 <latexrelease|fltrace>\EndIncludeInRelease
2178 <latexrelease|fltrace>\IncludeInRelease{0000/00/00}%
2179 <latexrelease|fltrace> {\@makefcolumn}{negative height floats}%
2180 <latexrelease|fltrace>\def\@makefcolumn #1{%
2181 <latexrelease|fltrace> \begingroup
2182 <latexrelease|fltrace> \@fpmin \z@
2183 <latexrelease|fltrace> \let \@testfp \@gobble
2184 <latexrelease|fltrace> \@tryfcolumn #1%
2185 <latexrelease|fltrace> \endgroup
2186 <*trace>
2187 <latexrelease|fltrace> \if@fcolmade
2188 <latexrelease|fltrace> \fl@trace{PAGE: in \string\clearpage
2189 <latexrelease|fltrace> \if@twocolumn ---twocolumn\fi---}%
2190 <latexrelease|fltrace> \fl@trace{----- float column/page completed
2191 <latexrelease|fltrace> from \string#1}%
2192 <latexrelease|fltrace> \fi
2193 </trace>
2194 <latexrelease|fltrace>}
2195 <latexrelease|fltrace>\EndIncludeInRelease
2196 </2ekernel|fltrace|latexrelease>

```

This will line up the last baselines in the two columns provided they are constructed in the normal way: i.e. ending in a skip of minus the original depth, with `\@textbottom` adding nothing.

Thus again it is essential for `\@textbottom` to have depth 0pt.

```

2197 <latexrelease|fltrace>\IncludeInRelease{2015/01/01}%

```

```

2198 <latexrelease | fltrace> {\@outputdblcol}{2 column marks}%
2199 <*2ekernel | fltrace | latexrelease>

```

This is just a change to the single command `\@outputdblcol` so that it saves mark information for the first column and restores it in the second column.

```

2200 \def\@outputdblcol{%
2201   \if@firstcolumn
2202     \global\@firstcolumnfalse

```

Save the left column

```

2203     \global\setbox\@leftcolumn\copy\@outputbox
2204 <fltrace>   \fl@trace{PAGE: first column boxed}%

```

Remember the marks from the first column

```

2205     \splitmaxdepth\maxdimen
2206     \vbadness\maxdimen

```

In case of `\enlargethispage` we will have infinite negative glue at the bottom of the page (coming from `\vss`) and that will earn us an error message if we `\vsplit` to get at the marks. So we need to remove the last glue (if any) at the end of `\@outputbox` as we are only interested in marks that change doesn't matter.

```

2207     \setbox\@outputbox\vbox{\unvbox\@outputbox\unskip}%
2208     \setbox\@outputbox\vsplit\@outputbox to\maxdimen

```

One minor difference from the current `fixmarks` package, pass the marks through a token register to stop any `#` tokens causing an error in a `\def`.

```

2209     \toks@\expandafter{\topmark}%
2210     \xdef\@firstcoltopmark{\the\toks@}%
2211     \toks@\expandafter{\splitfirstmark}%
2212     \xdef\@firstcolfirstmark{\the\toks@}%

```

This test does not work if truly empty marks have been inserted, but  $\text{\LaTeX}$  marks should always have (at least) two brace groups. (Except before the first mark is used, when the marks are empty, but that is OK here.)

```

2213     \ifx\@firstcolfirstmark\@empty
2214       \global\let\@setmarks\relax
2215     \else
2216       \gdef\@setmarks{%
2217         \let\firstmark\@firstcolfirstmark
2218         \let\topmark\@firstcoltopmark}%
2219     \fi

```

End of change

```

2220   \else
2221     \global\@firstcolumntrue
2222     \setbox\@outputbox\vbox{%
2223       \hb@xt@\textwidth{%
2224         \hb@xt@\columnwidth{\box\@leftcolumn \hss}%
2225         \hfil

```

The color of the `\vrule` should be `\normalcolor` as to not inherit the color from the column.

```

2226         {\normalcolor\vrule \@width\columnseprule}%
2227         \hfil
2228       \hb@xt@\columnwidth{\box\@outputbox \hss}}}%
2229 <fltrace>   \fl@trace{PAGE: second column also boxed}%
2230     \@combinedblfloats

```

Override current first and top with those of first column if necessary

```

2231 \setmarks
End of change
2232 \@outputpage
2233 <fltrace> \fl@trace{PAGE: two column page completed}%
2234 \begingroup
2235 \dblfloatplacement
2236 \@startdblcolumn
2237 \@whilesw\if@fcolmade \fi{\@outputpage
2238 <fltrace> \fl@trace{PAGE: double float page completed}%
2239 \@startdblcolumn}%
2240 \endgroup
2241 \fi}%

2242 <latexrelease | fltrace> \EndIncludeInRelease
2243 <latexrelease | fltrace> \IncludeInRelease{0000/00/00}%
2244 <latexrelease | fltrace> {\@outputdblcol}{2 column marks}%
2245 <latexrelease | fltrace> \def\@outputdblcol{%
2246 <latexrelease | fltrace> \if@firstcolumn
2247 <latexrelease | fltrace> \global \@firstcolumnfalse
2248 <latexrelease | fltrace> \global \setbox\@leftcolumn \box\@outputbox
2249 <*trace>
2250 <latexrelease | fltrace> \fl@trace{PAGE: first column boxed}%
2251 </trace>
2252 <latexrelease | fltrace> \else
2253 <latexrelease | fltrace> \global \@firstcolumntrue
2254 <latexrelease | fltrace> \setbox\@outputbox \vbox {%
2255 <latexrelease | fltrace> \hb@xt@\textwidth {%
2256 <latexrelease | fltrace> \hb@xt@\columnwidth {%
2257 <latexrelease | fltrace> \box\@leftcolumn \hss}%
2258 <latexrelease | fltrace> \hfil
2259 <latexrelease | fltrace> {\normalcolor\vrule
2260 <latexrelease | fltrace> \@width\columnseprule}%
2261 <latexrelease | fltrace> \hfil
2262 <latexrelease | fltrace> \hb@xt@\columnwidth {%
2263 <latexrelease | fltrace> \box\@outputbox \hss}%
2264 <latexrelease | fltrace> }%
2265 <latexrelease | fltrace> }%
2266 <*trace>
2267 <latexrelease | fltrace> \fl@trace{PAGE: second column also boxed}%
2268 </trace>
2269 <latexrelease | fltrace> \@combinedblfloats
2270 <latexrelease | fltrace> \@outputpage
2271 <*trace>
2272 <latexrelease | fltrace> \fl@trace{PAGE: two column page completed}%
2273 </trace>
2274 <latexrelease | fltrace> \begingroup
2275 <latexrelease | fltrace> \dblfloatplacement
2276 <latexrelease | fltrace> \@startdblcolumn

```

This loop could be replaced by an `\expandafter` tail recursion in `\@startdblcolumn`.

```

2277 <latexrelease | fltrace> \@whilesw\if@fcolmade \fi
2278 <latexrelease | fltrace> {\@outputpage

```

```

2279 <*trace>
2280 <latexrelease | fltrace>      \fl@trace{PAGE: double float page completed}%
2281 </trace>
2282 <latexrelease | fltrace>      \@startdblcolumn}%
2283 <latexrelease | fltrace>      \endgroup
2284 <latexrelease | fltrace>      \fi
2285 <latexrelease | fltrace>}%
2286 <latexrelease | fltrace>\EndIncludeInRelease
2287 </2ekernel | fltrace | latexrelease>

```

### 1.1.3 Float placement parameters

The main purpose of this section is to ensure that all the float-placement parameters which need to be set in a class file or package have been declared. It also describes their use and sets values for them which are reasonable for typical documents using US letter or A4 sized paper.

#### Limits for the placement of floating objects

- \c@topnumber** This counter holds the maximum number of floats that can appear at the top of a text page or column.
- ```

2288 <*2ekernel>
2289 \newcount\c@topnumber
2290 \setcounter{topnumber}{2}

```
- (End definition for \c@topnumber. This function is documented on page ??.)*
- \topfraction** This macro holds the maximum proportion (as a decimal number) of a text page or column that can be occupied by floats at the top.
- ```

2291 \newcommand\topfraction{.7}

```
- (End definition for \topfraction. This function is documented on page ??.)*
- \c@bottomnumber** This counter holds the maximum number of floats that can appear at the bottom of a text page or column.
- ```

2292 \newcount\c@bottomnumber
2293 \setcounter{bottomnumber}{1}

```
- (End definition for \c@bottomnumber. This function is documented on page ??.)*
- \bottomfraction** This macro holds the maximum proportion (as a decimal number) of a text page or column that can be occupied by floats at the bottom.
- ```

2294 \newcommand\bottomfraction{.3}

```
- (End definition for \bottomfraction. This function is documented on page ??.)*
- \c@totalnumber** This counter holds the maximum number of floats that can appear on any text page or column.
- ```

2295 \newcount\c@totalnumber
2296 \setcounter{totalnumber}{3}

```
- (End definition for \c@totalnumber. This function is documented on page ??.)*



|                                    |                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\textfraction</code>         | This macro holds the minimum proportion (as a decimal number) of a text page or column that must be occupied by text.<br>2297 <code>\newcommand\textfraction{.2}</code><br><i>(End definition for <code>\textfraction</code>. This function is documented on page ??.)</i>                                                                            |
| <code>\floatpagefraction</code>    | This macro holds the minimum proportion (as a decimal number) of a page or column that must be occupied by floating objects before a ‘float page’ is produced.<br>2298 <code>\newcommand\floatpagefraction{.5}</code><br><i>(End definition for <code>\floatpagefraction</code>. This function is documented on page ??.)</i>                         |
| <code>\c@dbltopnumber</code>       | This counter holds the maximum number of double-column floats that can appear on the top of a two-column text page.<br>2299 <code>\newcount\c@dbltopnumber</code><br>2300 <code>\setcounter{dbltopnumber}{2}</code><br><i>(End definition for <code>\c@dbltopnumber</code>. This function is documented on page ??.)</i>                              |
| <code>\dbltopfraction</code>       | This macro holds the maximum proportion (as a decimal number) of a two-column text page that can be occupied by double-column floats at the top.<br>2301 <code>\newcommand\dbltopfraction{.7}</code><br><i>(End definition for <code>\dbltopfraction</code>. This function is documented on page ??.)</i>                                             |
| <code>\dblfloatpagefraction</code> | This macro holds the minimum proportion (as a decimal number) of a page that must be occupied by double-column floating objects before a ‘double-column float page’ is produced.<br>2302 <code>\newcommand\dblfloatpagefraction{.5}</code><br><i>(End definition for <code>\dblfloatpagefraction</code>. This function is documented on page ??.)</i> |

### Floats on a text page

|                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\floatsep</code><br><code>\textfloatsep</code><br><code>\intextsep</code> | When a floating object is placed on a page with text, these parameters control the separation between the float and the other objects on the page. These parameters are used for both one-column mode and single-column floats in two-column mode. They are all rubber lengths.<br><code>\floatsep</code> is the space between adjacent floats that are placed at the top or bottom of the text page or column.<br><code>\textfloatsep</code> is the space between the main text and floats at the top or bottom of the page or column.<br><code>\intextsep</code> is the space between in-text floats and the text.<br>2303 <code>\newskip\floatsep</code><br>2304 <code>\newskip\textfloatsep</code><br>2305 <code>\newskip\intextsep</code><br>2306 <code>\setlength\floatsep {12\p@ \@plus 2\p@ \@minus 2\p@}</code><br>2307 <code>\setlength\textfloatsep{20\p@ \@plus 2\p@ \@minus 4\p@}</code><br>2308 <code>\setlength\intextsep {12\p@ \@plus 2\p@ \@minus 2\p@}</code><br><i>(End definition for <code>\floatsep</code>, <code>\textfloatsep</code>, and <code>\intextsep</code>. These functions are documented on page ??.)</i> |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

`\dblfloatsep` `\dbltextfloatsep` When double-column floats (floating objects that span the whole `\textwidth`) are placed at the top of a text page in two-column mode, the separation between the float and the text is controlled by `\dblfloatsep` and `\dbltextfloatsep`. They are rubber lengths.

`\dblfloatsep` is the space between adjacent double-column floats placed at the top of the text page.

`\dbltextfloatsep` is the space between the main text and double-column floats at the top of the page.

```
2309 \newskip\dblfloatsep
2310 \newskip\dbltextfloatsep
2311 \setlength\dblfloatsep{12\p@ \@plus 2\p@ \@minus 2\p@}
2312 \setlength\dbltextfloatsep{20\p@ \@plus 2\p@ \@minus 4\p@}
```

*(End definition for `\dblfloatsep` and `\dbltextfloatsep`. These functions are documented on page ??.)*

### Floats on their own page or column

`\@fptop` `\@fpsep` `\@fpbot` When floating objects are placed on a separate page or column, called a ‘float page’, the layout of the page is controlled by these parameters, which are rubber lengths.

At the top of the page `\@fptop` is inserted; typically this supplies some stretchable whitespace. At the bottom of the page `\@fpbot` is inserted. Between adjacent floats `\@fpsep` is inserted.

These parameters are used for all floating objects on a ‘float page’ in one-column mode, and for single-column floats in two-column mode.

Note that at least one of the two parameters `\@fptop` and `\@fpbot` should contain a `plus ...fil` so as to fill the remaining empty space.

```
2313 \newskip\@fptop
2314 \newskip\@fpsep
2315 \newskip\@fpbot
2316 \setlength\@fptop{0\p@ \@plus 1fil}
2317 \setlength\@fpsep{8\p@ \@plus 2fil}
2318 \setlength\@fpbot{0\p@ \@plus 1fil}
```

*(End definition for `\@fptop`, `\@fpsep`, and `\@fpbot`. These functions are documented on page ??.)*

`\@dblftop` Double-column ‘float pages’ in two-column mode use similar parameters.

```
\@dblfpsep 2319 \newskip\@dblftop
\@dblfpbot 2320 \newskip\@dblfpsep
2321 \newskip\@dblfpbot
2322 \setlength\@dblftop{0\p@ \@plus 1fil}
2323 \setlength\@dblfpsep{8\p@ \@plus 2fil}
2324 \setlength\@dblfpbot{0\p@ \@plus 1fil}
```

*(End definition for `\@dblftop`, `\@dblfpsep`, and `\@dblfpbot`. These functions are documented on page ??.)*

`\topfigrule` `\botfigrule` `\dblfigrule` The macros can be used to put in rules between floats and text; whatever they insert should be vertical mode material which takes up zero space.

```
2325 \let\topfigrule=\relax
2326 \let\botfigrule=\relax
2327 \let\dblfigrule=\relax
2328 \endkernel
```

*(End definition for `\topfigrule`, `\botfigrule`, and `\dblfigrule`. These functions are documented on page ??.)*

## File T

# lthyphen.dtx

This file contains the code for loading hyphenation patterns into L<sup>A</sup>T<sub>E</sub>X. Most of this will end up in a file called `hyphen.ltx`. If you wish to customize your L<sup>A</sup>T<sub>E</sub>X system in respect of hyphenation patterns, write a file `hyphen.cfg`. If this file exists, it will be loaded instead of `hyphen.ltx`. See the comments below for additional information.

To produce the printed version of this file the following code is used. It can be extracted with the DOCSTRIP program, or one can run this file directly through L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>.

```
1 <*driver>
2 \documentclass{ltxdoc}
3 \begin{document}
4 \DocInput{lthyphen.dtx}
5 \end{document}
6 </driver>
```

The default file `hyphen.ltx` loads hyphenation patterns for US english. If you want to load additional or other hyphenation patterns, you should create a file `hyphen.cfg`. This is best done by starting from `hyphen.ltx`.

For backward compatibility, the default file, `hyphen.ltx`, first tries to load the file `hyphen.tex`. If this file exists, an information message is issued and the appropriate defaults for T<sub>E</sub>X's internal parameters are set: `\language` is initialized to 0, and `\lefthyphenmin` and `\righthyphenmin` to 2 and 3, respectively, to disallow x- or -xx breaks.

```
7 <*default>
8 \InputIfFileExists{hyphen.tex}%
9   {\message{Loading hyphenation patterns for US english.}}%
10   \language=0
11   \lefthyphenmin=2 \righthyphenmin=3 }%
```

Otherwise, since we cannot do anything without any hyphenation patterns, an error message is printed and the IniT<sub>E</sub>X run is terminated by invoking `\@@end` (which is the L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> name for T<sub>E</sub>X's `\end` primitive).

```
12   {\errhelp{The configuration for hyphenation is incorrectly
13             installed.^^J%
14             If you don't understand this error message you need
15             to seek^^Jexpert advice.}%
16   \errmessage{OOPS! I can't find any hyphenation patterns for
17             US english.^^J \space Think of getting some or the
18             latex2e setup will never succeed}\@@end}
19 </default>
```

The following example describes the possible contents of a file `hyphen.cfg` that will load both US English and German hyphenation patterns, making the former the default. It sets `\language` to 0 for the US patterns and to 1 for the German patterns. Then `\language` is set to 0 to make this the default and the default values of `\lefthyphenmin` and `\righthyphenmin` are set.

```
language=0
input hyphen % (or \input ushyphen1 if the file has been renamed)
language=1
input ghyph31
```

```
language=0
lefthyphenmin=2
righthyphenmin=3
endinput
```

Another possibility is to use the package `babel`, by Johannes Braams. That package is distributed with a suitable `hyphen.cfg` file.

# File U

## ltxfinal.dtx

### 1 Final settings

This section contains the final settings for L<sup>A</sup>T<sub>E</sub>X. It initialises some debugging and typesetting parameters, sets the default `\catcodes` and `uc/lc` codes, and inputs the hyphenation file.

#### 1.1 Debugging

By default, L<sup>A</sup>T<sub>E</sub>X shows statistics:

```
1 \*2ekernel
2 \tracingstats1
```

#### 1.2 Typesetting parameters

```
\@lowpenalty These are penalties used internally.
\@medpenalty 3 \newcount\@lowpenalty
\@highpenalty 4 \newcount\@medpenalty
5 \newcount\@highpenalty
```

*(End definition for \@lowpenalty, \@medpenalty, and \@highpenalty. These functions are documented on page ??.)*

```
\newmarks Allocate extended marks types if etex is active. Placed here at the end of the format to
increase compatibility with count allocations in earlier releases.
```

```
6 \</2ekernel>
7 \*2ekernel | latexrelease>
8 \<latexrelease>\IncludeInRelease{2015/01/01}%
9 \<latexrelease> \newmarks}{Extended Allocation}%
10 \ifx\marks\@undefined\else
11 \def\newmarks{%
12 \e@alloc\marks \e@alloc@chardef{\count256}\m@ne\e@alloc@top}
13 \fi
14 \</2ekernel | latexrelease>
15 \<latexrelease>\EndIncludeInRelease
16 \<latexrelease>\IncludeInRelease{0000/00/00}%
17 \<latexrelease> \newmarks}{Extended Allocation}%
18 \<latexrelease>\let\newmarks\@undefined
19 \<latexrelease>\EndIncludeInRelease
20 \*2ekernel>
```

*(End definition for \newmarks. This function is documented on page ??.)*

```
\newXeTeXintercharclass Allocate \XeTeXintercharclass types if xetex is active. previously defined in xetex.ini.
\XeTeXalloc@intercharclass
\XeTeXalloc@intercharclass@top
21 \</2ekernel>
22 \*2ekernel | latexrelease>
23 \<latexrelease>\IncludeInRelease{2015/01/01}%
24 \<latexrelease> {\newXeTeXintercharclass}{Extended Allocation}%
```

Classes allocated 1 to 4094 (or 254 on older xetex) (In earlier XeLaTeX versions 1, 2 and 3 were pre-set for CJK).

```

25 \ifx\XeTeXcharclass\@undefined
26 \else
27 \ifdim\the\XeTeXversion\XeTeXrevision\p@>0.99993\p@
28 \chardef\Xe@alloc@intercharclass@top=4095
29 \else
30 \chardef\Xe@alloc@intercharclass@top=255
31 \fi
32 \def\newXeTeXintercharclass{%
33 \Xe@alloc\XeTeXcharclass
34 \chardef\Xe@alloc@intercharclass\m@ne\Xe@alloc@intercharclass@top}
35 \fi
36 </2ekernel | latexrelease>
37 <latexrelease>\EndIncludeInRelease
38 <latexrelease>\IncludeInRelease{0000/00/00}%
39 <latexrelease> \{newXeTeXintercharclass\}{Extended Allocation}%
40 <latexrelease> \ifx\XeTeXcharclass\@undefined
41 <latexrelease> \else
42 <latexrelease> \def\Xe@alloc@#1#2#3#4#5{\global\advance#1\@ne
43 <latexrelease> \Xe@ch@ck#1#4#2%
44 <latexrelease> \allocationnumber#1%
45 <latexrelease> \global#3#5\allocationnumber
46 <latexrelease> \wlog{\string#5=\string#2\the\allocationnumber}}
47 <latexrelease> \def\Xe@ch@ck#1#2#3{%
48 <latexrelease> \ifnum#1<#2\else
49 <latexrelease> \errmessage{No room for a new #3}%
50 <latexrelease> \fi}
51 <latexrelease> \def\newXeTeXintercharclass{%
52 <latexrelease> \Xe@alloc@\Xe@alloc@intercharclass
53 <latexrelease> \XeTeXcharclass\chardef\@cclv}
54 <latexrelease> \fi
55 <latexrelease>\EndIncludeInRelease
56 <*2ekernel | latexrelease>
57 <latexrelease>\IncludeInRelease{2016/02/01}%
58 <latexrelease> {\Xe@alloc@intercharclass}{Start of XeTeX class allocator}%
59 \ifx\XeTeXcharclass\@undefined
60 \else
61 \countdef\Xe@alloc@intercharclass=257
62 \Xe@alloc@intercharclass=\z@
63 \fi
64 </2ekernel | latexrelease>
65 <latexrelease>\EndIncludeInRelease
66 <latexrelease>\IncludeInRelease{2015/01/01}%
67 <latexrelease> {\Xe@alloc@intercharclass}{Start of XeTeX class allocator}%
68 <latexrelease> \ifx\XeTeXcharclass\@undefined
69 <latexrelease> \else
70 <latexrelease> \Xe@alloc@intercharclass=\thr@@
71 <latexrelease> \fi
72 <latexrelease>\EndIncludeInRelease
73 <latexrelease>\IncludeInRelease{0000/00/00}%
74 <latexrelease> {\Xe@alloc@intercharclass}{Start of XeTeX class allocator}%
75 <latexrelease> \ifx\XeTeXcharclass\@undefined

```

```

76 <latexrelease> \else
77 <latexrelease> \newcount\xe@alloc@intercharclass
78 <latexrelease> \xe@alloc@intercharclass=\thr@@
79 <latexrelease> \fi
80 <latexrelease>\EndIncludeInRelease
81 <*2ekernel>

```

(End definition for `\newXeTeXintercharclass`, `\xe@alloc@intercharclass`, and `\e@alloc@intercharclass@top`. These functions are documented on page ??.)

The default values of the picture and `\fbox` parameters:

```

82 \unitlength = 1pt
83 \fboxsep = 3pt
84 \fboxrule = .4pt

```

The saved value of T<sub>E</sub>X's `\maxdepth`:

```

85 \@maxdepth = \maxdepth

```

`\vsize` initialized because a `\clearpage` with `\vsize < \topskip` causes trouble. `\@colroom` and `\@colht` also initialized because `\vsize` may be set to them if a `\clearpage` is done before the `\begin{document}`

```

86 \vsize = 1000pt
87 \@colroom = \vsize
88 \@colht = \vsize

```

Initialise `\textheight` `\textwidth` and page style, to avoid internal errors if they are not set by the class.

```

89 \textheight=.5\maxdimen
90 \textwidth=\textheight
91 \ps@empty

```

### 1.3 Lccodes for hyphenation

For 7- and 8-bit engines the assumption of T1 encodings is the basis for the hyphenation patterns. That's not the case for the Unicode engines, where the assumption is engine-native working. The common loader system provides access to data from the Unicode Consortium covering not only `\lccode` but also other related data. The `\lccode` part of that at least needs to be loaded before hyphenation is tackled: XeT<sub>E</sub>X follows the standard T<sub>E</sub>X route of building patterns into the format. LuaT<sub>E</sub>X doesn't require this data be loaded *here* but it does need to be loaded somewhere. Rather than test for the Unicode engines by name, the approach here is to look for the extended math mode handling both provide: any other engine developed in this area will presumably also provide `\Umathcode`.

```

92 \ifnum 0%
93 \ifx\Umathcode\@undefined\else 1\fi
94 \ifx\XeTeXmathcode\@undefined\else 1\fi
95 >\z@
96 \message{ Unicode character data,}
97 \input{load-unicode-data}
98 </2ekernel>
99 <latexrelease>\IncludeInRelease{2016/02/01}%
100 <latexrelease> {\XeTeXintercharclasses}{XeTeX character classes}%
101 <latexrelease> \ifx\XeTeXinterchartoks\undefined
102 <latexrelease> \else

```

```

103 <latexrelease> \begingroup
104 <latexrelease> \chardef\XeTeXcharclassID = 0 %
105 <latexrelease> \chardef\XeTeXcharclassOP = 0 %
106 <latexrelease> \chardef\XeTeXcharclassCL = 0 %
107 <latexrelease> \chardef\XeTeXcharclassEX = 0 %
108 <latexrelease> \chardef\XeTeXcharclassIS = 0 %
109 <latexrelease> \chardef\XeTeXcharclassNS = 0 %
110 <latexrelease> \chardef\XeTeXcharclassCM = 0 %
111 <latexrelease> \input{load-unicode-xetex-classes}
112 <latexrelease> \endgroup
113 <latexrelease> \global\let\xtxHanGlue\undefined
114 <latexrelease> \global\let\xtxHanSpace\undefined
115 <latexrelease> \global\XeTeXinterchartoks 0 1 = {}
116 <latexrelease> \global\XeTeXinterchartoks 0 2 = {}
117 <latexrelease> \global\XeTeXinterchartoks 0 3 = {}
118 <latexrelease> \global\XeTeXinterchartoks 1 0 = {}
119 <latexrelease> \global\XeTeXinterchartoks 2 0 = {}
120 <latexrelease> \global\XeTeXinterchartoks 3 0 = {}
121 <latexrelease> \global\XeTeXinterchartoks 1 1 = {}
122 <latexrelease> \global\XeTeXinterchartoks 1 2 = {}
123 <latexrelease> \global\XeTeXinterchartoks 1 3 = {}
124 <latexrelease> \global\XeTeXinterchartoks 2 1 = {}
125 <latexrelease> \global\XeTeXinterchartoks 2 2 = {}
126 <latexrelease> \global\XeTeXinterchartoks 2 3 = {}
127 <latexrelease> \global\XeTeXinterchartoks 3 1 = {}
128 <latexrelease> \global\XeTeXinterchartoks 3 2 = {}
129 <latexrelease> \global\XeTeXinterchartoks 3 3 = {}
130 <latexrelease> \fi
131 <latexrelease> \EndIncludeInRelease
132 <latexrelease> \IncludeInRelease{0000/00/00}%
133 <latexrelease> {\XeTeXintercharclasses}{\XeTeX character classes}%
134 <latexrelease> \ifx\XeTeXinterchartoks\undefined
135 <latexrelease> \else
136 <latexrelease> \input{load-unicode-xetex-classes}
137 <latexrelease> \gdef\xtxHanGlue{\hskip0pt plus 0.1em\relax}
138 <latexrelease> \gdef\xtxHanSpace{\hskip0.2em plus 0.2em minus 0.1em\relax}
139 <latexrelease> \global\XeTeXinterchartoks 0 1 = {\xtxHanSpace}
140 <latexrelease> \global\XeTeXinterchartoks 0 2 = {\xtxHanSpace}
141 <latexrelease> \global\XeTeXinterchartoks 0 3 = {\nobreak\xtxHanSpace}
142 <latexrelease> \global\XeTeXinterchartoks 1 0 = {\xtxHanSpace}
143 <latexrelease> \global\XeTeXinterchartoks 2 0 = {\nobreak\xtxHanSpace}
144 <latexrelease> \global\XeTeXinterchartoks 3 0 = {\xtxHanSpace}
145 <latexrelease> \global\XeTeXinterchartoks 1 1 = {\xtxHanGlue}
146 <latexrelease> \global\XeTeXinterchartoks 1 2 = {\xtxHanGlue}
147 <latexrelease> \global\XeTeXinterchartoks 1 3 = {\nobreak\xtxHanGlue}
148 <latexrelease> \global\XeTeXinterchartoks 2 1 = {\nobreak\xtxHanGlue}
149 <latexrelease> \global\XeTeXinterchartoks 2 2 = {\nobreak\xtxHanGlue}
150 <latexrelease> \global\XeTeXinterchartoks 2 3 = {\xtxHanGlue}
151 <latexrelease> \global\XeTeXinterchartoks 3 1 = {\xtxHanGlue}
152 <latexrelease> \global\XeTeXinterchartoks 3 2 = {\xtxHanGlue}
153 <latexrelease> \global\XeTeXinterchartoks 3 3 = {\nobreak\xtxHanGlue}
154 <latexrelease> \fi
155 <latexrelease> \EndIncludeInRelease
156 <*2ekernel>

```



There is one over-ride that makes sense here (see below for the same for 8-bit engines): setting the lccode for - to itself.

```
157 \lccode'\- ='\- % default hyphen char
```

The alternative is that a “traditional” engine is in use.

```
158 \else
```

We set things up so that hyphenation files can assume that the default (T1) lccodes are in use (at present this also sets up the uccodes). We temporarily define `\reserved@a` to apply `\reserved@c` to all the numbers in the range of its arguments.

```
159 \def\reserved@a#1#2{%
160   \@tempcnta#1\relax
161   \@tempcntb#2\relax
162   \reserved@b
163 }
164 \def\reserved@b{%
165   \ifnum\@tempcnta>\@tempcntb\else
166     \reserved@c\@tempcnta
167     \advance\@tempcnta\@ne
168     \expandafter\reserved@b
169   \fi
170 }
```

Depending on the T<sub>E</sub>X version, we might not be allowed to do this for non-ASCII characters.

```
171 \def\reserved@c#1{%
172   \count@=#1\advance\count@ by -"20
173   \uccode#1=\count@
174   \lccode#1=#1
175 }
176 \reserved@a{'\a}{'\z}
177 \reserved@a{"A0}{\BC}
178 \reserved@a{"E0}{\FF}
```

The upper case characters need their `\uccode` and `\lccode` values set, and their `\sfcode` set to 999.

```
179 \def\reserved@c#1{%
180   \count@=#1\advance\count@ by "20
181   \uccode#1=#1
182   \lccode#1=\count@
183   \sfcode#1=999
184 }
185 \reserved@a{'\A}{'\Z}
186 \reserved@a{"80}{\9C}
187 \reserved@a{"C0}{\DF}
```

Well, it would be nice if that were correct, but unfortunately, the Cork encoding contains some odd slots whose uccode or lccode isn’t quite what you’d expect.

```
188 \uccode'\^^Y='I % dotless i
189 \lccode'\^^Y='^^Y % dotless i
190 \uccode'\^^Z='J % dotless j, ae in OT1
191 \lccode'\^^Z='^^Z % dotless j, ae in OT1
192 \lccode'\^^9d='i % dotted I
193 \uccode'\^^9d='^^9d % dotted I
194 \lccode'\^^9e='^^9e % d-bar
195 \uccode'\^^9e='^^d0 % d-bar
```

Finally here is one that helps hyphenation in the OT1 encoding.

```
196 \lccode'\^^[='^^[ % oe in OT1
```

And we also set the \lccode of \- and \textcompwordmark so that they do not prevent hyphenation in the remainder of the word (as suggested by Lars Helström).

```
197 \lccode'\- ='\' % default hyphen char
198 \lccode 127=127 % alternate hyphen char
199 \lccode 23 =23 % textcompwordmark in T1
```

End of the conditional to select either Unicode or T1 encoding defaults.

```
200 \fi
```

At this stage, we can install any last-minute expl3 set-up.

```
201 \@expl@finalise@setup@@
202 \def\@expl@finalise@setup@@{}
```

This is as good a place as any to active a few XeTeX-specific settings

```
203 \ifx\XeTeXuseglyphmetrics\undefined
204 \else
205   \XeTeXuseglyphmetrics=1 %
206   \XeTeXdashbreakstate=1 %
207 \fi
```

## 1.4 Hyphenation

The following code will be compiled into the format file. It checks for the existence of `hyphen.cfg` in inputs that file if found. Otherwise it inputs `hyphen.ltx`. Note that these are loaded in *before* the \catcodes are set, so local hyphenation files can use 8-bit input.

We try to load the customized hyphenation description file.

```
208 \InputIfFileExists{hyphen.cfg}
209   {\typeout{=====^^J%
210             Local configuration file hyphen.cfg used^^J%
211             =====}%
212   \def\@addtofilelist##1{\xdef\@filelist{\@filelist,##1}}%
213   }
214   {\input{hyphen.ltx}}
215 \let\@addtofilelist\@gobble
```

\l@nohyphenation

```
216 \ifx\l@nohyphenation \undefined
217   \newlanguage\l@nohyphenation
218 \fi
```

(End definition for \l@nohyphenation. This function is documented on page ??.)

\document@default@language Default document language. -1 acts as language 0, but used as a flag in \document to see if it has been set in the preamble.

```
219 </2ekernel>
220 <*2ekernel | latexrelease>
221 <latexrelease>\IncludeInRelease{2017/04/15}%
222 <latexrelease>          {\document@default@language}{Save language for hyphenation}%
223 \let\document@default@language\m@ne
224 </2ekernel | latexrelease>
225 <latexrelease>\EndIncludeInRelease
```

```

226 <latexrelease>\IncludeInRelease{0000/00/00}%
227 <latexrelease>{\document@default@language}{Save language for hyphenation}%
228 <latexrelease>\let\document@default@language\@undefined
229 <latexrelease>\EndIncludeInRelease
230 <*2ekernel>

```

(End definition for \document@default@language. This function is documented on page ??.)

## 1.5 Font loading

Fonts loaded during the formatting process might already have changed the \font@submax from 0pt to something higher. If so, we put out a bold warning.

```

231 \ifdim \font@submax >\z@
232   \@font@warning{Size substitutions with differences\MessageBreak
233                 up to \font@submax\space have occurred.\MessageBreak
234                 \MessageBreak
235                 Please check the transcript file
236                 carefully\MessageBreak
237                 and redo the format generation if necessary!
238                 \@gobbletwo}%
239   \errhelp{Only stopped, to give you time to
240           read the above message.}
241   \errmessage{}

```

We reset the macro. Otherwise every user will get a warning on every job.

```

242 \def\font@submax{0pt}
243 \fi

```

## 1.6 Input encoding

Starting with the 2018 L<sup>A</sup>T<sub>E</sub>X release default the inputencoding to UTF-8. Unless the format is being used with luatex, xetex, encetex or mltex.

This is done in a way largely compatible with older releases: utf8.def is input just as if

```
\usepackage[utf8]{inputenc}
```

had been used, however rather than input the whole package a minimal core part just enough to support loading the UTF-8 encoding files is defined here.

If a document re-specifies UTF-8 this is silently ignored.

```

244 </2ekernel>
245 <*2ekernel | latexrelease>

    Check that a classic 8-bit tex engine is being used (LaTeX or PDFLaTeX).

246 <latexrelease>\IncludeInRelease{2018/04/01}%
247 <latexrelease>{\UTFviii@invalid}{UTF-8 default}%

    Skip this section in Unicode TeX, or if MLTeX and EncTeX are enabled.

248 \ifnum0%
249   \ifx\Umathcode\@undefined\else 1\fi
250   \ifx\mubyte\@undefined\else 1\fi
251   \ifx\charsubdef\@undefined\else 1\fi
252   =\z@

```

```

253 \def\saved@space@catcode{10}
254 \let\@inpenc@test\relax
255 \def\IeC{%
256   \ifx\protect\@typeset@protect
257     \expandafter\@firstofone
258   \else
259     \noexpand\IeC
260   \fi
261 }

```

Make characters active for UTF-8 input formats

```

262 \@tempcnta=1
263 \loop
264   \catcode\@tempcnta=13 %
265   \advance\@tempcnta\@ne %
266   \ifnum\@tempcnta<32 %
267   \repeat %
268   \catcode0=15 % null
269   \catcode9=10 % tab
270   \catcode10=12 % ctrl J
271   \catcode12=13 % ctrl L
272   \catcode13=5 % newline
273   \@tempcnta=128
274   \loop
275     \catcode\@tempcnta=13
276     \advance\@tempcnta\@ne
277   \ifnum\@tempcnta<256
278   \repeat

```

`\UseRawInputEncoding` Reset 8 bit characters to catcode 12 so the input encoding matches the “Raw” font encoding. Useful for special behaviours, or for compatibility with older L<sup>A</sup>T<sub>E</sub>X formats.

```

279 \def\UseRawInputEncoding{%
280   \let\inputencodingname\@undefined % revert
281   \let\DeclareFontEncoding\DeclareFontEncoding@saved % revert
282   \let\DeclareUnicodeCharacter\@undefined % revert
283   \@tempcnta=1
284   \loop
285     \catcode\@tempcnta=15 %
286     \advance\@tempcnta\@ne %
287     \ifnum\@tempcnta<32 %
288     \repeat %
289     \catcode0=15 % null
290     \catcode9=10 % tab
291     \catcode10=12 % ctrl J
292     \catcode12=13 % ctrl L
293     \catcode13=5 % newline
294     \@tempcnta=128
295     \loop
296       \catcode\@tempcnta=12
297       \advance\@tempcnta\@ne
298     \ifnum\@tempcnta<256
299     \repeat
300 }

```

*(End definition for \UseRawInputEncoding. This function is documented on page ??.)*

`\DeclareFontEncoding@saved` Saved version of `\DeclareFontEncoding@` before `utf8.def` modifies it for use in `\UseRawInputEncoding` above.

```
301 \let\DeclareFontEncoding@saved\DeclareFontEncoding@
```

(End definition for `\DeclareFontEncoding@saved`. This function is documented on page ??.)

```
302 \edef\inputencodingname{utf8}%
303 \input{utf8.def}
304 \let\UTFviii@undefined@err@@\UTFviii@undefined@err
305 \let\UTFviii@invalid@err@@\UTFviii@invalid@err
306 \let\UTFviii@two@octets@@\UTFviii@two@octets
307 \let\UTFviii@three@octets@@\UTFviii@three@octets
308 \let\UTFviii@four@octets@@\UTFviii@four@octets
309 <2kernel>\def\UTFviii@undefined@err#1{\@gobble#1}%
310 <2kernel>\let\UTFviii@invalid@err\string
311 <2kernel>\let\UTFviii@two@octets\string
312 <2kernel>\let\UTFviii@three@octets\string
313 <2kernel>\let\UTFviii@four@octets\string
314 <2kernel>\everyjob\expandafter{\the\everyjob
315 <2kernel>\let\UTFviii@undefined@err\UTFviii@undefined@err@@
316 <2kernel>\let\UTFviii@invalid@err\UTFviii@invalid@err@@
317 <2kernel>\let\UTFviii@two@octets\UTFviii@two@octets@@
318 <2kernel>\let\UTFviii@three@octets\UTFviii@three@octets@@
319 <2kernel>\let\UTFviii@four@octets\UTFviii@four@octets@@
320 <2kernel>}}
321 \let\@inpenc@test\@undefined
322 \let\saved@space@catcode\@undefined
```

For formats not set up for UTF-8 default, set the C0 controls to catcode 15.

```
323 \else
324 \@tempcnta=0
325 \loop
326 \catcode\@tempcnta=15 %
327 \advance\@tempcnta\@ne %
328 \ifnum\@tempcnta<32 %
329 \repeat %
330 \catcode0=15 % null
331 \catcode9=10 % tab
332 \catcode10=12 % ctrl J
333 \catcode12=13 % ctrl L
334 \catcode13=5 % newline
335 \let\UseRawInputEncoding\relax
```

This ends the skipped code in Unicode engines:

```
336 \fi
337 </2kernel | latexrelease>
338 <latexrelease>\EndIncludeInRelease
339 <latexrelease>\IncludeInRelease{0000/00/00}%
340 <latexrelease> \UTFviii@invalid}{UTF-8 default}}%
```

The first block of commands got only introduced in 2019 but we revert all of Unicode support in one go not jump to the intermediate version.

```
341 <latexrelease> \let\UTFviii@two@octets@combine\@undefined
342 <latexrelease> \let\UTFviii@three@octets@combine\@undefined
343 <latexrelease> \let\UTFviii@four@octets@combine\@undefined
```

```

344 <latexrelease> \let\UTFviii@two@octets@string\@undefined
345 <latexrelease> \let\UTFviii@three@octets@string\@undefined
346 <latexrelease> \let\UTFviii@four@octets@string\@undefined
347 <latexrelease> \let\UTFviii@two@octets@noexpand\@undefined
348 <latexrelease> \let\UTFviii@three@octets@noexpand\@undefined
349 <latexrelease> \let\UTFviii@four@octets@noexpand\@undefined

350 <latexrelease> \@tempcnta=0
351 <latexrelease> \loop
352 <latexrelease> \catcode\@tempcnta=15
353 <latexrelease> \advance\@tempcnta\@ne
354 <latexrelease> \ifnum\@tempcnta<32
355 <latexrelease> \repeat %
356 <latexrelease> \catcode9=10 % tab
357 <latexrelease> \catcode10=12 % ctrl J
358 <latexrelease> \catcode12=13 % ctrl L
359 <latexrelease> \catcode13=5 % newline
360 <latexrelease> \@tempcnta=128
361 <latexrelease> \loop
362 <latexrelease> \catcode\@tempcnta=12
363 <latexrelease> \advance\@tempcnta\@ne
364 <latexrelease> \ifnum\@tempcnta<256
365 <latexrelease> \repeat
366 <latexrelease> \let\IeC\@undefined
367 <latexrelease> \def\DeclareFontEncoding#1#2#3{%
368 <latexrelease> \expandafter
369 <latexrelease> \ifx\csname T@#1\endcsname\relax
370 <latexrelease> \def\cdp@elt{\noexpand\cdp@elt}%
371 <latexrelease> \xdef\cdp@list{\cdp@list\cdp@elt{#1}%
372 <latexrelease> {\default@family}{\default@series}%
373 <latexrelease> {\default@shape}}%
374 <latexrelease> \expandafter\let\csname#1-cmd\endcsname\@changed@cmd
375 <latexrelease> \else
376 <latexrelease> \@font@info{Redeclaring font encoding #1}%
377 <latexrelease> \fi
378 <latexrelease> \global\@namedef{T@#1}{#2}%
379 <latexrelease> \global\@namedef{M@#1}{\default@M#3}%
380 <latexrelease> \xdef\LastDeclaredEncoding{#1}%
381 <latexrelease> }
382 <latexrelease> \let\UseRawInputEncoding\@undefined
383 <latexrelease> \let\DeclareFontEncoding@saved\@undefined
384 <latexrelease> \let\inputencodingname\@undefined
385 <latexrelease> \EndIncludeInRelease

386 <*2ekernel>
387 % \begin{macrocode}
388 %
389 % We temporarily define |\reserved@a| to apply |\reserved@c| to all the
390 % numbers in the range of its arguments.
391 % \begin{macrocode}
392 \def\reserved@a#1#2{%
393 \@tempcnta#1\relax
394 \@tempcntb#2\relax
395 \reserved@b
396 }

```

```

397 \def\reserved@b{%
398   \ifnum\@tempcnta>\@tempcntb\else
399     \reserved@c\@tempcnta
400     \advance\@tempcnta\@ne
401     \expandafter\reserved@b
402   \fi
403 }

```

Set the special catcodes (although some of these are useless, since an error will have occurred if the catcodes have changed). Note that `^^J` has catcode ‘other’ for use in warning messages.

```

404 \catcode'\ =10
405 \catcode'\#=6
406 \catcode'\$=3
407 \catcode'\%=14
408 \catcode'\&=4
409 \catcode'\'=0
410 \catcode'\^=7
411 \catcode'\_ =8
412 \catcode'\{=1
413 \catcode'\}=2
414 \catcode'\-=13
415 \catcode'\@=11
416 \catcode'\^^I=10
417 \catcode'\^^J=12
418 \catcode'\^^L=13
419 \catcode'\^^M=5

```

Set the ‘other’ catcodes.

```

420 \def\reserved@c#1{\catcode#1=12\relax}
421 \reserved@c{'\!}
422 \reserved@c{'\"}
423 \reserved@a{'\''}{'\?}
424 \reserved@c{'\[}
425 \reserved@c{'\]}
426 \reserved@c{'\''}
427 \reserved@c{'\|}

```

Set the ‘letter’ catcodes.

```

428 \def\reserved@c#1{\catcode#1=11\relax}
429 \reserved@a{'\A'}{'\Z}
430 \reserved@a{'\a'}{'\z}

```

All the characters in the range 0–31 and 127–255 are illegal, *except* `tab` (`^^I`), `nl` (`^^J`), `ff` (`^^L`) and `cr` (`^^M`).

## 1.7 Lccodes and uccodes

We now again set up the default (T1) `uc/lccodes`. The lower case characters need their `\uccode` and `\lccode` values set. Some of this is a repeat of the set-up before loading hyphenation files. Depending on the `TEX` version, we might not be allowed to do this for non-ASCII characters. For the Unicode engines (`XeTEX` and `LuaTEX`) there is no need to do any of this: they use hyphenation data which does not alter any of the set up and so this entire block is skipped.

```

431 \ifnum 0%
432   \ifx\Umathcode\@undefined\else 1\fi
433   \ifx\XeTeXmathcode\@undefined\else 1\fi
434   >\z@
435 \else
436 \def\reserved@c#1{%
437   \count@=#1\advance\count@ by -"20
438   \uccode#1=\count@
439   \lccode#1=#1
440 }
441 \reserved@a{'\a}{'\z}
442 \reserved@a{"A0}{\BC}
443 \reserved@a{"E0}{\FF}

```

The upper case characters need their `\uccode` and `\lccode` values set, and their `\sfcode` set to 999.

```

444 \def\reserved@c#1{%
445   \count@=#1\advance\count@ by "20
446   \uccode#1=#1
447   \lccode#1=\count@
448   \sfcode#1=999
449 }
450 \reserved@a{'\A}{'\Z}
451 \reserved@a{"80}{\9C}
452 \reserved@a{"C0}{\DF}

```

Well, it would be nice if that were correct, but unfortunately, the Cork encoding contains some odd slots whose `uccode` or `lccode` isn't quite what you'd expect.

```

453 \uccode'\^^Y='^I      % dotless i
454 \lccode'\^^Y='^Y      % dotless i
455 \uccode'\^^Z='^J      % dotless j, ae in OT1
456 \lccode'\^^Z='^Z      % dotless j, ae in OT1
457 \lccode'\^^9d='^i     % dotted I
458 \uccode'\^^9d='^9d    % dotted I
459 \lccode'\^^9e='^9e    % d-bar
460 \uccode'\^^9e='^d0    % d-bar

```

Finally here is one that helps hyphenation in the OT1 encoding.

```

461 \lccode'\^^[='^[[    % oe in OT1
462 \fi % End of reset block for 8-bit engines

```

`\MakeUppercase`  
`\MakeUppercase`  
`\@uclclist`

And whilst we're doing things with `uc/lc` tables, here are two commands to upper- and lower-case a string.

*Note* that this implementation is subject to change! At the moment we're not providing any way to extend the list of `uc/lc` commands, since finding a good interface is difficult. These commands have some nasty features, such as uppercasing mathematics, environment names, labels, etc. A much better long-term solution is to use all-caps fonts, but these aren't generally available.

```

463 \DeclareRobustCommand{\MakeUppercase}[1]{%
464   \def\i{I}\def\j{J}%
465   \def\reserved@a##1##2{\let##1##2\reserved@a}%
466   \expandafter\reserved@a\@uclclist\reserved@b{\reserved@b\@gobble}%

```



Tell UTF-8 processing to process chars even though we are in an `\protected@edef`.

```

467 \let\UTF@two@octets@noexpand\@empty
468 \let\UTF@three@octets@noexpand\@empty
469 \let\UTF@four@octets@noexpand\@empty
470 \protected@edef\reserved@a{\uppercase{#1}}%
471 \reserved@a
472 }}
473 \DeclareRobustCommand{\MakeLowercase}[1]{%
474 \def\reserved@a##1##2{\let##2##1\reserved@a}%
475 \expandafter\reserved@a\@uclclist\reserved@b{\reserved@b\@gobble}%
476 \let\UTF@two@octets@noexpand\@empty
477 \let\UTF@three@octets@noexpand\@empty
478 \let\UTF@four@octets@noexpand\@empty
479 \protected@edef\reserved@a{\lowercase{#1}}%
480 \reserved@a
481 }}
482 \def\@uclclist{\oe\OE\o\O\ae\AE
483 \dh\DH\dj\DJ\l\L\ng\NG\ss\SS\th\TH}

```

The above code works, but has the nasty side-effect that if you say something like:

```

\markboth{\MakeUppercase\contentsname}
{\MakeUppercase\contentsname}

```

then the uppercasing is only done to the first letter of the contents name, since the mark expands out to:

```

\mark{\protect\MakeUppercase Table of Contents}
{\protect\MakeUppercase Table of Contents}

```

In order to get round this, we redefine `\MakeUppercase` and `\MakeLowercase` to grab their argument and brace it. This is a very low-level hack, and is *not* recommended practice! This is an instance of a general problem that makes it unsafe to grab arguments unbraced, and probably needs a more general solution. For the moment though, this hack will do:

```

484 \protected@edef\MakeUppercase#1{\MakeUppercase{#1}}
485 \protected@edef\MakeLowercase#1{\MakeLowercase{#1}}

```

(End definition for `\MakeUppercase`, `\MakeUppercase`, and `\@uclclist`. These functions are documented on page ??.)

## 1.8 Applying Patch files

Between major releases, small patches will be distributed in files `ltpatch.ltx` which must be added at this point.

Patch file code removed.

```

486 %\IfFileExists{ltpatch.ltx}
487 % {\typeout{=====^~J%
488 % Applying patch file ltpatch.ltx^~J%
489 % =====}}
490 % \def\fmtversion@topatch{unknown}
491 % \input{ltpatch.ltx}
492 % \ifx\fmtversion\fmtversion@topatch
493 % \ifx\patch@level\@undefined

```

```

494 %      \typeout{^^J^^J^^J%
495 %      !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J%
496 %      !! Patch file 'ltpatch.ltx' not suitable for this^^J%
497 %      !! version of LaTeX.^^J^^J%
498 %      !! Please check if initex found an old patch file:^^J%
499 %      !! --- if so, rename it or delete it, and redo the^^J%
500 %      !! initex run.^^J%
501 %      !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J}%
502 %      \batchmode \@@end
503 %      \else

```

The code below adds the 'patch level' string to the first \typeout in the startup banner.

```

504 %      \def\fmtversion@topatch{0}%
505 %      \ifx\fmtversion@topatch\patch@level\else
506 %      \def\reserved@a\typeout##1##2\reserved@a{%
507 %      \typeout{##1 patch level \patch@level}##2}
508 %      \everyjob\expandafter\expandafter\expandafter{%
509 %      \expandafter\reserved@a\the\everyjob\reserved@a}
510 %      \let\reserved@a\relax
511 %      \the\everyjob
512 %      \fi
513 %      \fi
514 %      \else
515 %      \typeout{^^J^^J^^J%
516 %      !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J%
517 %      !! Patch file 'ltpatch.ltx' (for version <\fmtversion@topatch>)^^J%
518 %      !! is not suitable for version <\fmtversion> of LaTeX.^^J^^J%
519 %      !! Please check if initex found an old patch file:^^J%
520 %      !! --- if so, rename it or delete it, and redo the^^J%
521 %      !!      initex run.^^J%
522 %      !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J}%
523 %      \batchmode \@@end
524 %      \fi
525 %      \let\fmtversion@topatch\relax
526 %      }{}

```

## 1.9 Freeing Memory

\reserved@a And just to make sure nobody relies on those definitions of \reserved@b and friends.  
\reserved@b These macros are reserved for use in the kernel. *Do not use them as general scratch macros.*

```

527 \let\reserved@a\@filelist
528 \let\reserved@b=\@undefined
529 \let\reserved@c=\@undefined
530 \let\reserved@d=\@undefined
531 \let\reserved@e=\@undefined
532 \let\reserved@f=\@undefined

```

(End definition for \reserved@a and \reserved@b. These functions are documented on page ??.)

\toks

```

533 \toks0{}
534 \toks2{}
535 \toks4{}

```

```
536 \toks6{}
```

```
537 \toks8{}
```

*(End definition for \toks. This function is documented on page ??.)*

**\errhelp** Empty the error help message, which may have some rubbish:

```
538 \errhelp{}
```

*(End definition for \errhelp. This function is documented on page ??.)*

## 1.10 Initialise file list

**\@providesfile** Initialise for use in the document. During initex a modified version has been used which leaves debugging information for `latexbug.tex`.

```
539 \def\@providesfile#1[#2]{%
```

```
540     \wlog{File: #1 #2}%
```

```
541     \expandafter\xdef\csname ver@#1\endcsname{#2}%
```

```
542 \endgroup}
```

*(End definition for \@providesfile. This function is documented on page ??.)*

**\@filelist** Reset `\@filelist` so files input while making the format are not listed. The list built up so far may take up a lot of memory and so it is moved to `\reserved@a` where it will be overwritten as soon as almost any L<sup>A</sup>T<sub>E</sub>X command is issued in a class file. However the `latexbug.tex` program will be able to access this information and insert it into a bug report.

**\@addtofilelist**

```
543 \let\@filelist\@gobble
```

```
544 \def\@addtofilelist#1{\xdef\@filelist{\@filelist,#1}}%
```

*(End definition for \@filelist and \@addtofilelist. These functions are documented on page ??.)*

## 1.11 Do some temporary work for pre-release

This is a good place to load code that hasn't yet been integrated into the other files ...

## 1.12 Some last minute initializations ...

Load the first aid set of definitions for external packages that await updates.

```
545 \input{latex2e-first-aid-for-external-files.ltx}
```

## 1.13 Dumping the format

Finally we make @ into a letter, ensure the format will be in the 'normal' error mode, and dump everything into the format file.

```
546 \makeatother
```

```
547 \errorstopmode
```

```
548 \dump
```

```
549 \</2ekernel>
```

# Change History

|                                                                                                                                                                                                                                                                         |     |                                                                                                                                                                          |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1985-11-04 ltmath.dtx LaTeX2.09                                                                                                                                                                                                                                         |     | <code>\mathversion</code> : Test if version defined added. . . . .                                                                                                       | 277 |
| General: produce warning message if line extends into margin. Doesn't warn about formula overprinting equation number. . . . .                                                                                                                                          | 489 |                                                                                                                                                                          |     |
| 1989-04-10 ltfssbas.dtx v1.0a                                                                                                                                                                                                                                           |     | 1989-04-29 ltfssbas.dtx v1.0i                                                                                                                                            |     |
| General: Starting with version numbers! <code>\ifmmode</code> added in <code>\math@group</code> . . . . .                                                                                                                                                               | 267 | General: Removed the <code>\halign</code> <code>\noalign</code> correction (wasn't bugfree) . . . . .                                                                    | 267 |
| 1989-04-10 ltfssbas.dtx v1.0b                                                                                                                                                                                                                                           |     | 1989-04-29 ltfssini.dtx v1.0f                                                                                                                                            |     |
| General: <code>\preload@sizes</code> added. . . . .                                                                                                                                                                                                                     | 267 | General: Corrections to L <sup>A</sup> T <sub>E</sub> X tabular env. added. . . . .                                                                                      | 366 |
| <code>\wrong@fontshape</code> changed to define substitution font/shape macro. . . . .                                                                                                                                                                                  | 267 | 1989-05-01 ltfssbas.dtx v1.0j                                                                                                                                            |     |
| 1989-04-10 ltfssini.dtx v1.0a                                                                                                                                                                                                                                           |     | General: Default for <code>\baselinestretch</code> added. . . . .                                                                                                        | 267 |
| General: Starting with version numbers <code>\newif</code> for <code>\@tempswa</code> added since this switch is unknown at the time when this file is read in. (latex.tex is loaded later.) <code>\math@famname</code> changed to <code>\math@version</code> . . . . . | 366 | 1989-05-22 ltfssbas.dtx v1.0k                                                                                                                                            |     |
| 1989-04-14 ltfssbas.dtx v1.0c                                                                                                                                                                                                                                           |     | General: Lines longer than 72 characters folded. . . . .                                                                                                                 | 267 |
| General: More documentation added. . . . .                                                                                                                                                                                                                              | 267 | 1989-05-22 ltfssini.dtx v1.0g                                                                                                                                            |     |
| 1989-04-15 ltfssini.dtx v1.0b                                                                                                                                                                                                                                           |     | General: Lines shortened to 72 characters . . . . .                                                                                                                      | 366 |
| General: <code>\mathfontset</code> renamed to <code>\mathversion</code> . . . . .                                                                                                                                                                                       | 366 | 1989-09-14 ltfssbas.dtx v1.0m                                                                                                                                            |     |
| 1989-04-19 ltfssbas.dtx v1.0d                                                                                                                                                                                                                                           |     | General: Global replacement: <code>\group</code> to <code>\mathgroup</code> . . . . .                                                                                    | 267 |
| General: Even more doc. . . . .                                                                                                                                                                                                                                         | 267 | <code>\mathversion</code> : Corrected typo: <code>\endscname</code> to <code>\endcsname</code> . . . . .                                                                 | 277 |
| 1989-04-21 ltfssbas.dtx v1.0e                                                                                                                                                                                                                                           |     | 1989-11-07 ltfssini.dtx v1.0i                                                                                                                                            |     |
| General: Documentation is fun! Parameters of <code>\define@mathalphabet</code> changed. . . . .                                                                                                                                                                         | 267 | General: All family, series, and shape names abbreviated. . . . .                                                                                                        | 366 |
| 1989-04-21 ltfssini.dtx v1.0c                                                                                                                                                                                                                                           |     | 1989-11-08 ltfssbas.dtx v1.0o                                                                                                                                            |     |
| General: Changed to conform to fam.tex. . . . .                                                                                                                                                                                                                         | 366 | General: First parameter of <code>\define@mathalphabet</code> and <code>\define@mathgroup</code> changed from string to control sequence. . . . .                        | 267 |
| 1989-04-23 ltfssbas.dtx v1.0f                                                                                                                                                                                                                                           |     | 1989-11-14 ltfssbas.dtx v1.0p                                                                                                                                            |     |
| General: % in <code>\getanddefinefonts</code> added. . . . .                                                                                                                                                                                                            | 267 | <code>\math@version</code> : Math version prefix 'mv@' added. . . . .                                                                                                    | 277 |
| 1989-04-26 ltfssini.dtx v1.0d                                                                                                                                                                                                                                           |     | 1989-11-19 ltfssbas.dtx v1.0q                                                                                                                                            |     |
| General: <code>\xpt</code> added. . . . .                                                                                                                                                                                                                               | 366 | <code>\define@newfont</code> : Group added. . . . .                                                                                                                      | 279 |
| 1989-04-27 ltfssbas.dtx v1.0g                                                                                                                                                                                                                                           |     | <code>\wrong@fontshape</code> : Instead of calling <code>\family\default@family</code> , etc. we directly set <code>\f@family</code> , etc. . . . .                      | 284 |
| General: Documentation revised. . . . .                                                                                                                                                                                                                                 | 267 | 1989-11-22 ltfssbas.dtx v1.0r                                                                                                                                            |     |
| 1989-04-27 ltfssini.dtx v1.0e                                                                                                                                                                                                                                           |     | <code>\math@version</code> : <code>\def</code> → <code>\edef</code> for <code>\math@version</code> . . . . .                                                             | 277 |
| General: Definitions of L <sup>A</sup> T <sub>E</sub> X symbols corrected. . . . .                                                                                                                                                                                      | 366 | 1989-11-25 ltfssbas.dtx v1.0s                                                                                                                                            |     |
| 1989-04-29 ltfssbas.dtx v1.0h                                                                                                                                                                                                                                           |     | General: All <code>\edef\font@name</code> changed to <code>\xdef\font@name</code> . Necessary after introduction of <code>\begingroup/\endgroup</code> in v1.0q. . . . . | 267 |
| General: Documented problem with <code>\halign</code> , and <code>\noalign</code> . . . . .                                                                                                                                                                             | 267 | extra// → + in <code>\extra@def</code> . . . . .                                                                                                                         | 267 |

|                                                                          |                                                                                          |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 1989-11-26 ltfssbas.dtx v1.0t                                            | 1990-01-25 ltfssini.dtx v1.1e                                                            |
| <code>\select@group</code> : <code>\bgroup</code> / <code>\egroup</code> | <code>\nfss@text</code> : Macro added. . . . . 385                                       |
| changed to                                                               | 1990-01-27 ltfssbas.dtx v1.2d                                                            |
| <code>\begingroup</code> / <code>\endgroup</code> to avoid               | <code>\DeclarePreloadSizes</code> : Font identifier                                      |
| empty Ord atom on math list. . . 287                                     | set to <code>\relax</code> . . . . . 273                                                 |
| 1989-12-02 ltfssini.dtx v1.1b                                            | 1990-01-28 ltfssbas.dtx v1.2e                                                            |
| General: <code>\rmmath</code> renamed to                                 | <code>\mathgroup</code> : <code>\newfam</code> let to                                    |
| <code>\mathrm</code> . . . . . 366                                       | <code>\new@mathgroup</code> . . . . . 267                                                |
| 1989-12-03 ltfssini.dtx v1.1c                                            | 1990-01-28 ltfssbas.dtx v1.2f                                                            |
| General: Some internal macros                                            | <code>\define@newfont</code> : Added call to                                             |
| renamed to make them                                                     | <code>\curr@fontshape</code> macro to allow                                              |
| inaccessible. . . . . 366                                                | substitution. . . . . 280                                                                |
| 1989-12-05 ltfssbas.dtx v1.0u                                            | <code>\wrong@fontshape</code> : Warning message                                          |
| <code>\addto@hook</code> : <code>\addto@hook</code> added. . 291         | slightly changed. . . . . 284                                                            |
| 1989-12-05 ltfssstrc.dtx v1.0u fam.dtx                                   | 1990-01-28 ltfssini.dtx v1.2b                                                            |
| <code>\every@math@size</code> : Hook <code>\every@size</code>            | <code>\em</code> : Call to <code>\@nomath</code> added. . . . . 383                      |
| added. . . . . 318                                                       | 1990-02-08 ltfssini.dtx v1.1g                                                            |
| 1989-12-13 ltfssstrc.dtx v1.0f                                           | General: Protected the commands                                                          |
| <code>\use@mathgroup</code> : <code>\expandafter</code> added            | <code>\family</code> , <code>\series</code> , <code>\shape</code> , <code>\size</code> , |
| before final <code>\fi</code> . . . . . 321                              | <code>\selectfont</code> , and <code>\mathversion</code> . 366                           |
| 1989-12-16 ltfssbas.dtx v1.1a                                            | 1990-02-16 ltfssbas.dtx v1.2g                                                            |
| <code>\select@group</code> : <code>\relax</code> in front                | General: Support for changes of                                                          |
| added. . . . . 287                                                       | <code>\baselineskip</code> without changing                                              |
| Now four arguments. . . . . 287                                          | the size. . . . . 267                                                                    |
| Redefinition of alphabet now                                             | <code>\math@version</code> : <code>\@nomath</code> added. . . 277                        |
| simpler. . . . . 287                                                     | 1990-02-16 ltfssstrc.dtx v1.0i                                                           |
| Usage of ‘=’ macro added. . . . . 287                                    | <code>\selectfont</code> : Changed <code>\f@size</code> to                               |
| 1989-12-16 ltfssstrc.dtx v1.1a                                           | <code>\lcl@currsiz</code> (see fam file). . . 315                                        |
| <code>\selectfont</code> : Changed order of calls. 315                   | 1990-02-18 ltfssstrc.dtx v1.0j                                                           |
| <code>\use@mathgroup</code> : Redefinition of                            | General: Redefine unprotected version                                                    |
| alphabet now simpler. . . . . 321                                        | <code>\p@selectfont</code> instead of                                                    |
| Usage of ‘=’ macro added. . . . . 321                                    | <code>\selectfont</code> . . . . . 315                                                   |
| 1990-01-18 ltfssstrc.dtx v1.0h                                           | 1990-03-14 ltfssstrc.dtx v1.0k                                                           |
| General: <code>\tracingfonts</code> meaning                              | General: Added code for TeX3. . . . 311                                                  |
| changed. . . . . 311                                                     | <code>\extract@font</code> : Added code for                                              |
| 1990-01-20 ltfssbas.dtx v1.2a                                            | TeX3. . . . . 314                                                                        |
| <code>\math@bgroup</code> : Def. placed in this                          | <code>\selectfont</code> : Added code for TeX3. 315                                      |
| file. . . . . 289                                                        | 1990-03-30 ltfssbas.dtx v1.2h                                                            |
| <code>\math@egroup</code> : Def. placed in this                          | <code>\math@egroup</code> : Changed to have one                                          |
| file. . . . . 289                                                        | arg. . . . . 289                                                                         |
| <code>\select@group</code> : Def for alph id                             | 1990-03-30 ltfssstrc.dtx v1.2h                                                           |
| changed. . . . . 287                                                     | <code>\use@mathgroup</code> : Third argument                                             |
| 1990-01-21 ltfssbas.dtx v1.2b                                            | removed (see <code>\math@egroup</code> ). . . 321                                        |
| <code>\select@group</code> : Code moved to                               | 1990-04-01 ltfssbas.dtx v1.2i                                                            |
| <code>\use@mathgroup</code> . . . . . 287                                | General: Code added from                                                                 |
| 1990-01-21 ltfssstrc.dtx v1.2b                                           | tracefnt.dtx. . . . . 267                                                                |
| <code>\use@mathgroup</code> : Macro added to                             | Support for TeX3. . . . . 267                                                            |
| allow cleaner interface. . . . . 321                                     | 1990-04-01 ltfssstrc.dtx v1.0l                                                           |
| 1990-01-23 ltfssbas.dtx v1.2c                                            | General: Part of code moved to                                                           |
| General: <code>\no@version@warning</code>                                | fam.dtx. . . . . 311                                                                     |
| renamed to <code>\no@alphabet@error</code> . 267                         | <code>\tracingfonts</code> : Check if                                                    |
| Macro <code>\no@alphabet@help</code> added 267                           | <code>\tracingfonts</code> already defined. . 312                                        |
| <code>\no@alphabet@error</code> : Changed to                             |                                                                                          |
| error call . . . . . 267                                                 |                                                                                          |

|                                         |                                                                |
|-----------------------------------------|----------------------------------------------------------------|
| 1990-04-01 ltfsstrc.dtx v1.0o           | 1991-08-14 ltmath.dtx LaTeX2.09                                |
| \tracingfonts: Check if                 | \cases: (RmS) inserted extra braces                            |
| \tracingfonts defined removed           | around entry for NFSS . . . . . 484                            |
| again. . . . . 312                      | 1991-08-14 ltpictur.dtx LaTeX2.09                              |
| 1990-04-02 ltfsini.dtx v1.1i            | General: (RmS) inserted extra braces                           |
| General: \input of files now handled    | around entry for NFSS . . . . . 556                            |
| by docstrip. . . . . 366                | 1991-08-14 ltthm.dtx LaTeX2.09                                 |
| 1990-04-05 ltfsstrc.dtx v1.0m           | \@endtheorem: Moved \itshape after                             |
| \selectfont: Call \tracingon only if    | \item to make it work with NFSS 586                            |
| \tracingfonts greater than 3. . 315     | 1991-08-26 ltfsini.dtx v1.1n                                   |
| 1990-05-05 ltfsstrc.dtx v1.0n           | \reset@font: Macro introduced . . . 386                        |
| \selectfont: \tracingon with new        | 1991-08-26 ltmiscen.dtx LaTeX2.09                              |
| syntax. . . . . 315                     | \verbatim: \@@par added . . . . . 474                          |
| 1990-06-23 ltfsini.dtx v1.1k            | 1991-08-26 ltpictur.dtx LaTeX2.09                              |
| \nfss@text: Changed to \mbox. . . . 386 | \endpicture: (RmS & FMI) extra                                 |
| 1990-06-24 ltfsbas.dtx v1.2j            | boxing level around \@picbox to                                |
| \DeclarePreloadSizes: Missing           | guard against unboxing in math                                 |
| percent added. . . . . 273              | mode (proposed by John Hobby) 554                              |
| 1990-06-24 ltfsstrc.dtx v1.0o           | 1991-08-26 ltplain.dtx LaTeX2.09                               |
| \baselinestretch: Moved to              | \tracingall: Added                                             |
| tracefnt.dtx. . . . . 318               | \errorcontextlines=\maxdimen,                                  |
| \getanddefine@fonts: \Adding            | suggested by J. Schrod . . . . . 31                            |
| tracing code. . . . . 322               | 1991-09-29 ltboxes.dtx LaTeX2.09                               |
| \Macro moved from fam.dtx. . . . 322    | \@mpfootnotetext: (RmS) added                                  |
| Adding debug code. . . . . 322          | \reset@font . . . . . 522                                      |
| \use@mathgroup: Tracing code added. 321 | 1991-09-29 ltfloat.dtx LaTeX2.09                               |
| 1990-06-30 ltfsbas.dtx v1.2l            | \@footnotetext: (RmS) added                                    |
| \showhyphens: Macro added. . . . . 290  | \reset@font . . . . . 619                                      |
| 1990-06-30 ltfsstrc.dtx v1.0p           | 1991-09-29 ltmath.dtx LaTeX2.09                                |
| \use@mathgroup: Added \relax after      | \@eqnnum: RmS: \reset@font added. 489                          |
| math group number. . . . . 321          | 1991-09-29 ltsect.dtx LaTeX2.09                                |
| 1990-07-07 ltfsstrc.dtx v1.0q           | \@dottedtocline: (RmS) added                                   |
| \getanddefine@fonts: Group number       | \reset@font for page number . . 598                            |
| added to tracing. . . . . 322           | 1991-10-17 ltcntrl.dtx LaTeX2.09                               |
| \math@egroup: Tracing code added. 322   | \@tfor: (Rms) \xdef replaced by \def                           |
| \use@mathgroup: Group number            | (See FMI's array.doc) . . . . . 159                            |
| added to tracing. . . . . 321           | 1991-10-25 ltbibl.dtx LaTeX2.09                                |
| 1990-08-27 ltfsstrc.dtx 1.0r            | \@citex: added \reset@font,                                    |
| \type@restoreinfo: Some extra           | suggested by Bernd Raichle. . . . 625                          |
| tracing info. . . . . 317               | 1991-11-01 ltfloat.dtx LaTeX2.09                               |
| 1990-08-27 ltfsstrc.dtx v1.0r           | \footnote: (RmS) Added                                         |
| \getanddefine@fonts: Correcting         | \let\protect\noexpand in                                       |
| missing name after \tracingon. . 322    | \footnote, \footnotemark, and                                  |
| 1991-03-28 ltfsini.dtx v1.1m            | \footnotetext, since \xdef is                                  |
| \copyright: Extra braces added. . . 386 | used . . . . . 619                                             |
| 1991-03-30 ltfsini.dtx v1.2g            | 1991-11-04 ltlists.dtx LaTeX2.09                               |
| \newfont: Definition added. . . . . 384 | \makelabel: (RmS) added default                                |
| \symbol: Definition added. . . . . 385  | definition for \makelabel, to                                  |
| 1991-07-24 ltmiscen.dtx LaTeX2.09       | produce an error message. . . . . 508                          |
| \@verbatim: Added                       | 1991-11-04 ltplain.dtx RmS                                     |
| \penalty\interlinepenalty to            | General: Removed \itemitem since                               |
| definition of \par so that              | never needed/useful with L <sup>A</sup> T <sub>E</sub> X. . 29 |
| \samepage works . . . . . 474           |                                                                |

|                                                                                                                                                              |                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 1991-11-06 ltbib1.dtx LaTeX2.09                                                                                                                              | 1992-03-18 ltdefns.dtx LaTeX209                                                                                                                |
| \@citex: added code to remove a<br>leading blank . . . . . 625                                                                                               | General: (RMS) changed input<br>channel from 0 to \@inputcheck to<br>avoid conflicts with other channels<br>allocated by \newread . . . . . 71 |
| 1991-11-13 ltbib1.dtx LaTeX2.09                                                                                                                              | 1992-03-18 ltfloat.dtx LaTeX2.09                                                                                                               |
| \@bibitem: Changed counter enumi to<br>enumiv, as it says in the comment<br>above . . . . . 625                                                              | \@xympar: (RmS) added<br>\global\@ignorefalse . . . . . 613                                                                                    |
| 1991-11-21 ltfssini.dtx v1.1o                                                                                                                                | \end@float: (RmS) changed<br>\@esphack to \@Esphack . . . . . 608                                                                              |
| \reset@font: Added extra braces for<br>robustness. . . . . 386                                                                                               | 1992-03-18 ltlsts.dtx 0.0                                                                                                                      |
| Changed to protected version of<br>macro. . . . . 386                                                                                                        | \trivlist: RmS: added<br>\@nmbrlistfalse . . . . . 504                                                                                         |
| 1991-11-22 ltfloat.dtx LaTeX2.09                                                                                                                             | 1992-03-18 ltmiscen.dtx LaTeX2.09                                                                                                              |
| \footnote: (RmS) Added<br>\let\protect\noexpand in<br>\@xfootnote, \@xfootnotemark,<br>and \@xfootnotetext . . . . . 619                                     | \begin: Changed \@ignoretrue to<br>\@ignorefalse (as documented) 466                                                                           |
| 1991-11-22 ltlsts.dtx LaTeX2.09                                                                                                                              | 1992-03-21 ltfssini.dtx v1.2d                                                                                                                  |
| \@item: (RmS) Changed second call to<br>\makelabel to<br>\unhbox\@tempboxa. Avoids<br>problems with side effects in<br>\makelabel and is more efficient. 508 | General: Renamed \text to<br>\nfss@text to make it internal. . 366                                                                             |
| 1991-11-27 ltfssbas.dtx v1.3a                                                                                                                                | 1992-05-12 ltfssbas.dtx v1.3c                                                                                                                  |
| General: All \family, \shape etc.<br>renamed to \fontfamily etc. . . . 267                                                                                   | \extract@alph@from@version: Macro<br>added. . . . . 288                                                                                        |
| 1991-11-27 ltfssini.dtx v1.2a                                                                                                                                | \select@group: Added call to<br>\extract@alph@from@version. . 287                                                                              |
| General: All \family, \shape etc.<br>renamed to \fontfamily etc. . . . 366                                                                                   | 1992-07-26 ltfssbas.dtx v1.9a                                                                                                                  |
| 1992-01-06 ltfssini.dtx v1.2c                                                                                                                                | \curr@fontshape: . . . . . 279                                                                                                                 |
| General: added slitex code . . . . . 366                                                                                                                     | \DeclareFontShape: Introduced<br>\DeclareFontShape . . . . . 268                                                                               |
| 1992-01-10 ltbib1.dtx LaTeX2.09                                                                                                                              | \define@newfont: . . . . . 279                                                                                                                 |
| \@bibitem: Changed \c@enumiv to<br>\value of \@listctr . . . . . 625                                                                                         | \math@font: . . . . . 286                                                                                                                      |
| 1992-01-10 ltmath.dtx LaTeX2.09                                                                                                                              | \select@group: . . . . . 287                                                                                                                   |
| equation: RmS: put \hbox around<br>\@eqnnum to typeset the equation<br>number in text mode (as in the<br>eqnarray env.) . . . . . 489                        | \split@name: Added splitting into<br>\@f@encoding. . . . . 279                                                                                 |
| 1992-01-10 ltthm.dtx LaTeX2.09                                                                                                                               | \wrong@fontshape: . . . . . 284                                                                                                                |
| \@othm: (RmS) Check for existence of<br>theorem environment . . . . . 585                                                                                    | 1992-07-26 ltfssstrc.dtx v2.0b                                                                                                                 |
| 1992-01-14 ltbib1.dtx LaTeX2.09                                                                                                                              | \@fct@: . . . . . 330                                                                                                                          |
| \@biblabel: removed \hfill . . . . . 627                                                                                                                     | \@fct@sub: documentation fixes . . 331                                                                                                         |
| 1992-01-14 ltsect.dtx 0.0                                                                                                                                    | \selectfont: . . . . . 315                                                                                                                     |
| \@starttoc: (RmS) added \immediate<br>to \openout as all \write<br>commands are also executed<br>\immediate . . . . . 596                                    | \try@simple@size: . . . . . 325                                                                                                                |
| 1992-02-26 ltbib1.dtx LaTeX2.09                                                                                                                              | \try@size@range: . . . . . 328                                                                                                                 |
| \@lbibitem: Added \hfill to restore<br>left-alignment of bibliography<br>labels in alpha style . . . . . 625                                                 | \use@mathgroup: . . . . . 321                                                                                                                  |
|                                                                                                                                                              | 1992-08-14 ltbib1.dtx LaTeX2.09                                                                                                                |
|                                                                                                                                                              | \@citex: added missing argument<br>braces around \hbox, found by Ed<br>Szynter . . . . . 625                                                   |
|                                                                                                                                                              | 1992-08-14 ltboxes.dtx LaTeX209                                                                                                                |
|                                                                                                                                                              | \endminipage: (RmS) replaced<br>\vskip-\lastskip by \unskip<br>(proposed by FMi) . . . . . 522                                                 |
|                                                                                                                                                              | 1992-08-17 ltbib1.dtx LaTeX2.09                                                                                                                |
|                                                                                                                                                              | \@citex: simplified code for removing<br>leading blanks in citation key<br>(proposed by Frank Jensen and<br>Kresten Krab Thorup) . . . . . 625 |

|                                                                                                                                     |                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1992-08-19 ltsect.dtx 0.0                                                                                                           | 1992-11-26 ltfloat.dtx LaTeX2.09                                                                 |
| \@xsect: (RmS) corrected bug: stretch<br>and shrink in argument to \hskip<br>previously not negated . . . . .                       | \@footnotetext: (RmS) added<br>protection for \edef . . . . .                                    |
| 1992-08-19 ltthm.dtx LaTeX2.09                                                                                                      | \footnote: (RmS) Changed all to<br>‘def’protect’noexpand’protect’noexpand<br>. . . . .           |
| \@othm: (RmS) Changed error message<br>to complain about undefined<br>counter . . . . .                                             | 1992-12-03 ltfssini.dtx v?                                                                       |
| 1992-08-20 ltfssini.dtx v1.4b                                                                                                       | \hexnumber@: Make it accept<br>counters. . . . .                                                 |
| \@setsize: Added \@currsize. . . .                                                                                                  | 1993-03-08 preload.dtx v2.0b                                                                     |
| 1992-08-24 ltdefns.dtx LaTeX2.09                                                                                                    | General: Added 12pt preloads . . . .                                                             |
| \@ifnextchar: (Rms) \@ifnextchar<br>didn’t work if its first argument<br>was an equal sign. . . . .                                 | 1993-03-18 ltfssbas.dtx v2.0c                                                                    |
| 1992-08-24 ltmiscen.dtx LaTeX2.09                                                                                                   | General: Changed all \@tempdima in<br>\@tempdimb to avoid killing<br>\numberline . . . . .       |
| \begin: Added code to \begin to<br>remember line number. Used by<br>\@badend to display position of<br>non-matching \begin. . . . . | 1993-03-18 ltfsstrc.dtx v2.1b                                                                    |
| \verb: Changed \verb and \@sverb to<br>work correctly in math mode . . .                                                            | General: Changed all \@tempdima in<br>\@tempdimb to avoid killing<br>\numberline . . . . .       |
| 1992-08-25 ltsect.dtx LaTeX2.09                                                                                                     | Changed all \@tempdimb in<br>\@tempdimx to avoid killing<br>\numberline . . . . .                |
| \@sect: (FMi) replaced explicit setting<br>of \@svsec by call to<br>\@seccntformat . . . . .                                        | 1993-03-18 ltfsstrc.dtx v2.1c                                                                    |
| 1992-09-18 ltlists.dtx LaTeX2.09                                                                                                    | \DeclareSizeFunction: Added all<br>args to avoid blanks problems . .                             |
| \item: (RmS) Added warning if \item<br>is used in math mode . . . . .                                                               | 1993-04-09 lterror.dtx v1.0e                                                                     |
| 1992-09-18 lttab.dtx LaTeX2.09                                                                                                      | \@latexerr: Mention The<br>Companion . . . . .                                                   |
| \@array: Changed \par to \@empty to<br>avoid starting new row e.g. after<br>\hline . . . . .                                        | 1993-04-11 lterror.dtx v1.0f                                                                     |
| 1992-09-19 ltfsstrc.dtx v2.0c                                                                                                       | \@latexerr: Remove setting of<br>errorcontextlines . . . . .                                     |
| \try@simple@size: . . . . .                                                                                                         | 1993-05-05 ltfntcmd.dtx v2.0b                                                                    |
| 1992-09-21 ltfssini.dtx v1.4d                                                                                                       | General: Removed all LaTeX related<br>cmds . . . . .                                             |
| \not@math@alphabet: Macro defined.                                                                                                  | 1993-05-16 ltfssbas.dtx v2.0e                                                                    |
| 1992-09-22 ltfssbas.dtx v1.91a                                                                                                      | \showhyphens: Use \reset@font . .                                                                |
| General: Introduced \tf@size for<br>math size. . . . .                                                                              | 1993-07-16 ltfsstrc.dtx v2.1h                                                                    |
| 1992-09-22 ltfsstrc.dtx v2.1a                                                                                                       | General: Changed layout of info<br>messages . . . . .                                            |
| \getanddefine@fonts: Introduced<br>\tf@size for math size. . . . .                                                                  | 1993-07-17 ltoutenc.dtx 1.0d                                                                     |
| 1992-11-13 ltfssini.dtx v?                                                                                                          | General: changed \catcoding @ . . .                                                              |
| \hexnumber@: Made expandable. . . .                                                                                                 | 1993-08-03 ltmiscen.dtx LaTeX2.09                                                                |
| 1992-11-23 ltcounts.dtx LaTeX2.09                                                                                                   | \enddocument: Changed redefinition of<br>\global to redefinition of<br>\@setckpt. . . . .        |
| \stepcounter: Replaced {} in<br>\stepcounter by \begingroup<br>\endgroup to avoid adding an<br>empty ord in math mode . . . . .     | 1993-08-05 ltpictur.dtx LaTeX2.09                                                                |
| 1992-11-26 ltboxes.dtx LaTeX2.09                                                                                                    | \circle: (RMS) Added error message<br>if \circle is used in math mode.                           |
| \@mpfootnotetext: (RmS) added<br>protection for \edef . . . . .                                                                     | 1993-08-05 ltsect.dtx LaTeX2.09                                                                  |
|                                                                                                                                     | \@sect: (RmS) Made sure that<br>\protect works correctly in<br>expansion of \the counter . . . . |



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|-------------------------------------------|-------------------------------------------|
| 1993-08-05 ltspace.dtx LaTeX2e            | 1993-11-03 ltmath.dtx LaTeX2e             |
| \@hspace: (RmS) Removed                   | General: RmS: Initialized \everycr to     |
| superfluous \leavevmode in                | empty . . . . . 489                       |
| \@hspace and \@hspacer, as                | 1993-11-03 ltpictur.dtx LaTeX2.09         |
| suggested by CAR. . . . . 189             | General: (RmS) changed \halign to         |
| 1993-08-05 lttab.dtx latex2e              | \ialign to initialize \tabskip and        |
| \tabular*: Replaced                       | \everycr . . . . . 556                    |
| \expandafter\def by \@namedef. 538        | 1993-11-11 ltfssini.dtx v2.1a             |
| 1993-08-06 ltbibl.dtx LaTeX2.09           | \normalfont: Macro added . . . . . 386    |
| \@citex: Moved writing to .aux file in    | 1993-11-11 ltfssstrc.dtx v2.2a            |
| loop over citation keys so that           | General: Option concept added for         |
| leading blanks are removed there          | LaTeX2e . . . . . 311                     |
| as well. . . . . 625                      | 1993-11-14 ltclass.dtx v0.2a              |
| 1993-08-13 ltoutenc.dtx 1.0f              | \@currentx: Name changed from             |
| General: Protected against active @       | \@currentextension . . . . . 637          |
| sign. . . . . 215                         | \@resetoptions: macro added . . . . . 656 |
| 1993-08-13 preload.dtx v2.0c              | \AtEndDocument: Included extension        |
| General: Added \relax at end of font      | in the generated macro name for           |
| names. . . . . 411                        | package and class hooks. . . . . 657      |
| 1993-08-16 ltoutenc.dtx 1.0g              | \documentstyle: Added                     |
| General: Needs space after \string 215    | \RequirePackage                           |
| 1993-08-18 ltfssdcl.dtx v2.0e             | \@unusedoptionlist stuff. . . . . 648     |
| \new@mathversion: Exchanged names         | \load@onefilewithoptions: Moved           |
| of encodings in warning message of        | resetting of \default@ds, \ds@ and        |
| \SetSymbolFont. . . . . 348               | \@declaredoptions here, from the          |
| 1993-09-02 ltfssstrc.dtx v2.1i            | end of \ProcessOptions. . . . . 652       |
| General: Corrected name of sgen size      | \NeedsTeXFormat: made more robust         |
| function. . . . . 311                     | for alternative syntax for other          |
| 1993-09-03 ltmiscen.dtx LaTeX2.09         | formats. . . . . 649                      |
| \verbatim@nolig@list: Replaced            | \ProcessOptions*: Optimise ‘empty         |
| \@noligs by extensible list . . . . 479   | option’ code. . . . . 645                 |
| 1993-09-07 ltmiscen.dtx LaTeX2.09         | Stop adding the global option list        |
| \verb@balance@group: (RmS)                | inside class files. . . . . 645           |
| Changed definition of \verb so            | 1993-11-14 ltdefs.dtx v0.2a               |
| that it detects a missing second          | \g@addto@macro: Made global . . . . . 98  |
| delimiter. . . . . 478                    | 1993-11-15 ltclass.dtx v0.2b              |
| 1993-09-08 ltmiscen.dtx LaTeX2.09         | \documentstyle: Modified to match         |
| \enddocument: Added warning in case       | \ProcessOption* . . . . . 648             |
| of undefined references. . . . . 460      | \ProcessOptions*: Star form added. 645    |
| 1993-09-15 ltfssbas.dtx v2.0g             | 1993-11-17 ltclass.dtx v0.2c              |
| \DeclareFontEncoding: Corrected:          | \@fileswith@pti@ns: Macro added 656       |
| \default@T to \default@M. . . . . 271     | \@badrequireerror: Macro added . 658      |
| 1993-09-15 ltfssstrc.dtx v2.1j            | \@twoloadclasserror: Macro added 658      |
| General: Corrected spelling of            | \CurrentOption: Name changed from         |
| \noexpand. . . . . 311                    | \@curroption . . . . . 637                |
| 1993-09-19 lterror.dtx LaTeX2.09          | \DeclareOption*: Error checking           |
| \@invalidchar: (RmS) Error message        | added . . . . . 644                       |
| for invalid input characters. . . . . 168 | \load@onefilewithoptions: Added           |
| 1993-11-02 ltmath.dtx LaTeX2.09           | trap for two \LoadClass                   |
| General: RmS: Corrected description       | commands. . . . . 653                     |
| of \@eqnset, moved \@eqnset               | \NeedsTeXFormat: Name changed from        |
| accordingly and removed extra             | \NeedsFormat . . . . . 649                |
| \tabskip assignment. . . . . 489          | \ProcessOptions*: restoring               |
|                                           | \@fileswith@pti@ns added. . . . 645       |

|                                                                 |     |                                                                 |     |
|-----------------------------------------------------------------|-----|-----------------------------------------------------------------|-----|
| 1993-11-18 ltclass.dtx v0.2d                                    |     | <code>\@newcommand</code> : Macro added . . . . .               | 72  |
| <code>\documentstyle</code> : Modified                          |     | <code>\@newenv</code> : Macro interface changed . .             | 76  |
| <code>\RequirePackage</code> stuff. . . . .                     | 648 | <code>\@xargdef</code> : Macro interface changed .              | 72  |
| <code>\ExecuteOptions</code> : Use                              |     | <code>\@yargdef</code> : Avoid <code>\@?@?</code> token . . . . | 74  |
| <code>\CurrentOption</code> not <code>\reserved@a</code>        | 647 | Macro interface changed . . . . .                               | 74  |
| <code>\NeedsTeXFormat</code> : <code>\fmtname</code>            |     | <code>\newcommand</code> : Macro reimplemented                  |     |
| <code>\fmtversion</code> not <code>\@...</code> . . . . .       | 649 | and extended . . . . .                                          | 72  |
| 1993-11-21 ltfiles.dtx LaTeX2e                                  |     | <code>\renewcommand</code> : Macro reimplemented                |     |
| <code>\@missingfileerror</code> : Stop infinite                 |     | and extended . . . . .                                          | 74  |
| looping on <code>\@er@ext</code> . . . . .                      | 208 | <code>\renewenvironment</code> : Macro                          |     |
| 1993-11-21 ltmiscen.dtx v0.9a                                   |     | reimplemented and extended . . . .                              | 76  |
| <code>\@verbatim</code> : use <code>\verbatim@font</code>       |     | <code>\two@digits</code> : Macro added . . . . .                | 69  |
| instead of <code>\tt</code> . . . . .                           | 474 | 1993-11-23 ltoutput.dtx v0.1a                                   |     |
| <code>\verb</code> : Use <code>\verbatim@font</code> instead of |     | <code>\paperheight</code> : Register added . . . .              | 729 |
| <code>\tt</code> . . . . .                                      | 478 | <code>\paperwidth</code> : Register added . . . .               | 729 |
| <code>\verbatim@font</code> : Macro added . . . .               | 475 | 1993-11-23 ltoutput.dtx v0.1c                                   |     |
| 1993-11-22 ltclass.dtx v0.2f                                    |     | <code>\@enlargepage</code> : Command added . .                  | 773 |
| <code>\@fileswithoptions</code> : Made the                      |     | <code>\@kludgeins</code> : Insert added . . . . .               | 773 |
| default [] not <code>[\@unknownversion]</code>                  | 650 | <code>\@makecol</code> : Command changed . . . .                | 740 |
| <code>\@ifl@ter</code> : Added <code>//00</code> so parsing     |     | <code>\@specialoutput</code> : Command changed                  | 734 |
| never produces a runaway                                        |     | <code>\enlargethispage*</code> : Commands                       |     |
| argument. . . . .                                               | 640 | added . . . . .                                                 | 773 |
| General: <code>\@unknownversion</code> removed                  | 632 | 1993-11-24 ltfntcmd.dtx v2.1a                                   |     |
| <code>\load@onefilewithoptions</code> : Made the                |     | <code>\maybe@ic@</code> : Use <code>\t@st@ic</code> . . . . .   | 418 |
| initial version [] not                                          |     | <code>\t@st@ic</code> : Macro added . . . . .                   | 419 |
| <code>[\@unknownversion]</code> . . . . .                       | 652 | 1993-11-24 ltfssini.dtx v2.1a                                   |     |
| 1993-11-22 ltdefs.dtx LaTeX2e                                   |     | General: Removed <code>\xpt</code> stuff . . . .                | 386 |
| <code>\@minus</code> : Macro added . . . . .                    | 70  | 1993-11-24 ltlogos.dtx LaTeX2e                                  |     |
| <code>\@plus</code> : Macro added . . . . .                     | 70  | <code>\LaTeX</code> : Macro changed . . . . .                   | 191 |
| <code>\CheckCommand</code> : Macro added . . . .                | 77  | 1993-11-28 ltclass.dtx v0.2h                                    |     |
| <code>\providecommand</code> : Macro added . . . .              | 77  | <code>\@twoclasseserror</code> : Macro added .                  | 659 |
| 1993-11-22 lterror.dtx LaTeX2e                                  |     | General: Assorted commands now in                               |     |
| <code>\@errorcontextlines</code> : Macro added                  | 165 | the kernel removed. . . . .                                     | 636 |
| 1993-11-22 ltfiles.dtx LaTeX2e                                  |     | Directory syntax checing moved to                               |     |
| <code>\listfiles</code> : Removed checking for                  |     | <code>dircheck.dtx</code> . . . . .                             | 636 |
| <code>\@unknownversion</code> . . . . .                         | 210 | Primitive filenames now terminated                              |     |
| 1993-11-22 ltlength.dtx LaTeX2e                                 |     | by space not <code>\relax</code> . . . . .                      | 636 |
| <code>\@settodim</code> : Macro added . . . . .                 | 265 | <code>\endfilecontents</code> : Don't globally                  |     |
| <code>\@settopoint</code> : Macro added . . . . .               | 266 | allocate a write stream (always use                             |     |
| <code>\settodepth</code> : Macro added . . . . .                | 265 | 15) . . . . .                                                   | 659 |
| <code>\settoheight</code> : Macro added . . . . .               | 265 | 1993-11-28 ltfiles.dtx LaTeX2e                                  |     |
| 1993-11-22 ltlogos.dtx LaTeX2e                                  |     | <code>\@missingfileerror</code> : Use filename                  |     |
| <code>\LaTeXe</code> : Macro added . . . . .                    | 191 | parser from <code>dircheck</code> . . . . .                     | 208 |
| 1993-11-23 ltclass.dtx v0.2g                                    |     | 1993-11-29 ltoutput.dtx v1.0b                                   |     |
| <code>\@use@option</code> : Name changed from                   |     | <code>\@makecol</code> : <code>\@makespecialcolbox</code>       |     |
| <code>\@executeoption</code> . . . . .                          | 647 | added . . . . .                                                 | 740 |
| General: Various macros now moved                               |     | <code>\@makespecialcolbox</code> : Command                      |     |
| to <code>latex.tex</code> . . . . .                             | 636 | added . . . . .                                                 | 742 |
| Warnings and errors now directly                                |     | 1993-11-29 ltplain.dtx LaTeX2e                                  |     |
| coded. . . . .                                                  | 636 | General: All accents in decimals;                               |     |
| 1993-11-23 ltdefs.dtx LaTeX2e                                   |     | suggested by Paul Taylor . . . . .                              | 30  |
| <code>\@argdef</code> : Macro added . . . . .                   | 72  | 1993-11-30 ltoutput.dtx v1.0c                                   |     |
| <code>\@ifundefined</code> : Redefined to remove a              |     | <code>\fl@tracemessage</code> : Commands added                  | 775 |
| trailing <code>\fi</code> . . . . .                             | 92  |                                                                 |     |

|                                           |                                         |
|-------------------------------------------|-----------------------------------------|
| 1993-12-01 fontdef.dtx v2.1a              | 1993-12-04 ltfiles.dtx v0.9b            |
| General: Update for LaTeX2e . . . . . 389 | \@iinput: Macro reimplemented . . . 207 |
| 1993-12-01 ltoutput.dtx v1.0e             | \@input: Macro reimplemented . . . 208  |
| \@reinserts: Command added . . . 742      | \IfFileExists@: Macro added . . . 205   |
| 1993-12-03 ltboxes.dtx v0.1a              | \input: Macro reimplemented . . . 207   |
| \@argsbox: macro removed . . . . . 524    | 1993-12-05 ltfloat.dtx LaTeX2e          |
| \@begin@tempboxa: macro added . . 513     | \@dblfloatplacement: Command            |
| \@end@tempboxa: macro added . . . 513     | changed . . . . . 610                   |
| \@iirsbox: redefined to support           | \@xfloat: Command changed . . . 604     |
| \height . . . . . 524                     | 1993-12-05 ltoutput.dtx v1.0f           |
| \@imakebox: macro modified . . . . 513    | \@addtobot: Command changed . . . 754   |
| \@irsbox: redefined to support            | \@addtocurcol: Command changed 756      |
| \height . . . . . 524                     | \@addtodblcol: Command changed 767      |
| \@isavebox: color support . . . . . 516   | \@addtonextcol: Command changed 763     |
| extra group . . . . . 516                 | \@addtotoporbot: Command changed 755    |
| \@isavepicbox: extra group . . . . 516    | \@boxfpsbit: Command added . . . 778    |
| \@makebox: default changed from x to      | \@flcheckspace: Command added . 780     |
| c . . . . . 513                           | \@flsetnum: Command added . . . 779     |
| \@makepicbox: macro modified . . . 514    | \@flsettextmin: Command added . 780     |
| \@savebox: default c not x . . . . 516    | \@flstop: Commands added . . . . 776    |
| \bm@b: macros added . . . . . 513         | \@flupdates: Command added . . . 781    |
| \endlrbox: macro added . . . . . 516      | \@fpsadddfault: Command added 777       |
| \fbbox: extra group . . . . . 517         | \@getfpsbit: Command added . . . 778    |
| \lrbox: color support . . . . . 516       | \@opcol: Command changed . . . . 740    |
| macro added . . . . . 516                 | Hook added . . . . . 740                |
| \makebox: modified . . . . . 512          | \@outputpage: Command changed . 744     |
| \mbbox: extra group . . . . . 513         | \@resetfps: Command added . . . 779     |
| \minipage: Redefined to support extra     | \@setfloattypecounts: Command           |
| optional arguments . . . . . 521          | added . . . . . 778                     |
| \newsavebox: Pass the whole of arg 1      | \@setfpsbit: Command added . . . 779    |
| to \@ifdefinable . . . . . 515            | \@shipoutsetup: Command added . 744     |
| \parbox: Redefined to support extra       | \@startcolumn: Command changed 750      |
| optional arguments . . . . . 519          | \@startdblcolumn: Command               |
| \raisebox: redefined to support           | changed . . . . . 750                   |
| \height . . . . . 524                     | \@testfp: Command added . . . . 778     |
| \sbox: color support . . . . . 515        | \@textfloatsheight: Commands            |
| extra group . . . . . 515                 | added . . . . . 777                     |
| \set@color: color support . . . . . 515   | \@topnewpage: Commands changed 732      |
| macro added . . . . . 515                 | \@tryfcolumn: Command changed . 751     |
| 1993-12-03 ltclass.dtx v0.2i              | \@writesetup: \@startpagehook           |
| \@cls@pkg: Name changed to avoid          | added . . . . . 744                     |
| clash with output routine. . . . . 657    | \@output: Command changed . . . . 734   |
| General: \@onlypreamble: Many             | 1993-12-06 ltclass.dtx v0.2k            |
| commands declared. . . . . 636            | \ExecuteOptions: Preserve               |
| Removed obsolete                          | \CurrentOption. . . . . 647             |
| \@documentclass . . . . . 636             | 1993-12-06 ltoutput.dtx v1.0f           |
| 1993-12-03 lterror.dtx v1.0b              | \@specialoutput: Unboxing of 255        |
| \@latexerr: Set                           | added to rescue writes . . . . . 734    |
| \@errorcontextlines to -1 . . . 165       | 1993-12-06 ltoutput.dtx v1.0g           |
| 1993-12-03 ltffsini.dtx v2.1a             | \@topnewpage: \@floatplacement          |
| General: update for LaTeX2e . . . . 366   | placement bug fixed . . . . . 732       |
| 1993-12-04 ltfilehook.dtx v0.9b           | 1993-12-07 ltclass.dtx v0.2l            |
| \InputIfFileExists: Macro added 684       | \ProvidesFile: Macro added . . . . 643  |

|                                                                          |     |                                                                         |          |
|--------------------------------------------------------------------------|-----|-------------------------------------------------------------------------|----------|
| 1993-12-07 ltclass.dtx v0.2m                                             |     | <code>\fix@penalty</code> : Macro added . . . . .                       | 419      |
| <code>\load@onefilewithoptions</code> : Reset                            |     | <code>\maybe@ic</code> : Macro name changed . .                         | 418      |
| <code>\CurrentOption</code> . . . . .                                    | 652 | <code>\maybe@ic@</code> : Macro and name                                |          |
| 1993-12-07 ltoutenc.dtx 1.1                                              |     | changed . . . . .                                                       | 418      |
| General: Protected all special                                           |     | <code>\sw@slant</code> : Macro changed . . . . .                        | 419      |
| characters with <code>\string</code> . . . . .                           | 215 | <code>\textup</code> : Macros changed . . . . .                         | 416      |
| 1993-12-07 ltoutenc.dtx v1.1                                             |     | 1993-12-11 ltmath.dtx v0.9g                                             |          |
| General: Made all character numbers                                      |     | General: Added a group around the                                       |          |
| decimal. . . . .                                                         | 212 | first argument of <code>\frac</code> to prevent                         |          |
| Removed a lot of equal signs and                                         |     | changes (for example font changes)                                      |          |
| the like. . . . .                                                        | 212 | from modifying the contents of the                                      |          |
| 1993-12-08 ltboxes.dtx v0.1b                                             |     | second argument. . . . .                                                | 489      |
| <code>\@begin@tempboxa</code> : Extra braces for                         |     | 1993-12-11 ltoutenc.dtx v1.2a                                           |          |
| color support (braces removed                                            |     | General: Corrected for <code>tlenc</code> , <code>math</code> . . . . . | 212      |
| from other macros) . . . . .                                             | 513 | 1993-12-11 ltsect.dtx LaTeX2e                                           |          |
| <code>\@irsbox</code> : fix typo . . . . .                               | 524 | <code>\author</code> : Added default . . . . .                          | 587      |
| <code>\@parboxto</code> : <code>\endgraf</code> added due to             |     | <code>\title</code> : Added default . . . . .                           | 587      |
| extra group in <code>\@begin@tempboxa</code>                             | 519 | 1993-12-11 ltxref.dtx LaTeX2e                                           |          |
| <code>\lrbox</code> : move <code>\@endpfalse</code> out of the           |     | <code>\@setref</code> : Macro added . . . . .                           | 456      |
| inner group . . . . .                                                    | 516 | <code>\pageref</code> : Macro reimplemented . . .                       | 456      |
| 1993-12-08 ltfntcmd.dtx v2.1b                                            |     | <code>\ref</code> : Macro reimplemented . . . . .                       | 456      |
| General: Macros <code>\rm</code> , <code>\bf</code> and <code>\sf</code> |     | 1993-12-12 ltoutput.dtx v1.0h                                           |          |
| moved to <code>classes.dtx</code> . . . . .                              | 421 | <code>\@cflb</code> : <code>boxmaxdepth</code> setting moved            | 748      |
| 1993-12-08 ltlists.dtx LaTeX2e                                           |     | defs changed to <code>lets</code> . . . . .                             | 748      |
| <code>\@item</code> : use <code>\sbox</code> to support colour           | 507 | <code>\@cflt</code> : name changed . . . . .                            | 748      |
| 1993-12-08 ltspace.dtx LaTeX2e                                           |     | <code>\@docclearpage</code> : defs changed to                           |          |
| <code>\@bsphack</code> : Command reimplemented                           | 179 | <code>lets</code> . . . . .                                             | 739, 740 |
| Command reimplemented; late                                              |     | <code>\@makecol</code> : defs changed to <code>lets</code> . . .        | 741      |
| birthday present for Chris . . . . .                                     | 179 | <code>\@resetthfps</code> : Warnings added:                             |          |
| <code>\@vbsphack</code> : Command added . . . . .                        | 182 | minimal . . . . .                                                       | 779      |
| 1993-12-09 ltboxes.dtx v0.1c                                             |     | <code>\@startdblcolumn</code> : defs changed to                         |          |
| <code>\@irsbox</code> : fix another typo . . . . .                       | 524 | <code>lets</code> . . . . .                                             | 750, 751 |
| 1993-12-09 ltclass.dtx v0.2n                                             |     | <code>\@topnewpage</code> : braces removed . . . .                      | 732      |
| <code>\documentstyle</code> : input 209                                  |     | <code>\@tryfcolumn</code> : defs changed to <code>lets</code> .         | 751      |
| compatibility file. . . . .                                              | 648 | <code>\fl@tracemessage</code> : Commands                                |          |
| 1993-12-09 ltfiles.dtx v0.9e                                             |     | changed . . . . .                                                       | 775      |
| <code>\document</code> : Hook added . . . . .                            | 194 | 1993-12-13 ltclass.dtx v0.2o                                            |          |
| 1993-12-09 ltmiscen.dtx v0.9e                                            |     | General: Removed setting                                                |          |
| <code>\enddocument</code> : Hook added . . . . .                         | 460 | <code>\errorcontextlines</code> (now in                                 |          |
| 1993-12-10 ltoutenc.dtx v1.2                                             |     | <code>latex.tex</code> ) . . . . .                                      | 636      |
| General: Added source code for                                           |     | <code>\documentstyle</code> : compatibility file                        |          |
| <code>tlenc.sty</code> . . . . .                                         | 212 | now <code>latex209.sty</code> . . . . .                                 | 648      |
| 1993-12-11 ltfntcmd.dtx v3.0a                                            |     | <code>\usepackage</code> : Fixed error handling .                       | 649      |
| General: Complete reworking of all                                       |     | 1993-12-13 ltdirchk.dtx v0.2a                                           |          |
| text commands, using just one                                            |     | General: on the ‘docstrip’ pass, do not                                 |          |
| creator function . . . . .                                               | 413 | check <code>openin</code> path . . . . .                                | 10       |
| italic correction now put in front of                                    |     | <code>\IfFileExists</code> : Removed interactive                        |          |
| penalty before glue . . . . .                                            | 413 | prompting for current directory                                         |          |
| newcommands replaced by defs . .                                         | 413 | syntax . . . . .                                                        | 10       |
| newfontswitch command corrected                                          |     | <code>\strip@prefix</code> : modified, name                             |          |
| and changed . . . . .                                                    | 413 | changed from <code>\stripmeaning</code> . . . .                         | 5        |
| <code>\DeclareTextFontCommand</code> : Macro                             |     | 1993-12-13 ltlists.dtx latex2e                                          |          |
| changed . . . . .                                                        | 415 | <code>\trivlist</code> : Initialised <code>\@itemlabel</code>           | 504      |
| <code>\emph</code> : Macro changed . . . . .                             | 416 |                                                                         |          |

- 1993-12-13 ltmiscen.dtx v0.9h  
`\@noligs`: Readdded `\@noligs` . . . . . 479  
`\@verbatim`: Readdded `\@noligs` . . . 474  
Removed optional argument of  
`\item` . . . . . 474  
`center`: Removed optional argument  
of `\item` . . . . . 472  
`flushleft`: Removed optional  
argument of `\item` . . . . . 473  
`flushright`: Removed optional  
argument of `\item` . . . . . 473
- 1993-12-13 ltoutenc.dtx v1.2b  
General: Corrected file name in driver  
code. . . . . 212
- 1993-12-13 lttab.dtx latex2e  
`\tabbing`: Removed optional argument  
of `\item` . . . . . 533
- 1993-12-14 ltoutput.dtx v1.0i  
General: Section added to declare all  
parameters . . . . . 787
- 1993-12-15 ltboxes.dtx v0.1d  
`\@iminipage`: Changed default from  
‘c’ to ‘s’ . . . . . 521  
`\@iparbox`: Changed default from ‘c’  
to ‘s’ . . . . . 519  
`\minipage`: Changed default from ‘c’  
to ‘s’ . . . . . 521  
extra space removed. . . . . 521  
`\parbox`: Changed default from ‘c’ to  
‘s’ . . . . . 519
- 1993-12-15 ltclass.dtx v0.2p  
General: Removed extra ‘s’ from  
`\@warnings` . . . . . 636
- 1993-12-16 ltlogos.dtx LaTeX2e  
`\LaTeXe`: Extended logo by DPC . . 191
- 1993-12-16 ltmath.dtx v0.9i  
`\@eqncr`: use `\refstepcounter`  
instead of shortcut . . . . . 491  
General: use `\refstepcounter` instead  
of shortcut . . . . . 489
- 1993-12-16 ltmiscen.dtx v0.9i  
General: `\literal` added . . . . . 479
- 1993-12-16 ltpage.dtx LaTeX2e  
`\mark`: Init `\mark` at begin document 630
- 1993-12-16 ltspace.dtx LaTeX2e  
`\@bsphack`: Corrected optimisation :- ) 179
- 1993-12-16 lttab.dtx latex2e  
`\@xhline`: Measure from middle of  
vertical rules . . . . . 548
- 1993-12-17 ltclass.dtx v0.2q  
`\@documentclasshook`: Macro added 636  
`\@fileswithoptions`: Add  
`\@compatibility` hook . . . . . 650
- `\documentstyle`: Match Alan’s new  
code. . . . . 648
- 1993-12-17 ltoutenc.dtx 1.3  
General: Added this section . . . . . 216  
Removed all the hackery for use in  
`\DeclareFontEncoding`, and redid  
everything using  
`\DeclareTextFoo`. . . . . 228, 230  
Removed the catcode hackery, since  
the file is only read as a package in  
the preamble, and removed all the  
messages on the screen, which just  
confuse users. Replaced them by  
the appropriate `\ProvidesPackage`  
commands. Added XXXenc. . . . 215
- 1993-12-17 ltoutenc.dtx v1.3  
General: Added  
`\EncodingSpecificAccent`,  
`\EncodingSpecificAccentedLetter`  
and `\EncodingSpecificCommand`. 212  
Made Rokicki’s encoding a proper  
encoding scheme rather than a  
variant of OT1. . . . . 212
- 1993-12-17 ltoutput.dtx v1.0j  
`\@opcol`: Hook removed . . . . . 740  
`\@specialoutput`: Page room test  
added . . . . . 735  
`\@topnewpage`: check for vsize too  
small added . . . . . 732  
Page room test added . . . . . 734  
`\@writesetup`: —and then removed 744  
`\fl@tracemessage`: tracefloatvals  
made a document command . . . 775
- 1993-12-17 ltpage.dtx LaTeX2e  
`\mark`: Removed init `\mark` at begin  
document, since it doesn’t work. 630  
`\rightmark`: Stopgap solution to mark  
`\leftmark` and `\rightmark` work  
without initializing mark until the  
problem is solved. . . . . 630
- 1993-12-18 ltoutenc.dtx 1.3b  
General: Fixed typos with  
`\ProvidesPackage` lines. Added  
the `\NeedsTeXFormat` line. Added  
the last argument to  
`\DeclareEncoding`. Moved the use  
of the encodings to after their  
declaration. . . . . 215  
Replaced the missing last argument  
to `\DeclareFontEncoding`. 228, 230
- 1993-12-18 ltoutenc.dtx 1.3c  
General: Rewrote for the new syntax  
of `\EncodingSpecific`. . . . 228, 230

|                                                                                                                                                                                                                                |     |                                                                                                                                            |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Split <code>\EncodingSpecificAccent</code> up into <code>\EncodingSpecific</code> and <code>\DeclareAccent</code> . . . . .                                                                                                    | 216 | 1994-01-13 <code>ltmath.dtx</code> v0.9o<br><code>\@eqnocr</code> : correcting 0.9i . . . . .                                              | 491 |
| 1993-12-18 <code>ltoutenc.dtx</code> v1.3a<br>General: Replaced OT3 by XXX . . . . .                                                                                                                                           | 212 | General: correcting 0.9i . . . . .                                                                                                         | 489 |
| 1993-12-18 <code>ltoutenc.dtx</code> v1.3b<br>General: Corrected typos. . . . .                                                                                                                                                | 212 | 1994-01-14 <code>ltdirchk.dtx</code> v0.2d<br><code>\IfFileExists</code> : Close the <code>texsys.aux</code> output stream . . . . .       | 10  |
| Replaced the missing last argument to <code>\DeclareFontEncoding</code> . . . . .                                                                                                                                              | 212 | 1994-01-15 <code>ltfiles.dtx</code> v0.9o<br><code>\document</code> : move <code>\@preamblecmds</code> after document hook . . . . .       | 196 |
| 1993-12-18 <code>ltoutenc.dtx</code> v1.3c<br>General: A new syntax, separating accent-definitions from encoding-specific definitions, and allowing encoding-specific <code>\chardef</code> , <code>\let</code> , etc. . . . . | 212 | 1994-01-17 <code>ltclass.dtx</code> v0.2s<br><code>\@fileswithoptions</code> : Modify to reduce parameter stack usage . . . . .            | 650 |
| Rewrote for the new syntax of <code>\EncodingSpecific</code> . . . . .                                                                                                                                                         | 212 | General: Added many more <code>\@onlypreamble</code> commands . . . . .                                                                    | 636 |
| 1993-12-18 <code>ltoutenc.dtx</code> v1.3d<br>General: Some T1 stuff had drifted into the OT1 file. . . . .                                                                                                                    | 212 | Wrapped long lines to column 72 . . . . .                                                                                                  | 636 |
| 1993-12-18 <code>ltpage.dtx</code> LaTeX2e<br><code>\sloppy</code> : Added <code>\emergencystretch</code> . . . . .                                                                                                            | 630 | <code>\load@onefile@withoptions</code> : Modify to reduce parameter stack usage . . . . .                                                  | 654 |
| 1993-12-19 <code>ltclass.dtx</code> v0.2r<br><code>\endfilecontents</code> : Different message when ignoring a file . . . . .                                                                                                  | 659 | 1994-01-17 <code>ltfiles.dtx</code> LaTeX2e<br><code>\listfiles</code> : New Version, adds ‘tex’ if needed, and lines up columns . . . . . | 210 |
| 1993-12-19 <code>ltnfntcmd.dtx</code> v3.0b<br>General: <code>\@pdef</code> command added . . . . .                                                                                                                            | 413 | 1994-01-17 <code>ltfssbas.dtx</code> v2.1a<br>General: New math font setup . . . . .                                                       | 267 |
| Added by ASAJ. . . . .                                                                                                                                                                                                         | 421 | <code>\curr@math@size</code> : New math font setup . . . . .                                                                               | 278 |
| Made <code>\@newfontswitch</code> produce an error if command already exists, and added <code>\@renewfontswitch</code> , ASAJ . . . . .                                                                                        | 413 | <code>\everydisplay</code> : New math font setup . . . . .                                                                                 | 278 |
| Other tidying . . . . .                                                                                                                                                                                                        | 413 | <code>\everymath</code> : New math font setup . . . . .                                                                                    | 278 |
| Some more tidying done . . . . .                                                                                                                                                                                               | 413 | <code>\frozen@everydisplay</code> : New math font setup . . . . .                                                                          | 278 |
| Untidying added, so this is now a TEMPORARY version. . . . .                                                                                                                                                                   | 413 | <code>\frozen@everymath</code> : New math font setup . . . . .                                                                             | 278 |
| Wording changes by CAR. . . . .                                                                                                                                                                                                | 421 | <code>\math@version</code> : New math font setup . . . . .                                                                                 | 277 |
| <code>\DeclareOldFontCommand</code> : Corrected and tidied . . . . .                                                                                                                                                           | 420 | 1994-01-17 <code>ltfssini.dtx</code> v2.1e<br><code>\not@math@alphabet</code> : Message changed . . . . .                                  | 384 |
| <code>\DeclareTextFontCommand</code> : Corrected and tidied . . . . .                                                                                                                                                          | 415 | 1994-01-17 <code>ltfssrct.dtx</code> v2.3a<br>General: New math font setup . . . . .                                                       | 311 |
| 1993-12-19 <code>ltspace.dtx</code> LaTeX2e<br><code>\@bsphack</code> : There seem to be problems with selfmade birthday presents . . . . .                                                                                    | 180 | <code>\check@mathfonts</code> : New math font setup . . . . .                                                                              | 320 |
| 1993-12-20 <code>ltdefns.dtx</code> LaTeX2e<br><code>\@reargdef</code> : Kept old version of <code>\@reargdef</code> , for <code>array.sty</code> . . . . .                                                                    | 74  | <code>\glb@currsz</code> : New math font setup . . . . .                                                                                   | 317 |
| 1993-12-20 <code>ltfiles.dtx</code> v0.9m<br><code>\@obsoletefile</code> : Added this command, removed <code>\@oldfilewarning</code> . . . . .                                                                                 | 210 | <code>\restglb@settings</code> : New math font setup . . . . .                                                                             | 320 |
| 1994-01-05 <code>fontdef.dtx</code> v2.1d<br>General: Removed <code>nf</code> prefix from file names. . . . .                                                                                                                  | 391 | 1994-01-18 <code>ltbibl.dtx</code> LaTeX2e<br><code>\bibliography</code> : Use <code>\@input@</code> so include files are listed. . . . .  | 626 |
|                                                                                                                                                                                                                                |     | 1994-01-18 <code>ltclass.dtx</code> v0.2t<br><code>\@ifclassloaded</code> : Fix typo <code>\@pkgetension</code> . . . . .                  | 639 |
|                                                                                                                                                                                                                                |     | 1994-01-18 <code>ltfilehook.dtx</code> v0.9p<br><code>\InputIfFileExists</code> : New Definition . . . . .                                 | 684 |
|                                                                                                                                                                                                                                |     | 1994-01-18 <code>ltfiles.dtx</code> v0.9p<br><code>\@iffilenamepath</code> : Macro added . . . . .                                         | 206 |
|                                                                                                                                                                                                                                |     | <code>\@input</code> : do not use a different definition for <code>\input@path</code> . . . . .                                            | 208 |
|                                                                                                                                                                                                                                |     | <code>\@input@</code> : Macro added . . . . .                                                                                              | 208 |



|                                                                                                     |     |                                                                                                                                    |     |
|-----------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------|-----|
| <code>\IfFileExists@</code> : New Definition . . .                                                  | 205 | 1994-01-25 ltdirchk.dtx v0.2i                                                                                                      |     |
| <code>\includeonly</code> : Use <code>\@input@</code> so include files are listed. . . . .          | 200 | General: Protect against looping on <code>\@@input</code> and <code>\@end</code> . . . . .                                         | 2   |
| 1994-01-18 ltfssini.dtx v2.1f                                                                       |     | 1994-01-25 ltfssbas.dtx v2.1b                                                                                                      |     |
| <code>\not@math@alphabet</code> : Message corrected . . . . .                                       | 384 | <code>\math@version</code> : Corrections for math setup . . . . .                                                                  | 278 |
| 1994-01-18 ltmiscen.dtx v0.9p                                                                       |     | 1994-01-25 ltmath.dtx LaTeX2e                                                                                                      |     |
| <code>\@verbatim</code> : Add                                                                       |     | <code>\bordermatrix</code> : Removed <code>\p@renwd</code> . . . . .                                                               | 484 |
| <code>\global\@inlabelfalse</code> . . . . .                                                        | 474 | 1994-01-26 ltfssstrc.dtx v2.3c                                                                                                     |     |
| Only add <code>\penalty</code> if in hmode . . . . .                                                | 474 | <code>\check@mathfonts</code> : Correct trace info placement . . . . .                                                             | 320 |
| 1994-01-19 fontdef.dtx v2.1e                                                                        |     | <code>\restglb@settings</code> : Correct trace info placement . . . . .                                                            | 320 |
| General: Added missing setting for symbols in bold version. . . . .                                 | 396 | 1994-01-27 ltfntcmd.dtx v3.1a                                                                                                      |     |
| 1994-01-19 ltdirchk.dtx v0.2e                                                                       |     | <code>\nocorrlist</code> : Only <code>.</code> , used as default for cm fonts . . . . .                                            | 420 |
| <code>\IfFileExists</code> : name changed from <code>\test</code> . . . . .                         | 9   | 1994-01-29 ltclass.dtx v0.2v                                                                                                       |     |
| <code>\input@path</code> : No longer check that an empty group is in the path . . . . .             | 10  | <code>\@unprocessedoptions</code> : Macro added. . . . .                                                                           | 658 |
| <code>\strip@prefix</code> : name changed from <code>\strip@meaning</code> , to match NFSS. . . . . | 5   | <code>\load@onefile@withoptions</code> : All options raise error if no <code>\ProcessOptions</code> appears . . . . .              | 654 |
| 1994-01-19 ltmath.dtx v1.0n classes                                                                 |     | 1994-01-31 ltdefs.dtx v0.2w                                                                                                        |     |
| <code>\mathindent</code> : Deferred setting of <code>\mathindent</code> . . . . .                   | 492 | <code>\g@addto@macro</code> : Use toks register to avoid ‘hash’ problems . . . . .                                                 | 98  |
| 1994-01-20 ltdirchk.dtx v0.2f                                                                       |     | 1994-01-31 ltfiles.dtx v0.9t                                                                                                       |     |
| General: <code>\@copytexsys</code> and the <code>texsys.new</code> file removed . . . . .           | 8   | <code>\document</code> : set <code>\@normalsize</code> or <code>\normalsize</code> if necessary . . . . .                          | 195 |
| Modify all of <code>ltxcheck</code> . . . . .                                                       | 13  | 1994-01-31 ltfntcmd.dtx v3.1b                                                                                                      |     |
| <code>\IfFileExists</code> : <code>\@copytexsys</code> removed . . . . .                            | 10  | General: <code>\@normalsize</code> no longer defined . . . . .                                                                     | 413 |
| 1994-01-21 ltclass.dtx v0.2u                                                                        |     | 1994-02-01 ltpage.dtx LaTeX2e                                                                                                      |     |
| <code>\documentstyle</code> : compatibility file now <code>latex209.def</code> . . . . .            | 648 | <code>\pagestyle</code> : (DPC) Modify to get nicer error message . . . . .                                                        | 628 |
| 1994-01-21 ltdirchk.dtx v0.2g                                                                       |     | <code>\thispagestyle</code> : (DPC) Modify to get nicer error message . . . . .                                                    | 629 |
| General: Improve documentation, reorganise <code>docstrip</code> module . . . . .                   | 1   | 1994-02-02 ltclass.dtx v0.2x                                                                                                       |     |
| <code>\filename@parse</code> : Minor changes, and add Mac version ( <code>:</code> ) . . . . .      | 11  | <code>\load@onefile@withoptions</code> : Only run the hook and options check if the file was loaded. . . . .                       | 654 |
| <code>\today</code> : Name changed from <code>\stamp</code> , to save memory . . . . .              | 9   | 1994-02-03 ltoutput.dtx v1.0k                                                                                                      |     |
| 1994-01-21 ltfloat.dtx LaTeX2e                                                                      |     | <code>\@makespecialcolbox</code> : correct mistakes in the documentation . . . . .                                                 | 743 |
| <code>\@xfloat</code> : Added missing percent characters. . . . .                                   | 604 | 1994-02-07 ltclass.dtx v0.2y                                                                                                       |     |
| 1994-01-21 ltmiscen.dtx v0.9s                                                                       |     | <code>\@fileswithoptions</code> : Run <code>\@compatibility</code> on the first class to start (not the first to finish) . . . . . | 650 |
| <code>\verbatim@font</code> : Removed unnecessary category code hackery. . . . .                    | 475 | <code>\@ifclasswith</code> : Add extra <code>,s</code> so ‘two’ is not matched with ‘twocolumn’ . . . . .                          | 641 |
| 1994-01-24 ltdirchk.dtx v0.2h                                                                       |     | <code>\ProcessOptions*</code> : Add extra <code>,s</code> so ‘two’ is not matched with ‘twocolumn’ . . . . .                       | 645 |
| <code>\IfFileExists</code> : Stop testing once <code>texsys.aux</code> has been found . . . . .     | 9   |                                                                                                                                    |     |
| 1994-01-24 ltpage.dtx LaTeX2e                                                                       |     |                                                                                                                                    |     |
| <code>\pagestyle</code> : (DPC) Complain if <code>pagestyle</code> is undefined. . . . .            | 628 |                                                                                                                                    |     |

|                                                                                                                                                                                                                           |                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 1994-02-07 ltffssbas.dtx v2.1c                                                                                                                                                                                            | 1994-03-04 ltsect.dtx v1.0a                                                                                     |
| <code>\DeclareFontEncoding</code> : revert catcode settings earlier . . . . . 271                                                                                                                                         | General: Initial version, split from latex.dtx . . . . . 587                                                    |
| <code>\DeclareFontShape</code> : revert catcode settings earlier . . . . . 268                                                                                                                                            | 1994-03-04 lttab.dtx v1.0a                                                                                      |
| 1994-02-08 ltoutput.dtx v1.0k                                                                                                                                                                                             | General: Initial version, split from latex.dtx . . . . . 526                                                    |
| <code>\@makespecialcolbox</code> : boxmaxdepth setting added . . . . . 743                                                                                                                                                | 1994-03-04 ltvers.dtx v1.0a                                                                                     |
| boxmaxdepth setting removed . . 742                                                                                                                                                                                       | General: Initial version, split from latex.dtx . . . . . 34                                                     |
| General: Documentation and tasks tidied. . . . . 717                                                                                                                                                                      | 1994-03-07 ltboxes.dtx v0.1a                                                                                    |
| 1994-02-10 ltclass.dtx v0.2z                                                                                                                                                                                              | <code>\@mpfootnotetext</code> : Extra group for colour . . . . . 522                                            |
| <code>\@documentclasshook</code> : Changed the name from <code>\@compatibility</code> to <code>\@documentclasshook</code> , and added the check for whether <code>\@normalsize</code> has been defined. ASAJ. . . . . 636 | 1994-03-07 ltboxes.dtx v1.0a                                                                                    |
| <code>\@fileswithoptions</code> : Renamed <code>\@compatibility</code> to <code>\@documentclasshook</code> . ASAJ. . . 650                                                                                                | General: Unify format with other Kernel files . . . . . 512                                                     |
| 1994-02-10 ltffssbas.dtx v2.1d                                                                                                                                                                                            | 1994-03-07 ltdefns.dtx v1.0a                                                                                    |
| <code>\addto@hook</code> : Made <code>\addto@hook</code> long. . . . . 291                                                                                                                                                | <code>\@italiccorr</code> : Macro added . . . . . 70                                                            |
| 1994-02-10 ltffsscmp.dtx v2.1d                                                                                                                                                                                            | 1994-03-07 ltfiles.dtx v1.0a                                                                                    |
| <code>\scan@fontshape</code> : scan away stuff after pt . . . . . 335                                                                                                                                                     | General: Initial version, split from latex.dtx . . . . . 192                                                    |
| 1994-02-22 ltffssini.dtx v2.1g                                                                                                                                                                                            | Long lines wrapped to 72 columns 192                                                                            |
| General: Correct error message . . . 387                                                                                                                                                                                  | 1994-03-07 ltfinal.dtx v0.1a                                                                                    |
| 1994-02-24 ltffssbas.dtx v2.1e                                                                                                                                                                                            | General: Add code from the old dump.dtx . . . . . 804                                                           |
| <code>\DeclareFontShape</code> : Separate restoration of catcodes for fd cmds . . . . . 268                                                                                                                               | Initial version, split from latex.dtx 792                                                                       |
| <code>\define@newfont</code> : Separate restoration of catcodes for fd cmds . . . . . 280                                                                                                                                 | move code here from lhyphen.dtx 797                                                                             |
| <code>\nfss@catcodes</code> : Separate restoration of catcodes for fd cmds . . . . . 280                                                                                                                                  | Remove oldcomments environment use <code>\InputIfFileExists</code> not <code>\IfFileExists</code> . . . . . 797 |
| 1994-02-25 ltdirchk.dtx v0.2j                                                                                                                                                                                             | 1994-03-07 ltfloat.dtx v1.0a                                                                                    |
| General: Remove need for drv file . . . 1                                                                                                                                                                                 | <code>\@endfloatbox</code> : (DPC) Extra group for colour . . . . . 609                                         |
| 1994-03-01 ltdirchk.dtx v0.2k                                                                                                                                                                                             | <code>\@footnotetext</code> : (DPC) Extra group for colour . . . . . 619                                        |
| General: Add unstripped module, so that dircheck.dtx may be used with initex . . . . . 1                                                                                                                                  | <code>\@xfloat</code> : (DPC) Extra group for colour . . . . . 605                                              |
| 1994-03-02 ltboxes.dtx v0.1e                                                                                                                                                                                              | 1994-03-07 lthyphen.dtx v0.1c                                                                                   |
| General: Add 2kernel module . . . . . 512                                                                                                                                                                                 | General: move the 2kernel code to ltfinal.dtx . . . . . 790                                                     |
| Remove need for drv file . . . . . 512                                                                                                                                                                                    | 1994-03-07 ltlength.dtx v1.0a                                                                                   |
| 1994-03-02 ltclass.dtx v0.3a                                                                                                                                                                                              | <code>\@settodim</code> : (DPC) Extra group for colour . . . . . 265                                            |
| General: Remove need for driver file 636                                                                                                                                                                                  | 1994-03-07 ltlists.dtx v1.0a                                                                                    |
| 1994-03-03 ltboxes.dtx v0.1f                                                                                                                                                                                              | General: Initial version, split from latex.dtx . . . . . 496                                                    |
| <code>\@irsbox</code> : Replaced a missing <code>\else</code> 524                                                                                                                                                         | Long lines wrapped to 72 columns 496                                                                            |
| 1994-03-04 ltfloat.dtx v1.0a                                                                                                                                                                                              | 1994-03-07 ltpage.dtx v1.0a                                                                                     |
| General: Initial version, split from latex.dtx . . . . . 600                                                                                                                                                              | General: Initial version, split from ltherest.dtx . . . . . 628                                                 |
|                                                                                                                                                                                                                           | 1994-03-07 ltpictur.dtx v0.1a                                                                                   |
|                                                                                                                                                                                                                           | General: Initial version, split from latex.dtx . . . . . 551                                                    |
|                                                                                                                                                                                                                           | Long lines wrapped to 72 columns 551                                                                            |



|                                                        |                                          |
|--------------------------------------------------------|------------------------------------------|
| 1994-03-07 ltsect.dtx v1.0a                            | 1994-03-13 ltcentrl.dtx v1.0c            |
| \@hangfrom: (DPC) Extra groups for                     | \@tfor: (DPC) Add \@tf@r so a single     |
| colour . . . . . 594                                   | group is correctly treated. . . . . 159  |
| 1994-03-07 lttab.dtx v1.0a                             | 1994-03-13 ltfilehook.dtx v0.3b          |
| General: Long lines wrapped to 72                      | \InputIfFileExists: Use new cmd          |
| columns . . . . . 526                                  | \@addtofilelist . . . . . 684            |
| 1994-03-08 ltclass.dtx v0.3b                           | 1994-03-13 ltfiles.dtx LaTeX2e           |
| General: Modify driver code into ‘new                  | \@addtofilelist: Macro added . . . 210   |
| style’ . . . . . 636                                   | \listfiles: Reset \@addtofilelist        |
| 1994-03-08 ltdirchk.dtx v1.0a                          | at begin document . . . . . 211          |
| General: Reorganise driver module                      | 1994-03-13 ltssbas.dtx v2.1g             |
| into ‘new style’ . . . . . 1                           | General: add 2kernel module to omit      |
| 1994-03-08 ltplain.dtx v1.0a                           | repeated code . . . . . 267              |
| General: Remove need for a driver file. 14             | 1994-03-13 ltssdcl.dtx v2.1c             |
| 1994-03-10 ltssbas.dtx v2.2f                           | General: add 2kernel module to omit      |
| \math@egroup: Changed                                  | repeated code . . . . . 339              |
| \beginngroup/\endgroup to                              | 1994-03-14 ltboxes.dtx v1.0b             |
| \bggroup/\egroup. . . . . 289                          | \@isavebox: Use \color@setgroup . 516    |
| 1994-03-11 ltssdcl.dtx v2.1b                           | \@isavepicbox: Use                       |
| \DeclareSymbolFontAlphabet@:                           | \color@setgroup . . . . . 516            |
| Added check against use of                             | \color@beginngroup: macro added for      |
| alphabet switch outside of math                        | colour support . . . . . 515             |
| mode. . . . . 364                                      | \color@endgroup: macro added for         |
| \SetMathAlphabet@: Changed                             | colour support . . . . . 515             |
| parameter template in temporary                        | \lrbox: Use \color@setgroup . . . . 516  |
| macro to catch check add below. 353                    | \sbox: Use \color@setgroup . . . . . 515 |
| 1994-03-12 ltclass.dtx v0.3c                           | 1994-03-14 ltfloat.dtx 1.0c              |
| General: Change name from docclass                     | \@xympar: (DPC) Use                      |
| to ltclass . . . . . 636                               | \color@beginngroup . . . . . 613         |
| \ProvidesFile: Add \wlog . . . . . 643                 | 1994-03-14 ltfloat.dtx v1.0c             |
| \ProvidesPackage: Add \wlog . . . . 642                | \@endfloatbox: (DPC) Use                 |
| use \@gtempa . . . . . 642                             | \color@endgroup . . . . . 609            |
| 1994-03-12 ltdefs.dtx v1.0b                            | \@footnotetext: (DPC) Use                |
| \@reargdef: New defn, in terms of                      | \color@beginngroup, add                  |
| \@yargdef . . . . . 74                                 | \endgraf . . . . . 619                   |
| \@yargd@f: Name changed from                           | \@savemarbox: (DPC) Use                  |
| \XXX@argdef . . . . . 74                               | \color@beginngroup . . . . . 613         |
| 1994-03-12 ltdirchk.dtx v1.0b                          | \@xfloat: (DPC) Use                      |
| General: Change name from                              | \color@beginngroup . . . . . 605         |
| dircheck.dtx . . . . . 1                               | 1994-03-15 ltfiles.dtx LaTeX2e           |
| Minor edits to the typeouts in                         | \@missingfileerror: Quit on x or X       |
| ltxcheck . . . . . 1                                   | just like a real error . . . . . 208     |
| 1994-03-12 ltfloat.dtx v1.0b                           | 1994-03-15 ltfmtcmd.dtx v3.2a            |
| \@savemarbox: (DPC) Extra group for                    | General: Adapted to mass formatting 413  |
| colour . . . . . 613                                   | Changed \/ to \@@italiccorr . . 413      |
| \@xympar: (DPC) Extra bggroup for                      | Removed \@renewfontswitch . . . 413      |
| colour . . . . . 613                                   | Removed defs of short-forms and all      |
| 1994-03-12 ltplain.dtx v1.0b                           | sizes except \normalize . . . . 413      |
| General: Name changed from lplain.                     | 1994-03-15 ltoutput.dtx v1.0l            |
| The end of an era . . . . . 14                         | \@addtocurcol: Changed \addvspace        |
| 1994-03-12 ltplain.dtx v1.0e                           | to \vskip . . . . . 758, 762             |
| General: Replaced remaining width,                     | \@combinedblfloats: Removed              |
| height, depth by L <sup>A</sup> T <sub>E</sub> X macro | boxmaxdepth setting. . . . . 749         |
| names to save tokens. . . . . 14                       |                                          |

|                                          |                                           |
|------------------------------------------|-------------------------------------------|
| \@makecol: \maxdepth changed to          | 1994-03-28 ltsect.dtx v1.0b               |
| \@maxdepth . . . . . 741                 | General: Split further from               |
| Removed boxmaxdepth setting. . . 741     | ltherest.dtx . . . . . 587                |
| \@makespecialcolbox: Removed             | 1994-03-28 lttab.dtx v1.0b                |
| boxmaxdepth setting. . . . . 743         | General: Improve documentation . . 526    |
| \@topnewpage: Corrected and              | 1994-03-28 ltthm.dtx v1.0a                |
| amended warning message . . . . 733      | General: Initial version, split from      |
| Warning added: it should be              | latex.dtx . . . . . 583                   |
| improved . . . . . 734                   | 1994-03-29 ltcounts.dtx v1.0c             |
| General: Added some warnings when        | General: Create file from parts of        |
| page gets full of top floats. . . . 717  | ltmiscen and ltherest. . . . . 257        |
| Driver added and further tidying. 717    | 1994-03-29 ltlength.dtx v1.0c             |
| Removed duplicated code and              | General: Create file ltcntlen from parts  |
| corrected docstrip options. . . . . 717  | of ltmiscen and ltherest. . . . . 265     |
| Some boxmaxdepth settings                | 1994-03-29 ltmiscen.dtx v1.0d             |
| removed. . . . . 717                     | General: Remove counter macros to         |
| 1994-03-16 ltclass.dtx v0.3f             | ltcntlen . . . . . 459                    |
| General: Add pkgindoc package . . . 675  | 1994-03-29 ltpageno.dtx v1.0c             |
| 1994-03-16 ltfiles.dtx LaTeX2e           | General: Create file ltcntlen from parts  |
| \listfiles: Move this code directly      | of ltmiscen and ltherest. . . . . 453     |
| into \document . . . . . 211             | 1994-03-29 ltxref.dtx v1.0c               |
| 1994-03-16 ltfiles.dtx v1.0c             | General: Create file ltcntlen from parts  |
| \document: (DPC) directly add file list  | of ltmiscen and ltherest. . . . . 454     |
| settings . . . . . 196                   | 1994-03-31 ltbibl.dtx v1.0a               |
| 1994-03-16 ltmiscen.dtx v1.0b            | General: Initial version of ltidxbib.dtx, |
| \@verbatim: Remove                       | split from ltherest.dtx . . . . . 624     |
| \global\@inlabelfalse again. . . 474     | 1994-03-31 ltidxglo.dtx v1.0a             |
| 1994-03-28 ltalloc.dtx v1.0d             | General: Initial version of ltidxbib.dtx, |
| General: Redefinition of ‘new’           | split from ltherest.dtx . . . . . 621     |
| allocations removed. . . . . 154         | 1994-04-09 ltcounts.dtx v1.0d             |
| 1994-03-28 ltdirchk.dtx v1.0d            | \@newctr: \@nocnterr now has              |
| General: Improve documentation . . . . 1 | counter name argument . . . . . 258       |
| 1994-03-28 lterror.dtx v1.0d             | \addtocounter: \@nocnterr now has         |
| \@invalidchar: (DPC) Comment out         | counter name argument . . . . . 258       |
| (use catcode15 instead) . . . . . 168    | \setcounter: \@nocnterr now has           |
| General: Remove test for                 | counter name argument . . . . . 258       |
| \inputlineno undefined. . . . . 165      | \stepcounter: Use \addtocounter to        |
| 1994-03-28 ltfiles.dtx v1.0d             | have name checked . . . . . 259           |
| \document: (DPC) Use \normalsize         | 1994-04-09 ltthm.dtx v1.0b                |
| not \@normalsize . . . . . 195           | \@othm: Use standard counter error        |
| (DPC) remove                             | message (FMi) . . . . . 585               |
| \@normalsize check . . . . . 195         | 1994-04-11 ltclass.dtx v0.3g              |
| 1994-03-28 ltfloat.dtx v1.0b             | \endfilecontents: Add star form,          |
| \@caption: Use \normalsize not           | dont write \endinput at the end of        |
| \@normalsize . . . . . 603               | the file. . . . . 659                     |
| General: Split further from              | \ProvidesFile: Protect against weird      |
| ltherest.dtx . . . . . 600               | catcodes. . . . . 643                     |
| 1994-03-28 ltlists.dtx v1.0b             | 1994-04-11 ltfssbas.dtx v2.1h             |
| General: Improve documentation . . 495   | General: Added \defaultscriptratio        |
| 1994-03-28 ltmiscen.dtx v1.0c            | and \defaultscriptscriptratio.            |
| General: Improve Documentation . . 459   | ASAJ. . . . . 267                         |
| 1994-03-28 ltplain.dtx v1.0c             | \defaultscriptratio: Macro added 289      |
| \newlanguage: Remove some \outer         | \defaultscriptscriptratio: Macro          |
| declarations. . . . . 17                 | added . . . . . 289                       |

|                                        |                                         |
|----------------------------------------|-----------------------------------------|
| 1994-04-12 ltboxes.dtx v1.0c           | 1994-04-18 ltfsdcl.dtx v2.1d            |
| General: Remove \@acci, now defined    | General: Removed surplus                |
| in ltplain.dtx . . . . . 520           | \@no@alphabet@error (see                |
| Remove \@dischyph, now defined in      | fam.dtx) . . . . . 339                  |
| ltinit.dtx . . . . . 520               | 1994-04-18 ltfsstrc.dtx v2.3d           |
| 1994-04-12 ltdefs.dtx v1.0g            | General: Changed to new                 |
| \@dischyph: Define \@dischyph, was     | error/warning scheme . . . . . 311      |
| previously in ltboxes.dtx . . . . . 96 | \font@submax: Changed dimen to          |
| 1994-04-12 ltplain.dtx v1.0d           | macro . . . . . 329                     |
| General: Define \@acci . . . . . 30    | \fontsubfuzz: Changed dimen to          |
| 1994-04-12 ltvers.dtx v1.0b            | macro . . . . . 329                     |
| General: Have version info generated   | \subst@size: \font@submax and           |
| automatically. . . . . 34              | \fontsubfuzz now macros . . . . . 330   |
| 1994-04-14 ltfmtcmd.dtx v3.2b          | 1994-04-19 ltpage.dtx v1.0b             |
| General: Macros renamed to             | General: Improve documentation . . 628  |
| non-private forms, JB . . . . . 413    | 1994-04-20 ltfmtcmd.dtx v3.3a           |
| \DeclareOldFontCommand: Renamed        | General: Documentation up-dated . . 413 |
| from \@newfontswitch . . . . . 420     | New implementation of \nocorr . . 413   |
| 1994-04-15 ltboxes.dtx v1.0d           | \check@nocorr@: Macros added . . . 417  |
| \@isavebox: Added missing procent      | \maybe@ic@: \nocorr etc removed         |
| character. . . . . 516                 | from list of tokens to check, leaving   |
| 1994-04-17 ltcounts.dtx v1.0e          | only punctuation characters . . . . 418 |
| \@newctr: Use \@nocounterr instead     | 1994-04-20 ltmiscen.dtx v1.0e           |
| of \@nocnterr . . . . . 258            | \@enddocument@kernel@warnings:          |
| \addtocounter: Use \@nocounterr        | Changed logic for producing             |
| instead of \@nocnterr . . . . . 258    | warning messages . . . . . 462          |
| \setcounter: Use \@nocounterr          | 1994-04-21 ltboxes.dtx v1.0e            |
| instead of \@nocnterr . . . . . 258    | \@iiiminipage: Extra \bgroup for        |
| 1994-04-17 lterror.dtx v1.0h           | colour . . . . . 522                    |
| \@nocounterr: New name for error       | \@mpfootnotetext: Extra \endgraf        |
| message, old error message             | for colour . . . . . 522                |
| (without arg) kept . . . . . 166       | \@endminipage: Extra \egroup for        |
| 1994-04-17 ltthm.dtx v1.0c             | colour . . . . . 522                    |
| \@othm: Use new std counter error      | 1994-04-21 ltfinal.dtx v0.1c            |
| message (FMi) . . . . . 585            | General: Added comments, set the        |
| 1994-04-18 ltfinal.dtx v0.1b           | catcodes of 128–255. . . . . 792        |
| General: Initialise \textheight,       | 1994-04-22 ltfsini.dtx v2.1g            |
| \textwidth and page style . . . . 794  | \@not@math@alphabet: Message            |
| 1994-04-18 ltfloat.dtx v1.0d           | changed again . . . . . 384             |
| \@footnotetext: (DPC) Remove           | 1994-04-23 ltfinal.dtx v0.1d            |
| Colour support . . . . . 619           | General: Check that \font@submax is     |
| \@savemarbox: (DPC) Remove Colour      | still zero . . . . . 792                |
| support . . . . . 613                  | 1994-04-24 ltoutput.dtx v1.0m           |
| 1994-04-18 ltfsbas.dtx v2.1i           | \@resetthfps: Number 2 changed to       |
| General: Macro \@no@alphabet@help      | \tw@ . . . . . 779                      |
| removed again . . . . . 267            | Warning changed . . . . . 779           |
| \calculate@math@sizes: Changed         | \@specialoutput: Message changed to     |
| message to log only . . . . . 289      | give more info and ‘top’ removed . 735  |
| \@no@alphabet@error: Use std LaTeX     | \@topnewpage: Message changed to        |
| error macro . . . . . 267              | give more info . . . . . 734            |
| 1994-04-18 ltfsdcl.dtx ???             | Warning message removed as it will      |
| \DeclareMathAlphabet: Pass correct     | be generated later . . . . . 733        |
| arg (2 not 3) . . . . . 351            | General: Changed \@normalsize to        |
|                                        | \normalsize. . . . . 717                |

|                                                                                                                          |     |                                                                              |          |
|--------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------|----------|
| Corrected unverb commands in documentation. . . . .                                                                      | 717 | Removed Rokicki's OT1 variant encoding. Moved the driver to the top. . . . . | 215      |
| Removed some long lines and other aesthetic changes. . . . .                                                             | 717 | 1994-04-30 ltftcmd.dtx v3.3b                                                 |          |
| Warning messages changed/corrected. . . . .                                                                              | 717 | General: Documentation up-dated and tidied . . . . .                         | 413      |
| 1994-04-24 ltpictur.dtx v0.1b                                                                                            |     | Prefix frag@ changed to frag in \@protecteddef . . . . .                     | 413      |
| General: Removed surplus spaces after \hbox to in several cases . . . . .                                                | 551 | Title changed . . . . .                                                      | 413      |
| 1994-04-25 ltclass.dtx v0.3h                                                                                             |     | Warning changed to info message in \@protecteddef . . . . .                  | 413      |
| General: Removed spurious extra 's at the end of error messages . . . . .                                                | 636 | 1994-04-30 ltoutput.dtx v1.0n                                                |          |
| 1994-04-25 ltfloat.dtx v1.0e                                                                                             |     | \@activechar@info:                                                           |          |
| \@largefloatcheck: Changed warning message to give more info . . . . .                                                   | 609 | \@activechar@warning changed to \@activechar@info . . . . .                  | 744      |
| Command added . . . . .                                                                                                  | 609 | \@combinedblfloats: Removed rule in topnewpage case . . . . .                | 749      |
| General: Changed warning messages . . . . .                                                                              | 600 | \@emptycol: Empty column action added: \@emptycol . . . . .                  | 732      |
| Removed obsolete tracing code . . . . .                                                                                  | 600 | \@flsetnum: Rogue space removed . . . . .                                    | 780      |
| 1994-04-27 ltfsstrc.dtx v2.3e                                                                                            |     | \@specialoutput: Cut-off point changed to 2\baselineskip . . . . .           | 735      |
| General: Corrected item that was forgotten in last change. . . . .                                                       | 311 | Empty column action added: \@emptycol . . . . .                              | 735      |
| 1994-04-28 lterror.dtx v1.0j                                                                                             |     | Extra empty column added for twocolumn case . . . . .                        | 735      |
| \@inmatherr: Macro added . . . . .                                                                                       | 168 | Extra empty column added for twocolumn case (wrong, see below) . . . . .     | 735      |
| 1994-04-28 lterror.dtx v1.1c                                                                                             |     | \@topnewpage: Added setting of \col@number . . . . .                         | 732, 733 |
| \@inmatherr: Replaced \noexpand with \protect. . . . .                                                                   | 168 | Cut-off point changed to 3\baselineskip . . . . .                            | 734      |
| 1994-04-28 ltfsdcl.dtx v2.1e                                                                                             |     | Empty column action added: \@emptycol . . . . .                              | 734      |
| General: Removed all \uppercase in hex num parsing macros . . . . .                                                      | 339 | Message changed for Frank . . . . .                                          | 734      |
| 1994-04-28 ltlists.dtx v1.0c                                                                                             |     | General: \@activechar@warning changed to an info message. . . . .            | 717      |
| \item: Replaced \@ltxnomath by \@inmatherr . . . . .                                                                     | 506 | Added \col@number. . . . .                                                   | 717      |
| 1994-04-28 ltpictur.dtx v0.1c                                                                                            |     | Documentation tidied. . . . .                                                | 717      |
| \@multiput: (DPC) Macro added . . . . .                                                                                  | 555 | Empty column action added. . . . .                                           | 717      |
| General: bezier curves added . . . . .                                                                                   | 578 | Fixed bug from \dblfigrule with \@topnewpage. . . . .                        | 717      |
| \multiput: (DPC) Ignore spaces between )( . . . . .                                                                      | 554 | Full of floats action improved. . . . .                                      | 717      |
| \picture: (DPC) Ignore spaces before ( . . . . .                                                                         | 553 | \col@number: Added \col@number . . . . .                                     | 729      |
| 1994-04-28 ltplain.dtx v1.0g                                                                                             |     | \onecolumn: Added setting of \col@number . . . . .                           | 731      |
| General: Turn off overfull box tracing in log . . . . .                                                                  | 25  | 1994-05-01 lterror.dtx v1.0k                                                 |          |
| 1994-04-29 ltclass.dtx v1.0a                                                                                             |     | \@latexerr: (CAR) Added draft \@latexinfo. . . . .                           | 165      |
| General: Change version number to 1 (no other change) . . . . .                                                          | 636 | 1994-05-01 ltoutenc.dtx 1.4a                                                 |          |
| 1994-04-29 ltmiscen.dtx v1.0f                                                                                            |     | General: Added the \a command. . . . .                                       | 224      |
| \@verbatim: \leavevmode added . . . . .                                                                                  | 474 | Added the \SaveAtCatcode and \RestoreAtCatcode commands. . . . .             | 228      |
| Change to \everypar added . . . . .                                                                                      | 474 |                                                                              |          |
| 1994-04-29 ltoutenc.dtx 1.4a                                                                                             |     |                                                                              |          |
| General: Removed \EncodingSpecific. Renamed all the commands. Added \DeclareTextGlyph and \UndeclareTextCommand. . . . . | 216 |                                                                              |          |

|                                                                                                                                                             |          |                                                                                                                                                                           |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Removed the uc/lc table settings,<br>since the T1 uc/lc table is now the<br>default. . . . .                                                                | 236      | <code>\end@float</code> : (CAR) Added<br><code>\@largefloatcheck</code> . . . . .                                                                                         | 607 |
| Rewrote for the new syntax. . . . .                                                                                                                         | 228, 230 | 1994-05-03 <code>ltfssdcl.dtx</code> v2.1f<br>General: Renamed<br><code>\@DeclareMathDelimiter</code> to<br><code>\@DeclareMathDelimiter</code> . . . . .                 | 339 |
| 1994-05-01 <code>ltoutenc.dtx</code> v1.4a<br>General: Removed Rokicki's<br>encoding. . . . .                                                               | 212      | 1994-05-03 <code>ltlists.dtx</code> v1.0d<br><code>\@item</code> : <code>\hskip</code> changed to <code>\kern</code> . . . . .                                            | 507 |
| Renamed the commands, removed<br>the <code>\EncodingSpecific</code> command.<br>Turned all slots into decimal.<br>Added <code>\a</code> . . . . .           | 212      | <code>\item</code> : Removed superfluous braces . . . . .                                                                                                                 | 506 |
| 1994-05-02 <code>ltcntrl.dtx</code> v1.0l<br><code>\@break@tfor</code> : Macro added (from<br><code>ltfiles.dtx</code> ) . . . . .                          | 159      | 1994-05-03 <code>ltmiscen.dtx</code> v1.0h<br><code>\@centercr</code> : <code>\@badcrerr</code> replaced by<br><code>\@nolnerr</code> . . . . .                           | 471 |
| 1994-05-02 <code>ltdefns.dtx</code> v1.1f<br><code>\renewcommand</code> : Removed surplus<br><code>\space</code> in error . . . . .                         | 74       | 1994-05-03 <code>lttab.dtx</code> v1.0d<br><code>\@endpbox</code> : Use <code>\@finalstrut</code> based<br>on depth of <code>\@arstrutbox</code> . . . . .                | 549 |
| <code>\renewenvironment</code> : Removed surplus<br><code>\space</code> in error . . . . .                                                                  | 76       | 1994-05-04 <code>ltclass.dtx</code> v1.0b<br><code>\NeedsTeXFormat</code> : Changed wording of<br>the warning . . . . .                                                   | 650 |
| 1994-05-02 <code>ltfiles.dtx</code> v1.0f<br><code>\@iffilenamepath</code> : <code>\@break@loop</code><br>renamed to <code>\@break@tfor</code> . . . . .    | 206      | 1994-05-04 <code>lterror.dtx</code> v1.0m<br><code>\@badcrerr</code> : Error message removed . . . . .                                                                    | 168 |
| <code>\@obsoletefile</code> : Make<br><code>\@onlypreamble</code> . . . . .                                                                                 | 210      | 1994-05-05 <code>ltbibl.dtx</code> v1.0c<br><code>\@citex</code> : Set switch for warning and<br>end of run. . . . .                                                      | 625 |
| 1994-05-02 <code>ltfinal.dtx</code> v0.1e<br>General: Added setting the 'letter'<br>catcodes. . . . .                                                       | 802      | <code>\@nocite</code> : Do not write page number in<br><code>\@nocite</code> warning message. . . . .                                                                     | 626 |
| Added setting the 'other' catcodes. . . . .                                                                                                                 | 802      | Set switch for warning and end of<br>run. . . . .                                                                                                                         | 626 |
| Added setting the special catcodes. . . . .                                                                                                                 | 802      | 1994-05-05 <code>ltfinal.dtx</code> v0.1g<br>General: Added empty <code>errhelp</code> . . . . .                                                                          | 792 |
| Made slot 127 illegal . . . . .                                                                                                                             | 802      | <code>\errhelp</code> : Set error help empty. . . . .                                                                                                                     | 806 |
| Set all the catcodes . . . . .                                                                                                                              | 792      | 1994-05-05 <code>ltfntcmd.dtx</code> v3.3c<br><code>\@math@egroup</code> : Corrected<br><code>\@fontswitch</code> and added saved<br>versions . . . . .                   | 420 |
| 1994-05-02 <code>ltfinal.dtx</code> v0.1f<br>General: Set the catcode of control-J. . . . .                                                                 | 802      | General: Corrected <code>\@fontswitch</code> . . . . .                                                                                                                    | 413 |
| 1994-05-02 <code>ltmiscen.dtx</code> v1.0g<br>General: Changed 91 to 1991 and<br>moved some bits . . . . .                                                  | 459      | 1994-05-05 <code>ltmiscen.dtx</code> v1.0i<br>General: Removed braces from<br><code>ifnextchar</code> and <code>ifstar</code> arguments . . . . .                         | 459 |
| 1994-05-02 <code>ltoutput.dtx</code> v1.0o<br><code>\@resethfps</code> : Code shortened . . . . .                                                           | 779      | 1994-05-07 <code>lttab.dtx</code> v1.0c<br><code>\@maxtab</code> : Changed <code>\@firsttab</code> to<br><code>\chardef</code> . . . . .                                  | 530 |
| General: Code of <code>\@resethfps</code><br>shortened. . . . .                                                                                             | 717      | Changed <code>\@maxtab</code> to <code>\chardef</code> . . . . .                                                                                                          | 530 |
| 1994-05-03 <code>ltbibl.dtx</code> v1.0b<br><code>\@nocite</code> : Make <code>\@nocite</code> issue a<br>warning for an undefined citation<br>key. . . . . | 626      | General: Removed definition of <code>\+</code> . . . . .                                                                                                                  | 526 |
| 1994-05-03 <code>ltfinal.dtx</code> v0.1f<br>General: Set the catcode of control-J<br>to be 'other', for use in messages. . . . .                           | 792      | Removed surplus braces from<br><code>\@ifnextchar</code> constructs . . . . .                                                                                             | 526 |
| 1994-05-03 <code>ltfloat.dtx</code> v1.0f<br>General: (CAR) Added<br><code>\@largefloatcheck</code> . . . . .                                               | 600      | 1994-05-08 <code>ltfntcmd.dtx</code> v3.3d<br>General: Removed<br><code>\@undefinedfonterror</code> . . . . .                                                             | 413 |
| Removed unnecessary braces from<br>arguments of <code>\@ifnextchar</code> . . . . .                                                                         | 600      | <code>\@normalsize</code> : Removed<br><code>\@undefinedfonterror</code> . . . . .                                                                                        | 421 |
| <code>\end@dblfloat</code> : <code>\@largefloatcheck</code><br>added . . . . .                                                                              | 608      | 1994-05-09 <code>ltfntcmd.dtx</code> v3.3f<br>General: Replaced all <code>\next</code> by<br><code>\@let@token</code> and undo change<br>3.3e, whatever that was. . . . . | 413 |

|                                                              |     |                                                           |     |
|--------------------------------------------------------------|-----|-----------------------------------------------------------|-----|
| 1994-05-10 ltdefs.dtx v1.0n                                  |     |                                                           |     |
| General: (ASAJ) Added                                        |     | <code>\@changed@cmd</code> and                            |     |
| <code>\DeclareProtectedCommand</code> . . . . .              | 69  | <code>\DeclareProtectedCommand</code> . . . . .           | 216 |
| Added <code>\DeclareProtectedCommand</code>                  | 78  | Renamed the commands again.                               |     |
| Removed braces around                                        |     | Made the encoding part of the                             |     |
| <code>\@ifundefined</code> argument. ASAJ.                   | 75  | command syntax. Added the                                 |     |
| <code>\makeatother</code> : Added <code>\makeatletter</code> |     | <code>\DeclareTextCommand</code> interface.               |     |
| and <code>\makeatother</code> ASAJ. . . . .                  | 96  | Used                                                      |     |
| 1994-05-10 lterror.dtx v1.0n                                 |     | <code>\DeclareProtectedCommand</code> . . . . .           | 212 |
| <code>\@latexerr</code> : (ASAJ) Added extra                 |     | <code>\DeclareTextAccent</code> : Reimplemented           |     |
| blank lines to <code>\@latexerr</code> . . . . .             | 165 | using <code>\DeclareTextCommand</code> . . . . .          | 218 |
| 1994-05-10 ltmiscen.dtx v1.0j                                |     | 1994-05-11 ltspc.dtx v1.0o                                |     |
| <code>\@sverb</code> : Slight change in error                |     | <code>\hspace</code> : Use                                |     |
| message text. . . . .                                        | 477 | <code>\DeclareRobustCommand</code> . ASAJ.                | 188 |
| 1994-05-11 ltboxes.dtx v1.0f                                 |     | 1994-05-12 ltboxes.dtx v1.0g                              |     |
| <code>\@begin@tempboxa</code> : Use new                      |     | <code>\@finalstrut</code> : macro added . . . . .         | 525 |
| <code>\color@setgroup</code> concept. . . . .                | 513 | <code>\fbox</code> : New definition, merged with          |     |
| <code>\@iiiminipage</code> : Use new                         |     | <code>\framebox</code> . . . . .                          | 517 |
| <code>\color@setgroup</code> concept. . . . .                | 522 | <code>\framebox</code> : Merged <code>\fbox</code> and    |     |
| <code>\@mpfootnotetext</code> : Use new                      |     | <code>\framebox</code> . . . . .                          | 517 |
| <code>\color@setgroup</code> concept. . . . .                | 522 | <code>\normalcolor</code> : macro added for colour        |     |
| Use new <code>\normalcolor</code> and                        |     | support . . . . .                                         | 515 |
| <code>\@finalstrut</code> . . . . .                          | 522 | 1994-05-12 ltdefs.dtx v1.0p                               |     |
| General: Superfluous braces removed                          |     | General: (ASAJ) Fixed a bug with                          |     |
| from several commands . . . . .                              | 512 | <code>\relax</code> which was using <code>\@gobble</code> |     |
| <code>\color@setgroup</code> : macro added for               |     | before defining it. . . . .                               | 69  |
| colour support . . . . .                                     | 515 | Fixed a bug with <code>\relax</code> which was            |     |
| <code>\endminipage</code> : Use new                          |     | using <code>\@gobble</code> before defining it. . . . .   | 78  |
| <code>\color@setgroup</code> concept. . . . .                | 522 | 1994-05-12 ltfssbas.dtx v2.1j                             |     |
| 1994-05-11 ltclass.dtx v1.0c                                 |     | General: New baselinestretch concept                      | 267 |
| <code>\endfilecontents</code> : Add checks for               |     | Replaced hand-protected commands                          |     |
| form feed and tab . . . . .                                  | 659 | by <code>\DeclareRobustCommand</code> defs                | 267 |
| 1994-05-11 ltdirchk.dtx v1.0e                                |     | <code>\f@linespread</code> : New macro . . . . .          | 277 |
| General: Add <code>\ProvidesFile</code> as used              |     | <code>\fontencoding</code> : Use                          |     |
| in fd files. . . . .                                         | 4   | <code>\DeclareRobustCommand</code> . . . . .              | 275 |
| 1994-05-11 lterror.dtx v1.0o                                 |     | <code>\fontfamily</code> : Use                            |     |
| <code>\@latexerr</code> : (ASAJ) Removed one of              |     | <code>\DeclareRobustCommand</code> . . . . .              | 276 |
| the extra blank lines to                                     |     | <code>\fontseries</code> : Use                            |     |
| <code>\@latexerr</code> . . . . .                            | 165 | <code>\DeclareRobustCommand</code> . . . . .              | 276 |
| 1994-05-11 ltlogos.dtx v1.0o                                 |     | <code>\fontshape</code> : Use                             |     |
| <code>\LaTeX</code> : Use                                    |     | <code>\DeclareRobustCommand</code> . . . . .              | 276 |
| <code>\DeclareProtectedCommand</code> .                      |     | <code>\fontsize</code> : Redefined to use                 |     |
| ASAJ. . . . .                                                | 191 | <code>\set@fontsize</code> . . . . .                      | 276 |
| <code>\LaTeXe</code> : Use                                   |     | <code>\linespread</code> : New macro . . . . .            | 276 |
| <code>\DeclareProtectedCommand</code> .                      |     | <code>\mathversion</code> : Use                           |     |
| ASAJ. . . . .                                                | 191 | <code>\DeclareRobustCommand</code> . . . . .              | 277 |
| 1994-05-11 ltoutenc.dtx 1.5a                                 |     | 1994-05-12 ltfssdcl.dtx v2.1g                             |     |
| General: Made T1 and OT1 generate                            |     | General: Allow <code>\relax</code> as undefined           |     |
| packages rather than def files.                              |     | command . . . . .                                         | 339 |
| Renamed the ‘package’ module to                              |     | Allow <code>\relax</code> ’ed cmds to be                  |     |
| ‘teststy’. . . . .                                           | 215 | declared . . . . .                                        | 339 |
| 1994-05-11 ltoutenc.dtx v1.5a                                |     | 1994-05-12 ltfssini.dtx v2.1i                             |     |
| General: Reimplemented                                       |     | General: Moved <code>\fontencoding</code> to              |     |
| <code>\DeclareTextCommand</code> using                       |     | fam.dtx . . . . .                                         | 366 |
|                                                              |     | Moved <code>\fontfamily</code> to fam.dtx . . . . .       | 366 |



|                                                              |          |                                                                               |     |
|--------------------------------------------------------------|----------|-------------------------------------------------------------------------------|-----|
| Moved <code>\fontseries</code> to fam.dtx . . .              | 366      | 1994-05-13 ltfiles.dtx v1.0g                                                  |     |
| Moved <code>\fontshape</code> to fam.dtx . . .               | 366      | <code>\document</code> : Added execution of                                   |     |
| Moved <code>\fontsize</code> to fam.dtx . . .                | 366      | <code>\every@size</code> . . . . .                                            | 195 |
| Moved <code>\mathversion</code> to fam.dtx . . .             | 366      | 1994-05-13 ltfinal.dtx v0.1h                                                  |     |
| Moved <code>\selectfont</code> to tracefnt.dtx               | 366      | General: Added package <code>otlenc</code> , and                              |     |
| 1994-05-12 ltfsstrc.dtx v2.3f                                |          | defined <code>\@acci</code> , <code>\@accii</code> and                        |     |
| <code>\selectfont</code> : Use                               |          | <code>\@acciii</code> . . . . .                                               | 792 |
| <code>\DeclareRobustCommand</code> . . . . .                 | 315      | 1994-05-13 ltfinal.dtx v1.0h                                                  |     |
| 1994-05-12 ltoutenc.dtx 1.5a                                 |          | General: Added output enc stuff . . .                                         | 804 |
| General: Removed the                                         |          | 1994-05-13 ltfloat.dtx v1.0g                                                  |     |
| <code>\SaveAtCatcode</code> and                              |          | <code>\@footnotetext</code> : (DPC) Add new                                   |     |
| <code>\RestoreAtCatcode</code> commands. . .                 | 228      | style colour support:                                                         |     |
| Rewrote for the new syntax. . .                              | 228, 230 | <code>\normalcolor</code> . . . . .                                           | 619 |
| 1994-05-12 ltoutput.dtx v1.0p                                |          | (DPC) Use <code>\@finalstrut</code> . . . . .                                 | 619 |
| <code>\@writsetup</code> : <code>\normalcoloradded</code>    | 744      | <code>\xfloat</code> : (DPC) Use <code>\normalcolor</code>                    | 605 |
| General: <code>\normalcoloradded</code> in                   |          | 1994-05-13 ltfmtcmd.dtx v3.3g                                                 |     |
| various places (DPC). . . . .                                | 717      | General: Replaced <code>\@protecteddef</code> by                              |     |
| 1994-05-13 ltboxes.dtx v1.0h                                 |          | <code>\DeclareRobustCommand</code> . . . . .                                  | 413 |
| <code>\@arrayparboxrestore</code> : New accent               |          | 1994-05-13 ltfsbas.dtx v2.1k                                                  |     |
| system, use <code>\let</code> not <code>\def</code> . . . .  | 520      | General: Remove File identification                                           |     |
| 1994-05-13 ltcounts.dtx v1.0f                                |          | ‘typeout’ . . . . .                                                           | 267 |
| General: Removed <code>\@lalph</code> . . . . .              | 261      | 1994-05-13 ltfsbas.dtx v2.1l                                                  |     |
| Removed <code>\@lalph</code> . . . . .                       | 261      | <code>\DeclareFontEncoding</code> : Init encoding                             |     |
| 1994-05-13 ltdefns.dtx v1.0q                                 |          | change command . . . . .                                                      | 271 |
| General: (ASAJ) Renamed                                      |          | <code>\define@newfont</code> : Use <code>\@input@</code> for fd               |     |
| <code>\DeclareProtectedCommand</code> to                     |          | files . . . . .                                                               | 280 |
| <code>\DeclareRobustCommand</code> .                         |          | 1994-05-13 ltssdcl.dtx v2.1h                                                  |     |
| Removed <code>\@if@short@command</code> . . .                | 69       | General: Removed file identification                                          |     |
| (ASAJ) Replaces <code>\space</code> by ‘ ’ in                |          | typeout . . . . .                                                             | 339 |
| <code>\csname</code> . . . . .                               | 69       | 1994-05-13 ltssini.dtx v2.1j                                                  |     |
| Renamed                                                      |          | General: Removed file identification                                          |     |
| <code>\DeclareProtectedCommand</code> to                     |          | typeout . . . . .                                                             | 366 |
| <code>\DeclareRobustCommand</code> .                         |          | 1994-05-13 ltfsstrc.dtx v2.3g                                                 |     |
| Removed <code>\@if@short@command</code> .                    |          | General: Removed typeouts as                                                  |     |
| Moved to after the definition of                             |          | <code>\ProvidesPackage</code> writes to log. . .                              | 311 |
| <code>\@gobble</code> . . . . .                              | 78       | 1994-05-13 ltoutenc.dtx v1.5b                                                 |     |
| 1994-05-13 ltdefns.dtx v1.0r                                 |          | General: Added <code>\{</code> , <code>\}</code> and <code>\\$</code> . . . . | 212 |
| General: (ASAJ) Added logging                                |          | Renamed                                                                       |     |
| message to                                                   |          | <code>\DeclareProtectedCommand</code> to                                      |     |
| <code>\DeclareProtectedCommand</code> . . . . .              | 69       | <code>\DeclareRobustCommand</code> . . . . .                                  | 212 |
| Added logging message to                                     |          | Replaces <code>\space</code> by ‘ ’ in <code>\csname</code> . .               | 212 |
| <code>\DeclareProtectedCommand</code> . . . . .              | 78       | 1994-05-13 ltpictur.dtx v0.1d                                                 |     |
| 1994-05-13 ltdefns.dtx v1.0s                                 |          | General: Removed surplus braces from                                          |     |
| General: (ASAJ) Added                                        |          | <code>\@if..</code> constructions . . . . .                                   | 551 |
| <code>\@backslashchar</code> . . . . .                       | 69       | 1994-05-13 lttab.dtx v1.0d                                                    |     |
| (ASAJ) Coded <code>\@ifdefinable</code> more                 |          | <code>\@contfield</code> : Colour support . . . . .                           | 532 |
| efficiently. . . . .                                         | 69       | <code>\@startfield</code> : Colour support . . . .                            | 532 |
| Coded more efficiently, thanks to                            |          | <code>\@stopfield</code> : Colour support . . . . .                           | 532 |
| FMi. . . . .                                                 | 75       | <code>\a</code> : moved to ltoutenc . . . . .                                 | 530 |
| 1994-05-13 ltfiles.dtx LaTeX2e                               |          | 1994-05-14 fontdef.dtx v2.1f                                                  |     |
| <code>\listfiles</code> : Stop <code>\listfiles</code> being |          | General: Removed .def files. . . . .                                          | 391 |
| run twice . . . . .                                          | 210      | 1994-05-14 ltfsbas.dtx v2.1lm                                                 |     |
|                                                              |          | <code>\enc@update</code> : Macro added . . . . .                              | 276 |

|                                                                         |                                                                                            |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 1994-05-14 ltffssbas.dtx v2.1n                                          | 1994-05-16 ltffssbas.dtx v2.1p                                                             |
| General: Set defaults for all <code>\f@...</code> . . . . . 276         | <code>\fontsize</code> : Pass <code>\baselinestretch</code> not                            |
| <code>\DeclareErrorFont</code> : Don't set                              | <code>\f@linespread</code> . . . . . 276                                                   |
| <code>\f@encoding</code> . . . . . 283                                  | <code>\linespread</code> : Remove surplus braces 276                                       |
| <code>\DeclareFontEncoding</code> : Log if                              | 1994-05-16 ltffssini.dtx v2.1m                                                             |
| encoding is redeclared . . . . . 271                                    | <code>\@acciii</code> : Define saved versions of                                           |
| Only init enc change cmd when new                                       | accents . . . . . 388                                                                      |
| encoding . . . . . 271                                                  | 1994-05-16 ltlogos.dtx v1.1a                                                               |
| 1994-05-14 ltffssini.dtx v2.1k                                          | General: (ASAJ) Split from ltinit.dtx. 191                                                 |
| General: Init error font just before                                    | 1994-05-16 ltmath.dtx v1.0k                                                                |
| checking for fontdef.cfg . . . . . 387                                  | <code>\ensuremath</code> : Use                                                             |
| <code>\reset@font</code> : Remove surplus braces 386                    | <code>\DeclareRobustCommand</code> and add                                                 |
| 1994-05-14 ltfsstrc.dtx v2.3h                                           | extra braces in math mode . . . . 491                                                      |
| <code>\selectfont</code> : Added <code>\enc@update</code> . . . . . 316 | 1994-05-16 ltoutenc.dtx 1.5h                                                               |
| 1994-05-14 ltoutenc.dtx 1.5d                                            | General: <code>\pounds</code> was still using u                                            |
| General: Moved the driver to the top. 215                               | rather than ui shape. . . . . 228                                                          |
| 1994-05-14 ltoutenc.dtx v1.5c                                           | 1994-05-16 ltoutenc.dtx v1.5f                                                              |
| General: Added the fontenc package 254                                  | General: enc files now have uc                                                             |
| Added the fontenc package. . . . . 212                                  | encoding name parts (FMi) . . . . 212                                                      |
| Fixed a bug which caused an                                             | Revert code so that the encoding                                                           |
| infinite loop if <code>\f@encoding</code> was                           | given is used in                                                                           |
| incorrectly set. . . . . 212, 216                                       | <code>\DeclareTextCommand</code> (FMi) . . . 212                                           |
| Moved fontsmpl to its own dtx file. 212                                 | 1994-05-16 ltoutenc.dtx v1.5g                                                              |
| 1994-05-14 ltoutenc.dtx v1.5d                                           | General: Made fontenc.sty use the new                                                      |
| General: Rewrote                                                        | mixed-case encoding files. . . . . 212                                                     |
| <code>\DeclareTextCommand</code> to define its                          | Removed the lowercasing of the                                                             |
| argument to use the current                                             | filename. . . . . 254                                                                      |
| encoding by default, rather than                                        | 1994-05-16 ltoutenc.dtx v1.5h                                                              |
| the encoding provided to                                                | General: Added <code>\NG</code> , <code>\ng</code> , <code>\TH</code> , <code>\th</code> , |
| <code>\DeclareTextCommand</code> . . . . . 212, 216                     | <code>\DH</code> , <code>\dh</code> , <code>\DJ</code> and <code>\dj</code> . . . . . 212  |
| Tidied up the documentation. . . . . 212                                | Added <code>\r</code> (ring accent) and <code>\k</code>                                    |
| 1994-05-14 ltoutenc.dtx v1.5e                                           | (ogonek) accents. . . . . 212                                                              |
| General: Replaced <code>\ENC@cmd</code> by                              | Fixed a bug with <code>\pounds</code> . . . . . 212                                        |
| <code>\ENC-cmd</code> . . . . . 212                                     | Removed <code>\P</code> from the OT1                                                       |
| 1994-05-15 ltffssbas.dtx v2.1o                                          | definitions file. . . . . 212                                                              |
| General: encoding cmds changed to                                       | 1994-05-16 ltoutenc.dtx v1.5i                                                              |
| enc-cmd . . . . . 267                                                   | General: Fixed a bug with <code>\d</code> . . . . . 212                                    |
| 1994-05-16 fontdef.dtx v2.1g                                            | 1994-05-16 ltoutput.dtx v1.0q                                                              |
| General: Removed                                                        | <code>\@writsetup</code> : Changed setting of                                              |
| <code>\DeclareFontEncoding</code> for ot1 and                           | accents (FMi): with the new                                                                |
| t1 and input .def files instead . . . 391                               | encoding setup they can use <code>\let</code> .                                            |
| 1994-05-16 ltalloc.dtx v1.1a                                            | It could also use the new internal                                                         |
| General: (ASAJ) Split from ltinit.dtx. 154                              | commands? . . . . . 745                                                                    |
| 1994-05-16 ltcntrl.dtx v1.0a                                            | General: Changed setting of accents                                                        |
| General: (ASAJ) Split from ltinit.dtx. 156                              | (FMi). . . . . 717                                                                         |
| 1994-05-16 ltdefns.dtx v1.1a                                            | 1994-05-16 ltpar.dtx v1.1a                                                                 |
| General: (ASAJ) Split from ltinit.dtx. 69                               | General: (ASAJ) Split from ltinit.dtx. 170                                                 |
| 1994-05-16 lterror.dtx v1.1a                                            | 1994-05-16 ltplain.dtx v1.0h                                                               |
| General: (ASAJ) Completely new                                          | General: Comment out encoding                                                              |
| error interface. . . . . 160                                            | specific commands . . . . . 29                                                             |
| (ASAJ) Split from ltinit.dtx. . . . . 160                               | Remove <code>\@acci</code> and friends again . 30                                          |
| 1994-05-16 ltfinal.dtx v1.0i                                            | Remove unnecessary def for <code>\item</code> 29                                           |
| General: moved output enc stuff to                                      | <code>\loop</code> : Use Kabelschacht method . . . 28                                      |
| lfonts . . . . . 804                                                    | <code>\m@th</code> : Remove unnecessary space . . . 29                                     |



|                                                                 |                                                                      |     |
|-----------------------------------------------------------------|----------------------------------------------------------------------|-----|
| 1994-05-16 ltspace.dtx v1.1a                                    | Replaced <code>\defaultencoding</code> with                          |     |
| General: (ASAJ) Split from ltinit.dtx. 172                      | <code>\encodingdefault</code> . . . . .                              | 212 |
| 1994-05-17 ltclass.dtx v1.0e                                    | 1994-05-19 ltbibl.dtx v1.1a                                          |     |
| <code>\@use@option</code> : Execute option after                | General: Initial version of ltbibl.dtx,                              |     |
| removing from list, not before . . . 647                        | split from ltidxbib.dtx . . . . .                                    | 624 |
| 1994-05-17 ltdefns.dtx 1.1b                                     | 1994-05-19 ltcounts.dtx v1.1a                                        |     |
| General: (ASAJ) Added the                                       | General: Extracted file from ltcntlen. 257                           |     |
| <code>\@protect@...</code> commands. . . . . 79                 | 1994-05-19 ltdefns.dtx v1.1d                                         |     |
| 1994-05-17 ltdefns.dtx v1.1b                                    | General: (RmS) Added definitions for                                 |     |
| General: (ASAJ) Added definitions for                           | <code>\@namedef</code> and <code>\@nameuse</code> again. . 69        |     |
| <code>protect</code> . . . . . 69                               | 1994-05-19 ltfinal.dtx v0.1k                                         |     |
| (ASAJ) Removed warnings and                                     | General: Removed <code>\makeat...</code> . . . . 792                 |     |
| logging to lterror.dtx. . . . . 69                              | 1994-05-19 ltidxglo.dtx v1.1a                                        |     |
| Added the discussion of protected                               | General: Initial version of ltidxglo.dtx,                            |     |
| commands, defined the values that                               | split from ltidxbib.dtx . . . . . 621                                |     |
| <code>\protect</code> should have. . . . . 79                   | 1994-05-19 ltlength.dtx v1.1a                                        |     |
| 1994-05-17 ltdefns.dtx v1.1c                                    | General: Extract file ltlength from                                  |     |
| General: (ASAJ) Redid definitions for                           | ltcntlen. . . . . 265                                                |     |
| <code>protect</code> . . . . . 69                               | 1994-05-19 ltpageno.dtx v1.1a                                        |     |
| 1994-05-17 lterror.dtx v1.1b                                    | General: Extract file ltpageno from                                  |     |
| General: (ASAJ) Moved error stuff                               | ltcntlen. . . . . 453                                                |     |
| from ltdefns.dtx. . . . . 160                                   | 1994-05-19 ltplain.dtx v0.1k ltfinal                                 |     |
| 1994-05-17 ltfssini.dtx v2.1n                                   | <code>\showoutput</code> : used <code>\maxdimen</code> not           |     |
| <code>\copyright</code> : Really add extra braces 386           | 99999 . . . . . 31                                                   |     |
| <code>\nfss@text</code> : Added braces to allow                 | <code>\showoverfull</code> : used <code>\@ne</code> not 1 . . . . 31 |     |
| use in subscripts . . . . . 386                                 | 1994-05-19 ltxref.dtx v1.1a                                          |     |
| 1994-05-17 ltmath.dtx v1.0i                                     | General: Extract file ltxref from                                    |     |
| General: Replaced <code>\let</code> by <code>\gdef</code> , for | ltcntlen. . . . . 454                                                |     |
| indirect definition. . . . . 487                                | 1994-05-20 ltdefns.dtx v1.1e                                         |     |
| 1994-05-17 ltoutenc.dtx v1.5j                                   | General: Changed command name                                        |     |
| General: Added braces to <code>\pounds</code> so                | from <code>\@checkcommand</code> to                                  |     |
| it works as a subscript. . . . . 212                            | <code>\CheckCommand</code> . . . . . 69                              |     |
| 1994-05-18 ltdefns.dtx 1.1c                                     | <code>\CheckCommand</code> : Changed name from                       |     |
| General: (ASAJ) Renamed the                                     | <code>\@checkcommand</code> to                                       |     |
| commands, and removed one                                       | <code>\CheckCommand</code> . . . . . 77                              |     |
| which is no longer needed. . . . . 79                           | 1994-05-20 lterror.dtx v1.1c                                         |     |
| 1994-05-18 ltdefns.dtx v1.1c                                    | General: (ASAJ) Added                                                |     |
| General: Redid the discussion and                               | <code>\@latex@info@no@line</code> . . . . . 160                      |     |
| definitions, in line with the                                   | (ASAJ) Added missing full stops. 160                                 |     |
| proposed new setting of <code>\protect</code>                   | (ASAJ) Fixed a bug with                                              |     |
| in the output routine. . . . . 79                               | <code>\@inmatherr</code> . . . . . 160                               |     |
| 1994-05-18 ltfinal.dtx v0.1j                                    | 1994-05-20 ltfinal.dtx v0.1l                                         |     |
| General: Corrected the lccode for                               | General: Use new font warning                                        |     |
| d-bar. . . . . 792                                              | commands . . . . . 798                                               |     |
| 1994-05-18 ltlogos.dtx v1.1b                                    | 1994-05-20 ltfloat.dtx v1.0h                                         |     |
| General: (ASAJ) Added the $\TeX$                                | <code>\@endfloatbox</code> : Restore outer value of                  |     |
| logo. . . . . 191                                               | <code>@nobreak</code> switch. . . . . 609                            |     |
| (ASAJ) Made the $\LaTeX 2\epsilon$ logo use                     | <code>\outer@nobreak</code> : Macro added:                           |     |
| the text font ‘2’ rather than the                               | default is to do nothing. . . . . 609                                |     |
| math font ‘2’. . . . . 191                                      | 1994-05-20 ltfntcmd.dtx v3.3h                                        |     |
| 1994-05-18 ltoutenc.dtx v1.5k                                   | General: Use new error commands . 413                                |     |
| General: Made dotted-i produce ‘i’. 212                         | 1994-05-20 ltfssbas.dtx v2.1q                                        |     |
| Removed braces from <code>\pounds</code> and                    | General: Use new error commands . 267                                |     |
| <code>\dollar</code> . . . . . 212                              |                                                                      |     |

|                                                                                                                       |                                                                                                                     |     |
|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----|
| 1994-05-20 ltfssstrc.dtx v2.3i                                                                                        | (ASAJ) Replaced \\ and tilde by \\MessageBreak and \\space. ....                                                    | 160 |
| General: Use new error command names .....                                                                            | (ASAJ) Replaced \\@generic@message and \\@generic@error by \\GenericError, \\GenericWarning and \\GenericInfo. .... | 160 |
| 1994-05-20 ltmiscen.dtx v1.0l                                                                                         | (ASAJ) Replaces \\string by \\protect in some messages. ...                                                         | 160 |
| \\@writefile: Added correct setting of \\protect. ....                                                                | 1994-05-22 lterror.dtx v1.2d                                                                                        |     |
| 1994-05-20 ltmiscen.dtx v1.0m                                                                                         | \\GenericError: (DPC) Alternative version added for old TeXs ....                                                   | 161 |
| General: Use new warning commands                                                                                     | (DPC) New version using long command name. ....                                                                     | 161 |
| 1994-05-20 ltoutput.dtx v1.0s                                                                                         | 1994-05-22 ltfloat.dtx v1.0i                                                                                        |     |
| \\@writsetup: Added setting of \\protect during \\shipout. ....                                                       | General: Use new warning commands                                                                                   | 600 |
| General: Added setting of \\protect during \\shipout. ....                                                            | 1994-05-22 ltoutput.dtx v1.0t                                                                                       |     |
| 1994-05-20 ltpage.dtx v1.0d                                                                                           | General: Changed warnings and infos to new commands. ....                                                           | 717 |
| \\markright: Changed setting for \\protect. ....                                                                      | 1994-05-22 ltpictur.dtx v0.1e                                                                                       |     |
| 1994-05-20 ltsect.dtx v1.0c                                                                                           | General: Use new warning cmds ...                                                                                   | 551 |
| General: Correct setting of \\protect.                                                                                | 1994-05-23 ltclass.dtx v1.0h                                                                                        |     |
| \\addcontentsline: Correct setting of \\protect. ....                                                                 | \\NeedsTeXFormat: Don't stop completely when format is wrong                                                        | 649 |
| 1994-05-21 ltbibl.dtx v1.1b                                                                                           | \\usepackage: Remove argument if possible .....                                                                     | 649 |
| General: Use new warning commands                                                                                     | 1994-05-23 ltdirchk.dtx v1.0f                                                                                       |     |
| 1994-05-21 lterror.dtx v1.1d                                                                                          | General: Document \\@TeXversion ...                                                                                 | 1   |
| General: (ASAJ) Made the error commands robust. ....                                                                  | 1994-05-23 ltfssstrc.dtx v2.3j                                                                                      |     |
| 1994-05-21 ltfiles.dtx v1.0h                                                                                          | General: Removed def of \\f@warn@break .....                                                                        | 328 |
| General: Use new error commands                                                                                       | 1994-05-23 ltoutput.dtx v1.0u                                                                                       |     |
| 1994-05-21 ltlists.dtx v1.0f                                                                                          | \\@activechar@info: Added \\MessageBreak .....                                                                      | 744 |
| General: Use new error commands                                                                                       | \\@writsetup: Changed resetting of \\protect after shipout to use \\aftergroup .....                                | 744 |
| 1994-05-21 ltmiscen.dtx v1.0n                                                                                         | General: Added \\MessageBreak. ...                                                                                  | 717 |
| General: Use new error commands                                                                                       | Changed resetting of \\protect after shipout. ....                                                                  | 717 |
| 1994-05-21 ltsect.dtx v1.0d                                                                                           | 1994-05-24 lterror.dtx v1.2e                                                                                        |     |
| General: Use new error commands                                                                                       | \\@latex@info@no@line: Macro added                                                                                  | 164 |
| 1994-05-21 lttab.dtx v1.0f                                                                                            | 1994-05-24 lterror.dtx v1.2f                                                                                        |     |
| General: Use new error commands                                                                                       | General: (DPC) wrap long lines ...                                                                                  | 160 |
| 1994-05-21 ltxref.dtx v1.1b                                                                                           | 1994-05-24 ltfontcmd.dtx v3.3i                                                                                      |     |
| General: Use new warning commands                                                                                     | General: Tidying and typos fixed ...                                                                                | 413 |
| \\newlabel: Use new warning commands .....                                                                            | 1994-05-24 ltmiscen.dtx v1.0q                                                                                       |     |
| 1994-05-22 ltclass.dtx v1.0f                                                                                          | \\@currentvline: Use \\@empty as outer default .....                                                                | 470 |
| General: Use new warning and error commands .....                                                                     | 1994-05-25 ltdirchk.dtx v1.0g                                                                                       |     |
| 1994-05-22 ltdefns.dtx v1.1f                                                                                          | \\filename@parse: Mac parser had " typo for : .....                                                                 | 12  |
| General: Use new warning and error cmds .....                                                                         |                                                                                                                     |     |
| 1994-05-22 lterror.dtx v1.1e                                                                                          |                                                                                                                     |     |
| General: (ASAJ) Replaced bgroup by begingroup in error messages, to stop extra mathords creeping into math mode. .... |                                                                                                                     |     |
| 1994-05-22 lterror.dtx v1.2a                                                                                          |                                                                                                                     |     |
| General: (ASAJ) Made \\GenericError, \\GenericWarning and \\GenericInfo robust. ....                                  |                                                                                                                     |     |

|                                                                                                                                                                          |                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1994-05-25 ltfntcmd.dtx v3.3j                                                                                                                                            | 1994-06-01 ltlogos.dtx v1.1d                                                                                                                             |
| General: Insertion of <code>\aftergroups</code> to<br>implement <code>\nocorr</code> moved to the<br>end of the group . . . . .                                          | <code>\LaTeX</code> : Add <code>\m@th</code> to force math size<br>calculations . . . . .                                                                |
| 413                                                                                                                                                                      | 1994-06-01 ltoutput.dtx v1.0w                                                                                                                            |
| <code>\check@icr</code> : Macros added . . . . .                                                                                                                         | General: Tidied up typesetting. . . .                                                                                                                    |
| 417                                                                                                                                                                      | 1994-06-08 ltfinal.dtx v1.0m                                                                                                                             |
| <code>\check@nocorr@</code> : Insertion of<br><code>\aftergroups</code> moved and defaults<br>set up for efficiency . . . . .                                            | General: Add patch file system . . . .                                                                                                                   |
| 417                                                                                                                                                                      | 1994-06-09 ltfinal.dtx v1.0n                                                                                                                             |
| <code>\DeclareTextFontCommand</code> :<br><code>\expandafter</code> inserted . . . . .                                                                                   | General: For <code>TeX2</code> , do not set codes<br>for higher half of character<br>table. . . . .                                                      |
| 415                                                                                                                                                                      | 796, 802                                                                                                                                                 |
| Insertion of <code>\aftergroups</code> moved . . . .                                                                                                                     | 1994-06-09 ltfntcmd.dtx v3.3k                                                                                                                            |
| 415                                                                                                                                                                      | General: Tidying and typos fixed in<br>documentation . . . . .                                                                                           |
| 1994-05-25 ltoutput.dtx v1.0v                                                                                                                                            | 413                                                                                                                                                      |
| General: Extra documentation. . . .                                                                                                                                      | 1994-06-18 ltfntcmd.dtx v3.3l                                                                                                                            |
| 717                                                                                                                                                                      | General: Added check for empty text . . . .                                                                                                              |
| 1994-05-25 ltsect.dtx v1.0e                                                                                                                                              | 413                                                                                                                                                      |
| <code>\@dottedtocline</code> : Put braces around<br>argument 4 (the actual toc entry)<br>to avoid font (and possibly other)<br>changes leaking out to the leaders. . . . | <code>\check@nocorr@</code> : Added check for<br>empty text . . . . .                                                                                    |
| 598                                                                                                                                                                      | 417                                                                                                                                                      |
| 1994-05-25 ltthm.dtx v1.0c                                                                                                                                               | 1994-06-22 ltfntcmd.dtx v3.3m                                                                                                                            |
| General: Modify documentation . . .                                                                                                                                      | General: Removed space from<br><code>\nfss@text</code> . . . . .                                                                                         |
| 583                                                                                                                                                                      | 413                                                                                                                                                      |
| 1994-05-25 ltvers.dtx v1.0d                                                                                                                                              | Renamed <code>\check@nocorr</code> . . . . .                                                                                                             |
| General: Remove PRELIMINARY<br>TEST RELEASE from startup<br>banner (spring is here) . . . . .                                                                            | 413                                                                                                                                                      |
| 34                                                                                                                                                                       | <code>\check@nocorr@</code> : Renamed<br><code>\check@nocorr</code> to <code>\text@command</code><br>to improve <code>\long</code> error message . . . . |
| 1994-05-25 ltxref.dtx v1.1c                                                                                                                                              | 417                                                                                                                                                      |
| General: Modify documentation . . .                                                                                                                                      | <code>\DeclareTextFontCommand</code> : Removed<br>space from <code>\nfss@text</code> . . . . .                                                           |
| 454                                                                                                                                                                      | 415                                                                                                                                                      |
| 1994-05-26 ltfiles.dtx LaTeX2e                                                                                                                                           | 1994-06-22 ltmath.dtx v1.2t classes                                                                                                                      |
| <code>\@missingfileerror</code> : Modify message<br>format . . . . .                                                                                                     | <code>\mathindent</code> : Set <code>\mathindent</code> at the<br>end of the class instead of at begin<br>document . . . . .                             |
| 208                                                                                                                                                                      | 492                                                                                                                                                      |
| 1994-05-26 ltlogos.dtx v1.1c                                                                                                                                             | 1994-07-20 ltlogos.dtx v1.1e                                                                                                                             |
| General: Remove <code>\SLiTeX</code> logo . . . .                                                                                                                        | <code>\LaTeX</code> : Save a few tokens . . . . .                                                                                                        |
| 191                                                                                                                                                                      | 191                                                                                                                                                      |
| 1994-05-26 ltmiscen.dtx v1.0r                                                                                                                                            | <code>\LaTeXe</code> : Save a few tokens . . . . .                                                                                                       |
| General: <code>\literal</code> removed . . . . .                                                                                                                         | 191                                                                                                                                                      |
| 479                                                                                                                                                                      | 1994-07-20 ltpage.dtx v1.0h                                                                                                                              |
| 1994-05-26 ltplain.dtx v1.1m                                                                                                                                             | <code>\sloppy</code> : Save a few tokens . . . . .                                                                                                       |
| <code>\iterate</code> : (CAR) added <code>\long</code> . . . .                                                                                                           | 630                                                                                                                                                      |
| 28                                                                                                                                                                       | 1994-09-16 ltfssbas.dtx v2.1s                                                                                                                            |
| <code>\underbar</code> : (CAR/FMi) changed to<br>use box <code>\tw@</code> . . . . .                                                                                     | <code>\nfss@catcodes</code> : Reset [ and ] as well,<br>just in case . . . . .                                                                           |
| 29                                                                                                                                                                       | 281                                                                                                                                                      |
| 1994-05-26 ltplain.dtx v1.1p                                                                                                                                             | 1994-10-07 ltoutenc.dtx v1.5l                                                                                                                            |
| <code>\underbar</code> : (DPC) changed to use<br><code>\sbox</code> . . . . .                                                                                            | General: Moved the ogonek accent. . .                                                                                                                    |
| 29                                                                                                                                                                       | 212                                                                                                                                                      |
| 1994-05-29 ltfssdcl.dtx v2.1j                                                                                                                                            | 1994-10-11 ltdirchk.dtx v1.0h                                                                                                                            |
| General: Use new error commands . .                                                                                                                                      | <code>\@TeXversion</code> : Check for TeX3.14 . .                                                                                                        |
| 339                                                                                                                                                                      | 13                                                                                                                                                       |
| 1994-05-31 ltfinal.dtx v1.0n                                                                                                                                             | General: Modify all of ltxcheck again .                                                                                                                  |
| General: Renamed <code>lthyphen.*</code> to<br><code>lthyphen.*</code> . . . . .                                                                                         | 13                                                                                                                                                       |
| 792                                                                                                                                                                      | 1994-10-12 ltsect.dtx v1.0f                                                                                                                              |
| 1994-06-01 ltboxes.dtx v1.0i                                                                                                                                             | General: Doc. typos . . . . .                                                                                                                            |
| <code>\@frameb@x</code> : Macro added. . . . .                                                                                                                           | 587                                                                                                                                                      |
| 518                                                                                                                                                                      | 1994-10-14 fontdef.dtx v2.2a                                                                                                                             |
| <code>\@iframebox</code> : New version, so <code>\width</code><br>is correct in <code>\framebox</code> . . . . .                                                         | General: New coding . . . . .                                                                                                                            |
| 518                                                                                                                                                                      | 389                                                                                                                                                      |
| <code>\fbox</code> : New version, using<br><code>\@frameb@x</code> . . . . .                                                                                             | 1994-10-14 ltfssini.dtx v2.2a                                                                                                                            |
| 517                                                                                                                                                                      | General: New coding for cfg files . . .                                                                                                                  |
| <code>\framebox</code> : New version, so <code>\width</code> is<br>correct in <code>\framebox</code> . . . . .                                                           | 366                                                                                                                                                      |
| 517                                                                                                                                                                      | 1994-10-14 ltmiscen.dtx v1.0s                                                                                                                            |
|                                                                                                                                                                          | General: Move math to other file . .                                                                                                                     |
|                                                                                                                                                                          | 459                                                                                                                                                      |
|                                                                                                                                                                          | 1994-10-14 ltplain.dtx v1.1a                                                                                                                             |
|                                                                                                                                                                          | General: Moved code to other files. . .                                                                                                                  |
|                                                                                                                                                                          | 14                                                                                                                                                       |

|                                                               |                                                            |
|---------------------------------------------------------------|------------------------------------------------------------|
| 1994-10-15 ltfsbas.dtx v2.1t                                  | 1994-10-25 ltboxes.dtx v1.0l                               |
| $\backslash$ extract@alph@from@version: Warn                  | $\backslash$ isavepicbox: missing percent                  |
| if math alpha is used outside                                 | (moved from ltpatch) . . . . . 516                         |
| math . . . . . 289                                            | 1994-10-25 ltdefs.dtx v1.2b                                |
| 1994-10-18 ltboxes.dtx v1.0j                                  | General: Documentation                                     |
| $\backslash$ @frameb@x: $\backslash$ leavevmode added . . 518 | improvements . . . . . 69                                  |
| $\backslash$ @ifframebox: $\backslash$ leavevmode moved to    | 1994-10-25 ltoutenc.dtx 1.6a                               |
| $\backslash$ @frameb@x . . . . . 518                          | General: Added $\backslash$ textdollar,                    |
| $\backslash$ @parboxto: Macro added to remove                 | $\backslash$ textlbrace, $\backslash$ textrbrace,          |
| misuse of $\backslash$ @empty . . . . . 519                   | $\backslash$ textsterling, $\backslash$ textunderline. 230 |
| General: stuff from ltpatch done . . . 512                    | Removed $\backslash$ textlbrace,                           |
| $\backslash$ fbox: $\backslash$ long added . . . . . 517      | $\backslash$ textrbrace, $\backslash$ textunderline to     |
| $\backslash$ mbox: $\backslash$ long added . . . . . 513      | give them their proper names. . . 230                      |
| $\backslash$ sbox: $\backslash$ long added . . . . . 515      | 1994-10-25 ltoutenc.dtx v1.6a                              |
| 1994-10-18 ltclass.dtx v1.0j                                  | General: Added                                             |
| General: Move $\backslash$ listfiles to                       | $\backslash$ ProvideTextCommand,                           |
| ltfiles.dtx . . . . . 632                                     | $\backslash$ UseTextSymbol, $\backslash$ UseTextAccent,    |
| 1994-10-18 ltdefs.dtx v1.2a                                   | $\backslash$ DeclareTextSymbolDefault,                     |
| $\backslash$ @star@or@long: macro added . . . . 72            | $\backslash$ DeclareTextAccentDefault,                     |
| General: Add extra test for $\backslash$ endgraf              | $\backslash$ DeclareTextCommandDefault,                    |
| Add star-forms for all commands . . 69                        | and                                                        |
| $\backslash$ renew@environment: reset end                     | $\backslash$ ProvideTextCommandDefault. . . 212            |
| command . . . . . 76                                          | Added the $\backslash$ Provide commands,                   |
| 1994-10-18 ltfiles.dtx v1.0i                                  | and the default definitions. . . . 216                     |
| $\backslash$ listfiles: code moved here from                  | Added the defaults. . . . . 224                            |
| ltclass . . . . . 210                                         | Added the files OTlenc.def,                                |
| 1994-10-18 ltoutenc.dtx v1.5l                                 | Tlenc.def and OMSenc.def. . . . 224                        |
| General: Added new definitions of                             | Added the OMS encoding. . . . . 236                        |
| $\backslash$ patterns and $\backslash$ hyphenation. . . 224   | 1994-10-27 ltoutenc.dtx 1.6b                               |
| 1994-10-18 ltoutenc.dtx v1.5m                                 | General: Added $\backslash$ textasciicircum                |
| General: Added new definitions of                             | $\backslash$ textasciitilde $\backslash$ textbackslash     |
| $\backslash$ patterns and $\backslash$ hyphenation. . . 212   | $\backslash$ textbar $\backslash$ textbraceleft            |
| 1994-10-18 ltsect.dtx v1.0g                                   | $\backslash$ textbraceright                                |
| $\backslash$ @dottedtocline: Added                            | $\backslash$ textcompwordmark $\backslash$ textemdash      |
| $\backslash$ normalcolor for page number . . 598              | $\backslash$ textendash $\backslash$ textexclamdown        |
| General: Added $\backslash$ normalcolor . . . . 587           | $\backslash$ textgreater $\backslash$ texthyphenchar       |
| 1994-10-19 ltfsbas.dtx v2.1t                                  | $\backslash$ texthyphen $\backslash$ textless              |
| $\backslash$ DeclareFontEncoding: Add missing                 | $\backslash$ textquestiondown                              |
| $\backslash$ relax. . . . . 271                               | $\backslash$ textquotedblleft                              |
| 1994-10-23 ltfsstrc.dtx v23.k                                 | $\backslash$ textquotedblright                             |
| $\backslash$ every@math@size: Renamed to                      | $\backslash$ textquotedbl $\backslash$ textquoteleft       |
| $\backslash$ every@math@size . . . . . 318                    | $\backslash$ textquoteright                                |
| 1994-10-23 ltmath.dtx v1.0l                                   | $\backslash$ textunderscore                                |
| $\backslash$ @eqnnum: Added $\backslash$ normalcolor since    | $\backslash$ textvisiblespace . . . . . 230                |
| $\backslash$ eqno introduces a subgroup of the                | Added: $\backslash$ textemdash $\backslash$ textendash     |
| displayed math group . . . . . 489                            | $\backslash$ textexclamdown                                |
| $\backslash$ ensuremath: Remove extra braces:                 | $\backslash$ texthyphenchar $\backslash$ texthyphen        |
| but see p 168 of Leslie's book . . 491                        | $\backslash$ textquestiondown                              |
| 1994-10-24 ltboxes.dtx v1.0k                                  | $\backslash$ textquotedblleft                              |
| $\backslash$ fbox: Inner braces added (to fix                 | $\backslash$ textquotedblright                             |
| latex/1061) . . . . . 517                                     | $\backslash$ textquoteleft                                 |
| 1994-10-25 fontdef.dtx v2.2c                                  | $\backslash$ textquoteright . . . . . 228                  |
| General: Added OMSenc.def . . . . . 391                       | 1994-10-27 ltoutenc.dtx v1.5d                              |
|                                                               | General: Rewrote                                           |

- `\DeclareTextSymbol` to define its argument to use the current encoding by default, to fit with `\DeclareTextCommand`. . . . . 216
- 1994-10-27 ltoutenc.dtx v1.6b
  - General: Added `\textbackslash`. . . 236
  - Added more defaults for OT1. . . 224
  - Removed the enc.def files . . . . . 212
  - Removed the files OT1enc.def, T1enc.def and OMSenc.def. . . . 224
  - Renamed `\textlbrace` to `\textbraceleft` and `\textrbrace` to `\textbraceright`. . . . . 236
- 1994-10-29 ltmath.dtx 1.0m
  - General: ASAJ: Added `\DeclareMathOperator`. . . . . 480
  - ASAJ: Tidied up documentation. . . . 487
- 1994-10-29 ltmath.dtx v1.0m
  - General: ASAJ: Added `\mathellipsis`, `\mathdollar` and `\mathsterling`. . . . . 487
  - ASAJ: Removed `\dag`, `\ddag`. . . . 487
  - ASAJ: Renamed `\S` and `\P` to `\mathsection` and `\mathparagraph` and made them `\mathchardefs`. . . . . 487
- 1994-10-29 ltoutenc.dtx v1.6c
  - General: Added commands like `\dots` for use in text and math. . . . . 224
  - Renamed `\P`, `\S`, `\dag` and `\ddag` to `\textparagraph`, `\textsection`, `\textdagger` and `\textdaggerdbl`. . . . . 212
- 1994-10-30 ltdefns.dtx v1.2c
  - `\@onelevel@sanitize`: Macro added . . 95
  - General: (CAR)`\@onelevel@sanitize` added . . . . . 69
- 1994-10-30 ltdefns.dtx v1.2f
  - General: (DPC)`\newwrite`'s moved to ltfiles . . . . . 69
- 1994-10-30 ltmath.dtx v1.0n
  - General: ASAJ: Moved the new commands to ltoutenc. . . . . 487
- 1994-10-30 ltoutenc.dtx v1.6d
  - General: Added `\DeclareTextCompositeCommand`. 212
  - Added `\textcircled`. . . 212, 226, 236
  - Added `\t`. . . . . 226
  - Added math commands. . . . . 212
  - Added OML encoding. . . . . 212, 226
  - Added the OML encoding. . . . . 236
  - Made `\textless` and `\textgreater` come from OML. . . . . 226
- Moved math commands here from ltmath. . . . . 228
- Removed `\textregistered`. . . . . 226
- Rewrote `\copyright` to use `\textcircled`. . . . . 226
- 1994-10-31 fontdef.dtx v2.2d
  - General: Added OMLenc.def ... . . . 391
- 1994-10-31 fontdef.dtx v2.2e
  - General: ... and moved further down 391
- 1994-10-31 ltfloat.dtx v1.1a
  - `\@dblfloat`: Major changes since two-column and one-column cases merged . . . . . 603
  - `\@dblfloatset`: Macro added . . . . . 603
  - Major changes to parameter parsing, setting of local variables, etc; two-column and one-column cases merged; space hacks moved 603
  - `\@endfloatbox`: (DPC/CAR) Extra box added to remove colour resetting from vmode . . . . . 609
  - `\@floatboxreset`: Macro added . . . 607
  - `\@footnotetext`: (DPC/CAR) Move colour setting to output routine . 619
  - `\@savemarbox`: (DPC/CAR) Extra box added for colour . . . . . 613
  - `\@setfps`: Macro added . . . . . 604
  - `\@xdblfloat`: Macros removed: `\@dbflt`, `\@xdblfloat` . . . . . 609
  - `\@xfloat`: (DPC/CAR) Extra box added to remove colour resetting from vmode . . . . . 605
  - Major changes, removing setting of local variables, space hacks etc; two-column and one-column cases merged . . . . . 604
  - Reset hook added . . . . . 605
  - `\@xympar`: (DPC/CAR) Extra box added since needed for floats . . . 613
  - `\fps@dbl`: Macro added . . . . . 604
- 1994-10-31 ltoutput.dtx v1.1a
  - `\@makecol`: (DPC/CAR) Colour resetting moved to here . . . . . 741
  - `\@topnewpage`: (DPC/CAR) Extra box added to remove colour resetting from vmode . . . . . 733
  - (DPC/CAR) Use `\color@begingroup` for colour . . 733
  - (DPC/CAR) Use `\normalcolor` . . 733
- 1994-11-02 ltoutenc.dtx v1.6d
  - General: Wrapped lines longer than 70 characters. . . . . 212

|                                                              |                                                                |
|--------------------------------------------------------------|----------------------------------------------------------------|
| 1994-11-03 ltclass.dtx v1.0k                                 | 1994-11-04 ltpage.dtx v1.0e                                    |
| General: Move <code>\@missingfileerror</code>                | <code>\markright</code> : Added                                |
| to <code>ltfiles</code> . . . . . 636                        | <code>\@unexpandable@protect</code> . ASAJ. 629                |
| 1994-11-03 ltdirchk.dtx v1.0i                                | 1994-11-04 ltsect.dtx 1.0h                                     |
| General: Generate an error if <code>latex.ltx</code>         | <code>\@sect</code> : (ASAJ) Added                             |
| not used with <code>clean initex</code> . . . . . 1          | <code>\protected@edef</code> . . . . . 591                     |
| 1994-11-03 ltfiles.dtx v1.0j                                 | General: (ASAJ) Added                                          |
| <code>\@missingfileerror</code> : Move here from             | <code>\protected@xdef</code> to <code>\thanks</code> . . . 587 |
| <code>ltclass</code> . . . . . 208                           | 1994-11-04 ltsect.dtx v1.0h                                    |
| 1994-11-04 ltboxes.dtx v1.0m                                 | General: Added <code>\protected@write</code> to                |
| <code>\@mpfootnotetext</code> : Added                        | <code>\addtocontents</code> . ASAJ. . . . . 597                |
| <code>\protected@edef</code> . ASAJ. . . . . 522             | <code>\addcontentsline</code> : Added                          |
| 1994-11-04 ltdefs.dtx v1.2e                                  | <code>\protected@write</code> to                               |
| General: Added                                               | <code>\addcontentsline</code> . ASAJ. . . . . 596              |
| <code>\set@display@protect</code> to                         | 1994-11-04 lttab.dtx v1.0h                                     |
| <code>\typeout</code> . ASAJ. . . . . 69                     | <code>\@mkpream</code> : (ASAJ) Added                          |
| Added commands for setting and                               | <code>\@unexpandable@protect</code> to                         |
| restoring <code>\protect</code> . ASAJ. . . . . 81           | <code>\@mkpream</code> . . . . . 545                           |
| Rewrote protected short commands                             | <code>\multicolumn</code> : (ASAJ) added                       |
| using <code>\x@protect</code> . ASAJ. . . . . 79             | <code>\set@typeset@protect</code> . . . . . 541                |
| 1994-11-04 lterror.dtx v1.2g                                 | 1994-11-04 ltxref.dtx v1.1d                                    |
| General: Added                                               | <code>\label</code> : (ASAJ) Added                             |
| <code>\set@display@protect</code> to                         | <code>\protected@edef</code> . . . . . 456                     |
| <code>\Generic*</code> commands. ASAJ. . . 160               | (ASAJ) Added <code>\protected@write</code> 456                 |
| 1994-11-04 ltfiles.dtx v1.0k                                 | 1994-11-05 ltboxes.dtx v1.0n                                   |
| <code>\nofiles</code> : Added setting of                     | <code>\@mpfootnotetext</code> : Colour resetting               |
| <code>\protected@write</code> , <code>\makeindex</code>      | for footnotes moved to                                         |
| and <code>\makeglossary</code> to <code>\nofiles</code> .    | <code>endminipage</code> : as for main page. . 522             |
| ASAJ. . . . . 199                                            | <code>\color@endbox</code> : macro added for                   |
| <code>\protected@write</code> : Macro added                  | colour support . . . . . 515                                   |
| ASAJ. . . . . 200                                            | <code>\color@hbox</code> : macro added for colour              |
| 1994-11-04 ltfloat.dtx v1.1b                                 | support . . . . . 515                                          |
| <code>\@footnotetext</code> : (ASAJ) Added                   | <code>\endminipage</code> : Colour resetting for               |
| <code>\protected@edef</code> . . . . . 619                   | footnotes moved to here: as for                                |
| <code>\footnotemark</code> : Added                           | main page. . . . . 522                                         |
| <code>\protected@xdef</code> to                              | 1994-11-05 ltboxes.dtx v1.0o                                   |
| <code>\footnotemark</code> . . . . . 619                     | <code>\@mpfootnotetext</code> : Colour groups                  |
| 1994-11-04 ltidxglo.dtx v1.1b                                | restored here. . . . . 522                                     |
| <code>\@wrglossary</code> : Added                            | 1994-11-05 ltfloat.dtx v1.1c                                   |
| <code>\protected@write</code> to                             | <code>\@dblflset</code> : Add compatibility with               |
| <code>\@wrglossary</code> . . . . . 623                      | old version of <code>\@xfloat</code> . . . . . 603             |
| <code>\@wrindex</code> : Added <code>\protected@write</code> | <code>\@endfloatbox</code> : Use new <code>\color@hbox</code>  |
| to <code>\@wrindex</code> . . . . . 622                      | concept. . . . . 609                                           |
| General: Removed <code>\if@files</code> from                 | <code>\@footnotetext</code> : Removed                          |
| <code>\makeindex</code> . . . . . 621                        | <code>\normalcolor</code> (again) . . . . . 619                |
| <code>\makeglossary</code> : Removed <code>\if@files</code>  | <code>\@savemarbox</code> : Use new <code>\color@hbox</code>   |
| from <code>\makeglossary</code> . . . . . 622                | concept. . . . . 613                                           |
| 1994-11-04 ltmiscen.dtx v1.0t                                | <code>\@setfps</code> : Add compatibility with old             |
| <code>\@writefile</code> : Removed setting of                | version of <code>\@xfloat</code> . . . . . 604                 |
| <code>\protect</code> . ASAJ. . . . . 465                    | <code>\@xfloat</code> : Add compatibility with old             |
| 1994-11-04 ltoutenc.dtx v1.6f                                | version of <code>\@xfloat</code> : but the                     |
| General: Added <code>\_</code> . . . . . 227                 | arguments, provided at exorbitant                              |
| Added <code>\mathunderscore</code> . . . . . 228             | cost, are now completely ignored 604                           |
|                                                              | Use new <code>\color@hbox</code> concept. . . 605              |



|                                                                                                                            |     |                                                                                                                                                          |     |
|----------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <code>\@xympar</code> : Use new <code>\color@hbox</code> concept. . . . .                                                  | 613 | (DPC) reduce save stack usage latex/1742 . . . . .                                                                                                       | 291 |
| 1994-11-05 ltoutenc.dtx v1.6g                                                                                              |     | 1994-11-10 ltbibl.dtx v1.1c                                                                                                                              |     |
| General: Added setting of <code>\@typeset@protect</code> to <code>\patterns</code> and <code>\hyphenation</code> . . . . . | 224 | General: Fix <code>\nocite{*}</code> . . . . .                                                                                                           | 624 |
| 1994-11-05 ltoutput.dtx v1.1b                                                                                              |     | <code>\nocite</code> : Fix <code>\nocite{*}</code> . . . . .                                                                                             | 626 |
| <code>\@topnewpage</code> : Use new <code>\color@hbox</code> concept. . . . .                                              | 733 | 1994-11-10 ltmath.dtx v1.2v classes                                                                                                                      |     |
| <code>\@writsetup</code> : Change protect settings for new-style, protect-free aux-files. . . . .                          | 744 | <code>eqnarray</code> : Added value of <code>\parskip</code> to <code>\abovedisplayskip</code> to compensate for negative <code>\topsep</code> . . . . . | 494 |
| Use new <code>\color@hbox</code> concept. . . . .                                                                          | 744 | 1994-11-10 ltoutput.dtx v1.1e                                                                                                                            |     |
| 1994-11-05 ltoutput.dtx v1.1c                                                                                              |     | <code>\@writsetup</code> : Modify <code>\protect</code> setting . . . . .                                                                                | 744 |
| <code>\@beginDvi</code> : Added macro . . . . .                                                                            | 748 | 1994-11-10 ltplain.dtx v1.1b                                                                                                                             |     |
| <code>\@beginDvibox</code> : Added macro . . . . .                                                                         | 729 | General: (CAR) added patch to <code>\loop</code> . . . . .                                                                                               | 14  |
| <code>\@writsetup</code> : Add new <code>\AtBeginDvi</code> concept . . . . .                                              | 744 | <code>\iterate</code> : (CAR) added extra <code>\relax</code> . . . . .                                                                                  | 28  |
| <code>\AtBeginDvi</code> : Added macro . . . . .                                                                           | 729 | 1994-11-11 ltspace.dtx v1.2a                                                                                                                             |     |
| 1994-11-06 ltfssbas.dtx v2.1u                                                                                              |     | <code>\:</code> (DPC) Make robust . . . . .                                                                                                              | 176 |
| <code>\cf@encoding</code> : New macro . . . . .                                                                            | 277 | 1994-11-12 ltfntcmd.dtx v3.3o                                                                                                                            |     |
| <code>\DeclareFixedFont</code> : Renamed <code>\every@size</code> to <code>\every@math@size</code> . . . . .               | 269 | <code>\normalsize</code> : Added <code>\MessageBreak</code> . . . . .                                                                                    | 421 |
| 1994-11-06 ltfssini.dtx v2.2b                                                                                              |     | 1994-11-12 ltlists.dtx v1.2b ltspace                                                                                                                     |     |
| <code>\@setsize</code> : Use <code>\@typeset@protect</code> . . . . .                                                      | 385 | <code>\endtrivlist</code> : Changed order of tests to make <code>\@noitemerror</code> correct: end of an era. . . . .                                    | 504 |
| 1994-11-06 ltfssrc.dtx v2.3k                                                                                               |     | 1994-11-12 ltmiscen.dtx v1.0u                                                                                                                            |     |
| <code>\glb@currsize</code> : New implementation . . . . .                                                                  | 317 | <code>center</code> : Changed end macro to <code>\def</code> : safer and consistent . . . . .                                                            | 472 |
| <code>\try@simples</code> : New implementation . . . . .                                                                   | 329 | <code>flushleft</code> : Changed end macro to <code>\def</code> : safer and consistent . . . . .                                                         | 473 |
| <code>\try@size@substitution</code> : New implementation . . . . .                                                         | 328 | <code>flushright</code> : Changed end macro to <code>\def</code> : safer and consistent . . . . .                                                        | 473 |
| <code>\tryis@simple</code> : New implementation . . . . .                                                                  | 329 | 1994-11-12 ltplain.dtx v1.1c                                                                                                                             |     |
| 1994-11-07 fontdef.dtx v2.2f                                                                                               |     | General: Comment out more encoding specific commands . . . . .                                                                                           | 29  |
| General: (DPC) Add <code>\DeclareMathSizes</code> declarations . . . . .                                                   | 396 | 1994-11-12 ltspace.dtx v1.2b                                                                                                                             |     |
| (DPC) Updated to use <code>\ProvidesFile</code> . . . . .                                                                  | 391 | <code>\addpenalty</code> : Corrected error message . . . . .                                                                                             | 184 |
| 1994-11-07 ltfiles.dtx v1.0l                                                                                               |     | <code>\addvspace</code> : Corrected error message . . . . .                                                                                              | 183 |
| <code>\@unused</code> : move here from ltdefs, remove duplicate <code>\@mainaux</code> . . . . .                           | 194 | 1994-11-13 ltspace.dtx v1.2c                                                                                                                             |     |
| 1994-11-07 ltfiles.dtx v1.0m                                                                                               |     | <code>\addpenalty</code> : Recorrected error message . . . . .                                                                                           | 184 |
| <code>\document</code> : Renamed <code>\every@size</code> to <code>\every@math@size</code> . . . . .                       | 195 | <code>\addvspace</code> : Recorrected error message . . . . .                                                                                            | 183 |
| 1994-11-07 preload.dtx v2.1e                                                                                               |     | 1994-11-14 ltoutput.dtx v1.1f                                                                                                                            |     |
| General: (DPC) Updated to use <code>\ProvidesFile</code> . . . . .                                                         | 410 | <code>\@beginDvi</code> : Use normal box register: why a box? . . . . .                                                                                  | 748 |
| 1994-11-09 ltboxes.dtx v1.0p                                                                                               |     | <code>\@beginDvibox</code> : Use normal box register: why a box? . . . . .                                                                               | 729 |
| <code>\@finalstrut</code> : Revert <code>\finalstrut</code> to 2.09 equivalent (from ltpatch) . . . . .                    | 525 | <code>\@writsetup</code> : Modify new <code>\AtBeginDvi</code> concept . . . . .                                                                         | 744 |
| General: more colour changes. . . . .                                                                                      | 512 | General: Removed old definition of <code>\@testfp</code> . . . . .                                                                                       | 717 |
| 1994-11-09 ltfssbas.dtx v2.1v                                                                                              |     | 1994-11-14 ltspace.dtx v1.2d                                                                                                                             |     |
| <code>\@vpt</code> : (DPC) macros added, from setsize.dtx . . . . .                                                        | 291 | <code>\:</code> (DPC) Macro modified . . . . .                                                                                                           | 176 |

|                                                                     |                                                                   |
|---------------------------------------------------------------------|-------------------------------------------------------------------|
| 1994-11-14 lttab.dtx v1.0i                                          | 1994-11-18 ltfsdcl.dtx v2.1m                                      |
| <code>\tabularnewline</code> : (DPC) Macro                          | <code>\DeclareMathDelimiter</code> : (DPC)                        |
| added . . . . . 540                                                 | <code>\expandafter</code> instead of <code>\next</code> . . 358   |
| 1994-11-16 fontdef.dtx v2.2h                                        | 1994-11-18 ltfsstrc.dtx v2.3m                                     |
| General: (DPC) Removed <code>\{</code> and <code>\}</code> 391      | General: <code>\next</code> to <code>\reserved@f</code> . . . 311 |
| 1994-11-17 ltboxes.dtx v1.0q                                        | 1994-11-18 ltmath.dtx v1.0p                                       |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 512   | <code>\phantom</code> : (DPC) colour support . . 482              |
| 1994-11-17 ltclass.dtx v1.0l                                        | (DPC) use <code>\expandafter</code> instead of                    |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 632   | <code>\next</code> . . . . . 482                                  |
| 1994-11-17 ltcntrl.dtx v1.0b                                        | <code>\prime@s</code> : (DPC) use <code>\@let@token</code>        |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 156   | instead of <code>\next</code> and                                 |
| 1994-11-17 ltdefs.dtx v1.0g                                         | <code>\expandafter</code> instead of <code>\nxt</code> . . 486    |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . . 69  | <code>\smash</code> : (DPC) colour support . . . . 483            |
| 1994-11-17 ltdirchk.dtx v1.0j                                       | (DPC) use <code>\expandafter</code> instead of                    |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . . . 1 | <code>\next</code> . . . . . 483                                  |
| 1994-11-17 ltterror.dtx v1.2h                                       | 1994-11-21 ltfloat.dtx v1.1f                                      |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 160   | <code>\@endfloatbox</code> : Added reset of                       |
| 1994-11-17 ltfiles.dtx v1.0n                                        | minipage flag . . . . . 609                                       |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 192   | Corrected position of                                             |
| 1994-11-17 ltfinal.dtx v1.0o                                        | <code>\outer@nobreak</code> . . . . . 609                         |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 792   | <code>\@marginparreset</code> : Macro added . . 613               |
| 1994-11-17 ltfloat.dtx v1.1e                                        | <code>\@savemarbox</code> : Added <code>\@setminipage</code>      |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 600   | etc . . . . . 613                                                 |
| 1994-11-17 ltfntcmd.dtx v3.3p                                       | Added resetting of size and font . . 613                          |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 413   | Changed to <code>\color@vbox</code> . . . . . 613                 |
| 1994-11-17 ltfsbas.dtx v2.1w                                        | Use <code>\@setnobreak</code> etc . . . . . 613                   |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 267   | <code>\@setminipage</code> : Macro added . . . . . 607            |
| 1994-11-17 ltfsdcl.dtx v2.1m                                        | <code>\@setnobreak</code> : Macro added . . . . . 607             |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 339   | <code>\@xfloat</code> : Added <code>\@setminipage</code> . . 605  |
| 1994-11-17 ltfsstrc.dtx v2.3l                                       | Added resetting of size and font . . 605                          |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 311   | Changed to <code>\color@vbox</code> so that                       |
| 1994-11-17 ltmath.dtx v1.0o                                         | large floats overflow at the                                      |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 480   | bottom . . . . . 605                                              |
| 1994-11-17 ltmiscen.dtx v1.0v                                       | Missing percents reinserted after 4,                              |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 459   | 8: these are not numbers. . . . . 604                             |
| 1994-11-17 ltoutenc.dtx v1.6h                                       | Use <code>\@setnobreak</code> . . . . . 605                       |
| General: (DPC) <code>\@tempa</code> to                              | <code>\@xympar</code> : Changed to <code>\color@vbox</code> 613   |
| <code>\reserved@a</code> . . . . . 212                              | 1994-11-21 ltoutput.dtx v1.1i                                     |
| 1994-11-17 ltoutput.dtx v1.1h                                       | <code>\@addtocurcol</code> : Added <code>\if@nobreak</code>       |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 717   | test before float box . . . . . 758, 762                          |
| 1994-11-17 ltpictur.dtx v1.0f                                       | <code>\@specialoutput</code> : Added <code>\if@nobreak</code>     |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 551   | test . . . . . 737                                                |
| 1994-11-17 ltsect.dtx v1.0i                                         | <code>\@topnewpage</code> : Changed to                            |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 587   | <code>\color@vbox</code> . . . . . 733                            |
| 1994-11-17 lttab.dtx v1.0j                                          | 1994-11-22 ltfsdcl.dtx v2.1o                                      |
| General: <code>\@tempa</code> to <code>\reserved@a</code> . . 526   | General: wrap long lines . . . . . 339                            |
| 1994-11-18 ltboxes.dtx v1.0r                                        | 1994-11-22 ltoutenc.dtx v1.6i                                     |
| <code>\color@vbox</code> : macro added for colour                   | General: Corrected <code>\dots</code> so that                     |
| support . . . . . 515                                               | there's no kerning in monowidth                                   |
| 1994-11-18 ltfinal.dtx v1.0n                                        | fonts. . . . . 212                                                |
| General: re-allow slots 127–255 . . . . 802                         | Corrected typo with                                               |
| 1994-11-18 ltfsbas.dtx v2.1x                                        | <code>\mathunderscore</code> . . . . . 212                        |
| General: (DPC) use <code>\reserved@f</code> not                     | Fixed empty accents. Again. . . . 212                             |
| <code>\next</code> . . . . . 267                                    |                                                                   |



|                                       |     |                                     |     |
|---------------------------------------|-----|-------------------------------------|-----|
| 1994-11-24 ltdefs.dtx v1.2h           |     | argument containing lots of         |     |
| \@newenv: Added test for \endgraf ..  | 76  | commands. ....                      | 218 |
| 1994-11-25 ltplain.dtx v1.1f          |     | 1994-12-01 ltfinal.dtx v1.0p        |     |
| General: (DPC) Comment out lots of    |     | General: Renamed lthyphen.* to      |     |
| obsolete code .....                   | 14  | hyphen.*. ....                      | 792 |
| 1994-11-26 ltfloat.dtx v1.1b          |     | 1994-12-01 lthyphen.dtx v1.0g       |     |
| \footnote: (ASAJ) Added               |     | General: Rename lthyphen.ltx/cfg to |     |
| \protected@xdef. ....                 | 619 | hyphen.ltx/cfg .....                | 790 |
| 1994-11-28 ltcntrl.dtx v1.0c          |     | 1994-12-01 ltplain.dtx v1.1g        |     |
| General: Documentation                |     | General: (DPC) More doc changes ..  | 14  |
| improvements .....                    | 156 | 1994-12-02 fontdef.dtx v2.2i        |     |
| 1994-11-30 ltfiles.dtx v1.0o          |     | General: Commented out \ldots.      |     |
| \@dofilelist: Macro added .....       | 211 | ASAJ. ....                          | 389 |
| \listfiles: Use \@dofilelist ...      | 210 | 1994-12-02 ltssini.dtx v2.2c        |     |
| \nofiles: There is no                 |     | \copyright: \copyright is now in    |     |
| \@gobblethree... ..                   | 199 | ltoutenc. ASAJ .....                | 386 |
| 1994-11-30 ltssbas.dtx v2.1y          |     | 1994-12-02 ltlists.dtx v1.0e        |     |
| \fontshape: Use \@current@cmd in      |     | \@trivlist: RmS: Added check for    |     |
| \@enc@update. ASAJ. ....              | 276 | looping .....                       | 503 |
| 1994-11-30 ltmath.dtx 1.0q            |     | 1994-12-02 ltoutenc.dtx 1.7b        |     |
| General: ASAJ:                        |     | General: Redefined \a properly. ... | 224 |
| \DeclareMathOperator moved to         |     | 1994-12-02 ltoutenc.dtx v1.7b       |     |
| AMS <sub>La</sub> TeX. ....           | 480 | General: Fixed a bug with \a. ....  | 212 |
| 1994-11-30 ltmiscen.dtx v1.0w         |     | 1994-12-04 lthyphen.dtx v1.0h       |     |
| \@enddocument@kernel@warnings:        |     | General: Documentation edits for    |     |
| (DPC) Do warnings even for            |     | /1989 .....                         | 790 |
| \nofiles .....                        | 461 | 1994-12-05 ltoutenc.dtx v1.7c       |     |
| \@enddocument: (DPC) Use              |     | General: Added braces to            |     |
| \@dofilelist .....                    | 461 | \textcircled. ....                  | 212 |
| 1994-11-30 ltoutenc.dtx 1.7a          |     | 1994-12-06 ltssbas.dtx v2.1z        |     |
| General: Redefined \a for the new     |     | \DeclareFontEncoding: use           |     |
| scheme. ....                          | 224 | \nfss@catcodes .....                | 271 |
| 1994-11-30 ltoutenc.dtx v1.6g         |     | \nfss@catcodes: Added tab char as   |     |
| General: Removed new definitions of   |     | well .....                          | 281 |
| \patterns and \hyphenation,           |     | 1994-12-08 ltoutenc.dtx v1.7d       |     |
| since encoding-specific commands      |     | General: Added \null and \sh@ft to  |     |
| now expand in the mouth. ....         | 224 | \b and \d. ....                     | 212 |
| 1994-11-30 ltoutenc.dtx v1.7a         |     | 1994-12-08 lttab.dtx v1.0k          |     |
| General: Added new code for           |     | \@array: Add \tabularnewline ...    | 539 |
| encoding-specific commands.           |     | \@tabularnewline: (DPC) Made it     |     |
| These now expand in the mouth,        |     | \relax .....                        | 540 |
| which means that ligaturing and       |     | 1994-12-09 ltbibl.dtx v1.1d         |     |
| kerning can happen. ....              | 212 | \bibliographystyle: (DPC) Allow     |     |
| Always load the enc.def file, so that |     | use in preamble. ....               | 626 |
| the default encoding for the          |     | 1994-12-10 ltfloat.dtx v1.1g        |     |
| commands will change. ....            | 254 | \@dblfloat: Old version reinstated  |     |
| Redefined \@changed@cmd to expand     |     | temporarily .....                   | 603 |
| in the mouth. ....                    | 216 | \@dblflset: Macro removed           |     |
| Removed \@changed@x@mouth since       |     | temporarily .....                   | 603 |
| \@changed@x now expands in the        |     | Old version reinstated temporarily  | 603 |
| mouth. ....                           | 216 | \@setfps: Macro removed             |     |
| Rewrote \@text@composite so it        |     | temporarily .....                   | 604 |
| allows an empty argument, or an       |     | \@xdblfloat: Macros reinserted      |     |
|                                       |     | temporarily .....                   | 609 |

|                                                                                                                                                                                                                                                                             |     |                                                                                                  |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------|-----|
| <code>\xfloat</code> : Old version reinstated temporarily . . . . .                                                                                                                                                                                                         | 604 | 1995-04-21 <code>ltclass.dtx</code> v1.0m                                                        |     |
| Sanitisation added temporarily . .                                                                                                                                                                                                                                          | 604 | <code>\DeclareOption*</code> : Made long /1498                                                   | 644 |
| General: Some temps reinserted temporarily . . . . .                                                                                                                                                                                                                        | 600 | <code>\endfilecontents</code> : Close input check stream: latex/1487 . . . . .                   | 659 |
| <code>\fps@dbl</code> : Macro removed temporarily . . . . .                                                                                                                                                                                                                 | 604 | 1995-04-21 <code>ltfinal.dtx</code> v1.0q                                                        |     |
| 1994-12-10 <code>lftntcmd.dtx</code> v3.3q                                                                                                                                                                                                                                  |     | General: Allow initial patch level 0 .                                                           | 805 |
| <code>\@math@egroup</code> : Don't read arguments . . . . .                                                                                                                                                                                                                 | 420 | 1995-04-21 <code>ltoutenc.dtx</code> v1.7h                                                       |     |
| <code>\check@nocorr@</code> : Use <code>\space</code> command for comparison . . . . .                                                                                                                                                                                      | 417 | General: Added <code>\null \k</code> latex/1274                                                  | 212 |
| 1994-12-10 <code>lftssdcl.dtx</code> v2.1p                                                                                                                                                                                                                                  |     | 1995-04-22 <code>ltfiles.dtx</code> v1.0p                                                        |     |
| <code>\document@select@group</code> : Surround with braces (add fourth arg) . . .                                                                                                                                                                                           | 344 | <code>\includeonly</code> : Allow blanks in argument . . . . .                                   | 200 |
| <code>\select@group</code> : Surround with braces (add fourth arg) . . . . .                                                                                                                                                                                                | 342 | 1995-04-22 <code>ltmiscen.dtx</code> v1.0x                                                       |     |
| 1994-12-10 <code>ltoutenc.dtx</code> v1.7e                                                                                                                                                                                                                                  |     | General: Removed extra def of <code>\@gobble</code> . . . . .                                    | 459 |
| General: Added documentation for the OML encoding. . . . .                                                                                                                                                                                                                  | 212 | 1995-04-23 <code>ltsect.dtx</code> v1.0j                                                         |     |
| Replaced width with <code>\@width</code> and ditto height in vrules. . . . .                                                                                                                                                                                                | 212 | <code>\addcontentsline</code> : Use <code>\contentsline</code> internally. . . . .               | 596 |
| 1994-12-14 <code>ltoutenc.dtx</code> v1.7f                                                                                                                                                                                                                                  |     | 1995-04-24 <code>ltbibl.dtx</code> v1.1e                                                         |     |
| General: Added braces to <code>\copyright</code> so it works unbraced in subscripts. . . . .                                                                                                                                                                                | 212 | <code>\@citex</code> : Add <code>\mbox</code> to undefined case: latex/1239. . . . .             | 625 |
| Added check for math mode in <code>\@changed@cmd</code> . . . . .                                                                                                                                                                                                           | 212 | 1995-04-24 <code>ltbibl.dtx</code> v1.1f                                                         |     |
| Commented out <code>\textasciicircum</code> , <code>\textasciitilde</code> , <code>\textbackslash</code> , <code>\textbar</code> , <code>\textgreater</code> , <code>\textthyphenchar</code> , <code>\textthyphen</code> and <code>\textless</code> to save memory. . . . . | 212 | <code>\bibcite</code> : Make <code>\@onlypreamble</code> /1388. . . . .                          | 625 |
| 1995-01-12 <code>ltmath.dtx</code> v1.2y classes                                                                                                                                                                                                                            |     | 1995-04-24 <code>ltcntrl.dtx</code> v1.0d                                                        |     |
| <code>\@eqnnum</code> : Added <code>\normalcolor</code> . . .                                                                                                                                                                                                               | 492 | <code>\@for</code> : Dont expand second argument with <code>\edef</code> : /1317 (DPC) . . . . . | 159 |
| 1995-03-03 <code>ltoutenc.dtx</code> 1.7g                                                                                                                                                                                                                                   |     | 1995-04-24 <code>ltoutput.dtx</code> v1.1j                                                       |     |
| General: Corrected an error in documentation referring to the tabular rather than the tabbing environment. . . . .                                                                                                                                                          | 224 | <code>\fl@tracemessage</code> : Do not add to kernel unless 'trace' specified . . .              | 775 |
| 1995-04-02 <code>lftntcmd.dtx</code> v3.3r                                                                                                                                                                                                                                  |     | 1995-04-24 <code>ltoutput.dtx</code> v1.1l                                                       |     |
| <code>\@math@egroup</code> : Read them again to be able to add <code>\relax</code> . . . . .                                                                                                                                                                                | 420 | <code>\@begindivbox</code> : Add <code>\vbox</code> latex/1392 . . . . .                         | 729 |
| 1995-04-02 <code>lftssdcl.dtx</code> v2.1q                                                                                                                                                                                                                                  |     | <code>\@writsetup</code> : Reset <code>\@</code> latex/1451 (DPC) . . . . .                      | 745 |
| <code>\document@select@group</code> : fix problem for pr/1275 . . . . .                                                                                                                                                                                                     | 344 | 1995-04-24 <code>ltpage.dtx</code> v1.0f                                                         |     |
| <code>\select@group</code> : fix problem for pr/1275 . . . . .                                                                                                                                                                                                              | 342 | <code>\fussy</code> : reset <code>\emergencystretch</code> latex/1344 . . . . .                  | 631 |
| <code>\set@mathdelimiter</code> : fix pr/1329 . .                                                                                                                                                                                                                           | 361 | 1995-04-24 <code>ltplain.dtx</code> v1.1h                                                        |     |
| 1995-04-02 <code>lftssini.dtx</code> v2.2d                                                                                                                                                                                                                                  |     | <code>\newlanguage</code> : Remove remaining <code>\outer</code> declarations. . . . .           | 17  |
| <code>\not@math@alphabet</code> : add <code>\noexpand</code> to second part of message . . . . .                                                                                                                                                                            | 384 | 1995-04-24 <code>ltxref.dtx</code> v1.1e                                                         |     |
|                                                                                                                                                                                                                                                                             |     | <code>\newlabel</code> : Make <code>\@onlypreamble</code> for /1388. . . . .                     | 456 |
|                                                                                                                                                                                                                                                                             |     | 1995-04-25 <code>ltdefns.dtx</code> v1.2i                                                        |     |
|                                                                                                                                                                                                                                                                             |     | <code>\@check@c</code> : Make <code>\long</code> for latex/1346                                  | 77  |
|                                                                                                                                                                                                                                                                             |     | <code>\new@environment</code> : Parse arguments slowly but safely /1507 . . . . .                | 75  |
|                                                                                                                                                                                                                                                                             |     | 1995-04-25 <code>ltfiles.dtx</code> v1.0q                                                        |     |
|                                                                                                                                                                                                                                                                             |     | <code>\document</code> : Removed execution of <code>\every@size</code> latex/1407 . . . . .      | 195 |
|                                                                                                                                                                                                                                                                             |     | 1995-04-25 <code>ltsect.dtx</code> v1.0k                                                         |     |
|                                                                                                                                                                                                                                                                             |     | <code>\@dottedtocline</code> : Added <code>\hbox</code> around dots. . . . .                     | 598 |

|                                           |                                          |
|-------------------------------------------|------------------------------------------|
| 1995-04-27 ltboxes.dtx v1.0s              | 1995-05-07 ltplain.dtx v1.1j             |
| \@frameb@x: Move \leavevmode for          | General: Use \hb@xt@ . . . . . 14        |
| graphics/1512 . . . . . 518               | 1995-05-07 ltsect.dtx v1.0o              |
| \@iframebox: Move \leavevmode for         | General: Use \hb@xt@ . . . . . 587       |
| graphics/1512 . . . . . 518               | 1995-05-07 lttab.dtx v1.0l               |
| \@iirsbox: Move \leavevmode for           | General: Use \hb@xt@ . . . . . 526       |
| graphics/1512 . . . . . 524               | 1995-05-08 ltbibl.dtx v1.1g              |
| \@irsbox: Move \leavevmode for            | \@citex: Use \@firstofone . . . . . 625  |
| graphics/1512 . . . . . 524               | \bibitem: Removed unnecessary            |
| \fbbox: Move \leavevmode for              | braces . . . . . 625                     |
| graphics/1512 . . . . . 517               | \nocite: Use \@firstofone . . . . . 626  |
| \raisebox: Move \leavevmode for           | 1995-05-08 ltdefs.dtx v1.2k              |
| graphics/1512 . . . . . 524               | \typein: Use \@firstofone . . . . . 71   |
| 1995-04-27 ltfiles.dtx v1.0r              | 1995-05-08 ltdefs.dtx v1.2l              |
| \document: Added \global to support       | \typein: Remove unnecessary braces 71    |
| groups in hook . . . . . 196              | Replace \def by \let . . . . . 71        |
| 1995-04-27 ltmiscen.dtx v1.0y             | 1995-05-08 ltfstrc.dtx v2.3n             |
| \enddocument: \@checkend moved            | \ifnot@nil: Use \@firstofone . . . 323   |
| after hook . . . . . 460                  | 1995-05-11 fontdef.dtx v2.2j             |
| 1995-04-27 ltplain.dtx v1.1i              | General: Updates to some plain           |
| General: Move \hang and                   | macros . . . . . 389                     |
| \textindent to latex209.def . . . . 29    | 1995-05-12 ltclass.dtx v1.0n             |
| 1995-04-29 ltcntrl.dtx v1.0e              | \DeclareOption*: Use \toks@ to           |
| General: Moved init of \protect to        | remove need to double hash /1557 644     |
| ltdefs.dtx . . . . . 159                  | 1995-05-12 ltfloat.dtx v1.1h             |
| Removed unused defs for                   | \@footnotemark: Add \nobreak to          |
| \setprotect and                           | allow hyphenation. latex/1605 . . 620    |
| \resetprotect . . . . . 159               | 1995-05-12 ltpictur.dtx v1.0h            |
| 1995-04-29 ltdefs.dtx v1.2j               | \pictur@: Macro added for                |
| \protect: Init \protect here . . . . . 81 | latex/1355 . . . . . 553                 |
| 1995-04-29 ltpar.dtx v1.1b                | 1995-05-12 ltvers.dtx v1.0e              |
| General: (TO) Comments clean-up. 170      | General: Add autoload docstrip guards 34 |
| 1995-05-02 ltsect.dtx v1.0l               | Check for format older than 1 year 34    |
| \@dottedtocline: Don't reset to           | 1995-05-13 ltfstrc.dtx v2.3o             |
| \rmfamily . . . . . 598                   | General: Use single hash mark in         |
| 1995-05-03 ltsect.dtx v1.0m               | \DeclareOption . . . . . 312             |
| General: TO: Promoted                     | 1995-05-16 ltfloat.dtx v1.1i             |
| documentation to doc.sty                  | \@makefnmark: Now use                    |
| standard . . . . . 587                    | \textsuperscript. . . . . 617            |
| 1995-05-06 ltsect.dtx 1.0n                | \textsuperscript: Command                |
| \@secCNTformat: Use \quad instead of      | added./pr1503 . . . . . 617              |
| \hskip . . . . . 593                      | \thefootnote: Streamlined parts of       |
| \@sect: Added \relax after                | code. . . . . 617                        |
| \@secCNTformat just in case . . . 591     | 1995-05-17 ltboxes.dtx v1.0u             |
| 1995-05-07 ltboxes.dtx v1.0t              | \@irsbox: Removed surplus braces . 524   |
| General: Use \hb@xt@ . . . . . 512        | 1995-05-17 ltdefs.dtx v1.0o              |
| 1995-05-07 ltdefs.dtx v1.2k               | \g@addto@macro: Make long for            |
| \hb@xt@: Macro added . . . . . 70         | latex/1522 . . . . . 98                  |
| 1995-05-07 ltmath.dtx v1.0r               | 1995-05-17 ltlists.dtx v1.0g             |
| General: Use \hb@xt@ . . . . . 480        | \@item: Removed surplus braces . . . 507 |
| 1995-05-07 ltoutput.dtx v1.1m             | \@nbitem: Removed surplus braces . 508   |
| General: Use \hb@xt@. . . . . 717         | enumerate: Use \thr@@ and remove         |
| 1995-05-07 ltpictur.dtx v1.0g             | surplus braces . . . . . 509             |
| General: Use \hb@xt@ . . . . . 551        | itemize: Use \thr@@ . . . . . 510        |

|                                                                |     |                                                                |     |
|----------------------------------------------------------------|-----|----------------------------------------------------------------|-----|
| 1995-05-18 ltfloat.dtx v1.1j                                   |     | General: Moved definition of <code>\footins</code>             |     |
| <code>\@makefnmark</code> : Added <code>\normalfont</code> .   | 617 | and <code>\footnoterule</code> from <code>ltplain</code> .     | 617 |
| <code>\thempfootnote</code> : Added <code>\itshape</code> .    | 617 | <code>\textsuperscript</code> : Use                            |     |
| 1995-05-19 ltpictur.dtx v1.1a                                  |     | <code>\@textsuperscript</code>                                 | 617 |
| General: Support autoloading feature                           | 551 | 1995-05-24 ltfssbas.dtx v3.0a                                  |     |
| 1995-05-20 ltcounts.dtx v1.1b                                  |     | General: (DPC) Make file from                                  |     |
| <code>\@definecounter</code> : Streamlined code                | 259 | previous file, <code>fam.dtx</code> 1995/05/20                 |     |
| <code>\@fnsymbol</code> : Allowing both text and               |     | v2.2d                                                          | 267 |
| math                                                           | 262 | <code>\mathgroup</code> : (DPC) No need to                     |     |
| <code>\fnsymbol</code> : Streamlined code                      | 261 | redefine <code>\newfam</code> as not outer                     | 267 |
| 1995-05-20 ltcounts.dtx v1.1c                                  |     | 1995-05-24 ltfsscmp.dtx v3.0a                                  |     |
| <code>\@definecounter</code> : And do it right                 | 259 | General: (DPC) Make file from                                  |     |
| 1995-05-20 ltfloat.dtx v1.1k                                   |     | previous file, <code>fam.dtx</code> 1995/05/20                 |     |
| <code>\@makefnmark</code> : Moved <code>\normalfont</code>     |     | v2.2d                                                          | 334 |
| back and use <code>\@textsuperscript</code>                    | 617 | 1995-05-24 ltfssdcl.dtx v3.0a                                  |     |
| Moved <code>\normalfont</code> to                              |     | General: (DPC) Make file from                                  |     |
| <code>\textsuperscript</code>                                  | 617 | previous file, <code>latint.dtx</code> 1995/05/21              |     |
| <code>\textsuperscript</code> : Use <code>\normalfont</code> . | 617 | v2.1t                                                          | 339 |
| 1995-05-21 ltfssdcl.dtx v2.1t                                  |     | 1995-05-24 ltfssini.dtx v3.0a                                  |     |
| <code>\DeclareMathRadical</code> : Allow for                   |     | General: (DPC) Make file from                                  |     |
| undefined cs names                                             | 361 | previous file, <code>lfonts.dtx</code> 1995/05/23              |     |
| 1995-05-21 ltlists.dtx v1.0f                                   |     | v2.2e                                                          | 366 |
| General: Moved to <code>doc.sty</code> standard                | 495 | <code>\cal</code> : (DPC) Remove definition                    | 388 |
| 1995-05-21 ltmath.dtx v1.0r                                    |     | <code>\mit</code> : (DPC) Remove definition                    | 388 |
| <code>\@sqrt</code> : Use <code>\sqrtsign</code>               | 489 | 1995-05-24 ltfsstrc.dtx v3.0a                                  |     |
| General: Remove <code>\mathhexbox</code> from                  |     | General: (DPC) Make file from                                  |     |
| this file                                                      | 485 | previous file, <code>tracefnt</code> 1995/05/16                |     |
| Update some plain macros                                       | 480 | v2.3o                                                          | 311 |
| <code>\lefteqn</code> : Use <code>\rlap</code>                 | 491 | 1995-05-24 ltfsstrc.dtx v3.0b                                  |     |
| <code>\r@@t</code> : Use <code>\sqrtsign</code> instead of     |     | General: (DPC) Fix <code>\ProvidesFile</code>                  |     |
| <code>\sqrt</code>                                             | 482 | usage                                                          | 311 |
| 1995-05-21 ltoutenc.dtx v1.7h                                  |     | 1995-05-25 ltclass.dtx v1.0p                                   |     |
| <code>\@inmathwarn</code> : Added several                      |     | <code>\endfilecontents</code> : Delete                         |     |
| <code>\@onlypreamble</code>                                    | 216 | <code>\filecontents</code> after preamble                      | 659 |
| 1995-05-21 ltoutenc.dtx v1.7j                                  |     | 1995-05-25 ltfilehook.dtx v1.0t                                |     |
| General: Updated some plain macros                             | 228 | <code>\InputIfFileExists</code> : (CAR) added                  |     |
| 1995-05-21 ltplain.dtx v1.1j                                   |     | <code>\long</code>                                             | 684 |
| General: Moved some code to other                              |     | 1995-05-25 ltfiles.dtx v1.0s                                   |     |
| files                                                          | 14  | <code>\document</code> : Added check for <code>\topskip</code> |     |
| 1995-05-22 ltplain.dtx v1.1k                                   |     | zero                                                           | 196 |
| General: Definitions of <code>\footins</code> and              |     | 1995-05-25 ltfiles.dtx v1.0t                                   |     |
| <code>\footnoterule</code> moved to <code>ltfloat</code> .     | 31  | <code>\@iffilenamepath</code> : (CAR) added <code>\long</code> | 206 |
| 1995-05-22 lttab.dtx v1.1a                                     |     | <code>\document</code> : Corrected typo                        | 196 |
| General: Support autoloading feature                           | 526 | <code>\IfFileExists@</code> : (CAR) added <code>\long</code>   | 205 |
| 1995-05-23 ltfssini.dtx v2.2e                                  |     | <code>\nofiles</code> : (CAR) added <code>\long</code>         | 199 |
| <code>\newfont</code> : Font assignment made local             |     | <code>\protected@write</code> : (CAR) added                    |     |
| again.                                                         | 384 | <code>\long</code>                                             | 200 |
| 1995-05-24 ltdefns.dtx v1.1l                                   |     | 1995-05-25 ltfloat.dtx v1.1m                                   |     |
| <code>\newif</code> : (DPC) New implementation                 | 76  | <code>\@savemarbox</code> : (CAR) Resettings                   |     |
| 1995-05-24 ltdefns.dtx v1.2m                                   |     | moved to hook                                                  | 613 |
| <code>\typein</code> : (DPC) New implementation                | 71  | <code>\@xfloat</code> : (CAR) Resettings moved to              |     |
| 1995-05-24 ltfloat.dtx v1.1l                                   |     | hook                                                           | 605 |
| <code>\@textsuperscript</code> : Command                       |     |                                                                |     |
| added.                                                         | 617 |                                                                |     |

|                                                               |                                                               |
|---------------------------------------------------------------|---------------------------------------------------------------|
| 1995-05-25 ltlists.dtx v1.0i                                  | 1995-06-09 ltoutenc.dtx v1.7l                                 |
| <code>\endtrivlist</code> : Macros moved from                 | <code>\DeclareTextComposite</code> : Rewrote                  |
| ltspace.dtx ..... 504                                         | <code>\DeclareTextComposite</code> to define                  |
| 1995-05-25 ltmath.dtx v1.3c classes                           | the composite as a no-argument                                |
| <code>\@eqnnum</code> : replace                               | command rather than a                                         |
| <code>\reset@font\rmfamily</code> with                        | two-argument command. .... 219                                |
| <code>\normalfont</code> (PR 1578) ..... 492                  | 1995-06-11 ltspace.dtx v1.2g                                  |
| 1995-05-25 ltspace.dtx v1.2f                                  | <code>\restorecr</code> : (CAR) <code>\relax</code> added to  |
| <code>\vbsphack</code> : (CAR) not used so                    | stop silent eating of *. .... 190                             |
| ‘removed’. .... 182                                           | 1995-06-13 ltfinal.dtx v1.0t                                  |
| <code>\vspacer</code> : (CAR) <code>\@restorepar</code>       | General: Add patch level string more                          |
| added to avoid possible infinite tail                         | carefully ..... 805                                           |
| recursion caused by a typo in the                             | Call <code>\errorstopmode</code> ..... 806                    |
| argument. .... 185                                            | 1995-06-13 ltpictur.dtx v1.1b                                 |
| (CAR) macros modified to be more                              | General: Use <code>\ProvidesFile</code> in                    |
| efficient ..... 185                                           | autoload ..... 551                                            |
| General: Macros moved to ltlists.dtx 172                      | 1995-06-14 lttab.dtx v1.1b                                    |
| 1995-05-26 ltdefns.dtx v1.2n                                  | General: Use <code>\ProvidesFile</code> in                    |
| <code>\gobblefour</code> : (CAR) Added <code>\longs</code> 78 | autoload ..... 526                                            |
| 1995-05-26 ltmath.dtx v1.0s                                   | 1995-06-15 ltfssbas.dtx v3.0c                                 |
| <code>\@eqnnum</code> : Removed <code>\rmfamily</code> (PR    | General: (DPC) minor documentation                            |
| 1578), replaced <code>\reset@font</code> with                 | changes ..... 267                                             |
| <code>\normalfont</code> ..... 489                            | 1995-06-15 ltfsscnp.dtx v3.0b                                 |
| 1995-05-26 ltpage.dtx v1.0g                                   | General: (DPC) minor documentation                            |
| <code>\ps@plain</code> : removed <code>\rmfamily</code> (PR   | edits ..... 334                                               |
| 1578) ..... 629                                               | 1995-06-15 ltfssdcl.dtx v3.0b                                 |
| 1995-05-27 ltfssbas.dtx v3.0b                                 | General: (DPC) minor documentation                            |
| <code>\mathgroup</code> : (FMi) But a need to                 | changes ..... 339                                             |
| define <code>\new@mathgroup</code> ..... 267                  | 1995-06-19 ltbibl.dtx v1.1h                                   |
| 1995-06-05 fontdef.dtx v2.2k                                  | <code>\bibcite</code> : Call <code>\@newl@bel</code> so       |
| General: Moved math commands from                             | repeated keys produce better                                  |
| ltoutenc.dtx. .... 407                                        | warning. .... 625                                             |
| 1995-06-05 ltfinal.dtx v1.0r                                  | 1995-06-19 ltclass.dtx v1.0q                                  |
| General: Added <code>\MakeUppercase</code> and                | <code>\documentclass</code> : Dont redefine                   |
| <code>\MakeLowercase</code> . .... 792                        | <code>\usepackage</code> in compat mode for                   |
| 1995-06-05 ltoutenc.dtx v1.7k                                 | /1634 ..... 647                                               |
| <code>\@inmathwarn</code> : Removed                           | 1995-06-19 ltxref.dtx v1.1e                                   |
| <code>\protected@cmd</code> and replaced with                 | <code>\newlabel</code> : Use <code>\@newl@bel</code> to share |
| explicit <code>\noexpand</code> . .... 216                    | code with <code>\bibcite</code> ..... 456                     |
| General: Allowed                                              | 1995-06-28 ltfssini.dtx v3.0b                                 |
| <code>\ProvideTextCommandDefault</code>                       | General: (DPC) Fix documentation                              |
| after the preamble. .... 218                                  | typos ..... 366                                               |
| Commented out <code>\textless</code> and                      | 1995-06-28 ltmath.dtx v1.0t                                   |
| <code>\textgreater</code> . .... 226                          | General: minor doc edits ..... 480                            |
| Moved math commands to                                        | 1995-07-02 ltplain.dtx v1.1n                                  |
| fontdef.dtx. .... 228                                         | General: Removed surplus ‘by’ and ‘=’                         |
| Save some tokens in                                           | in various places ..... 14                                    |
| <code>\textvisiblespace</code> and                            | <code>\offinterlineskip</code> : Replaced 1000 by             |
| <code>\textunderscore</code> . .... 226                       | <code>\@m</code> ..... 28                                     |
| 1995-06-06 ltfinal.dtx v1.0s                                  | <code>\showoutput</code> : Use <code>\showoverfull</code> to  |
| General: Made <code>\MakeUppercase</code> and                 | save space ..... 31                                           |
| <code>\MakeLowercase</code> brace their                       | <code>\tracingall</code> : Use <code>\showoutput</code> to    |
| argument. .... 792                                            | save space ..... 31                                           |

|                                                                                                                             |                                                                                                                         |     |
|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----|
| 1995-07-03 ltdefs.dtx v1.2o                                                                                                 | Shorten redefinition of <code>\bibtex</code> and <code>\newlabel</code> . . . . .                                       | 461 |
| <code>\set@typeset@protect</code> : Use <code>\@typeset@protect</code> for init . . . . .                                   | 1995-07-14 ltbibl.dtx v1.1i                                                                                             |     |
| 1995-07-03 ltfntcmd.dtx v3.3s                                                                                               | <code>\bibtex</code> : Remove <code>\@onlypreamble</code> so still defined in new <code>\enddocument</code> . . . . .   | 625 |
| <code>\t@st@ic</code> : Use clean interface for jump . . . . .                                                              | 1995-07-14 ltxref.dtx v1.1g                                                                                             |     |
| 1995-07-05 ltfntcmd.dtx v3.3s                                                                                               | <code>\newlabel</code> : Remove <code>\@onlypreamble</code> so still defined in new <code>\enddocument</code> . . . . . | 456 |
| <code>\t@st@ic</code> : Renamed from <code>\test@next</code> . . . . .                                                      | 1995-07-19 ltfssini.dtx v3.0d                                                                                           |     |
| 1995-07-05 ltspc.dtx v1.2h                                                                                                  | General: (DPC) TeX2 support . . . . .                                                                                   | 387 |
| <code>\@gnewline</code> : Use <code>\break</code> . . . . .                                                                 | 1995-07-20 ltboxes.dtx v1.0v                                                                                            |     |
| <code>\@no@pgbk</code> : Macro replaces <code>\@pgbk</code> and <code>\@nopgbk</code> . . . . .                             | <code>\@isavebox</code> : Use <code>\sbox</code> . . . . .                                                              | 516 |
| <code>\nopagebreak</code> : Reimplemented both using <code>\@no@pgbk</code> . . . . .                                       | <code>\@isavepicbox</code> : Use <code>\sbox</code> . . . . .                                                           | 516 |
| 1995-07-09 ltcntrl.dtx v1.0f                                                                                                | 1995-07-21 ltoutput.dtx v1.1o                                                                                           |     |
| <code>\@iforloop</code> : Reimplemented using Kabschacht method . . . . .                                                   | <code>\@writesetup</code> : Command added . . . . .                                                                     | 744 |
| <code>\@iwhiledim</code> : Reimplemented using Kabschacht method . . . . .                                                  | New, experimental, versions: need in-lining . . . . .                                                                   | 744 |
| <code>\@iwhilenum</code> : Reimplemented using Kabschacht method . . . . .                                                  | 1995-08-09 ltmath.dtx v1.0u                                                                                             |     |
| <code>\@iwhiles</code> : Reimplemented using Kabschacht method . . . . .                                                    | General: Added code for class options <code>leqno</code> and <code>fleqn</code> . . . . .                               | 492 |
| <code>\@tfor</code> : Reimplemented using Kabschacht method . . . . .                                                       | 1995-08-11 ltlength.dtx v1.1b                                                                                           |     |
| 1995-07-09 ltlists.dtx v1.0j                                                                                                | General: Doc typos fixed for <code>latex/753</code> . . . . .                                                           | 265 |
| <code>enumerate</code> : Use <code>\expandafter</code> . . . . .                                                            | 1995-08-16 ltcntrl.dtx v1.0g                                                                                            |     |
| <code>itemize</code> : Use <code>\expandafter</code> . . . . .                                                              | <code>\@break@tfor</code> : Made long . . . . .                                                                         | 159 |
| 1995-07-12 ltpictur.dtx v1.1d                                                                                               | <code>\@forloop</code> : Made defs long . . . . .                                                                       | 159 |
| General: allow 2e commands in 209 mode. <code>latex/1737</code> . . . . .                                                   | <code>\@fornoop</code> : Made defs long . . . . .                                                                       | 159 |
| 1995-07-13 ltdefs.dtx v1.0p                                                                                                 | <code>\@iforloop</code> : Made defs long . . . . .                                                                      | 159 |
| General: Updates to documentation . . . . .                                                                                 | <code>\@iwhiledim</code> : Made defs long . . . . .                                                                     | 157 |
| 1995-07-13 ltfiles.dtx v1.0u                                                                                                | Removed <code>\@whilenoop</code> . . . . .                                                                              | 157 |
| General: Updates to docu . . . . .                                                                                          | <code>\@iwhilenum</code> : Made defs long . . . . .                                                                     | 157 |
| 1995-07-13 ltfssbas.dtx v3.0d                                                                                               | Removed <code>\@whilenoop</code> . . . . .                                                                              | 157 |
| <code>\@@defaultsubs</code> : macro added . . . . .                                                                         | <code>\@iwhiles</code> : Removed                                                                                        |     |
| <code>\@defaultsubs</code> : macro added . . . . .                                                                          | <code>\@whilesnoop</code> . . . . .                                                                                     | 157 |
| General: minor documentation changes . . . . .                                                                              | <code>\@tfor</code> : Made defs long . . . . .                                                                          | 159 |
| <code>\wrong@fontshape</code> : Change a macro not a switch to flag default font substitutions . . . . .                    | 1995-08-16 ltfiles.dtx v1.0v                                                                                            |     |
| 1995-07-13 ltmiscen.dtx v1.0z                                                                                               | <code>\document</code> : set <code>\@maxdepth</code> . . . . .                                                          | 196 |
| <code>\@centercr</code> : Use <code>\nobreak</code> . . . . .                                                               | set <code>\do</code> globally . . . . .                                                                                 | 196 |
| <code>\@enddocument@kernel@warnings</code> : Use <code>\@defaultsubs</code> instead of switch . . . . .                     | set <code>\topskip</code> globally . . . . .                                                                            | 196 |
| <code>\@writefile</code> : Added missing percent and use <code>\relax</code> in the THEN case . . . . .                     | 1995-08-24 ltfssbas.dtx v3.0f                                                                                           |     |
| <code>\@xobeysp</code> : Use <code>\nobreak</code> . . . . .                                                                | General: Added autoload code . . . . .                                                                                  | 267 |
| General: Improve Documentation . . . . .                                                                                    | 1995-08-24 ltfssstrc.dtx v3.0c                                                                                          |     |
| <code>\enddocument</code> : Set <code>\@setckpt</code> to <code>\@gobbletwo</code> instead of defining it by hand . . . . . | General: Macro <code>\gobble@font@spec</code> removed . . . . .                                                         | 323 |
|                                                                                                                             | <code>\tryis@simple</code> : . . . . .                                                                                  | 330 |
|                                                                                                                             | 1995-08-25 ltoutput.dtx v1.1p                                                                                           |     |
|                                                                                                                             | General: Support autoloading feature (FMI). . . . .                                                                     | 717 |
|                                                                                                                             | 1995-09-01 lterror.dtx v1.2i                                                                                            |     |
|                                                                                                                             | General: Add autoload support . . . . .                                                                                 | 160 |
|                                                                                                                             | 1995-09-01 ltplain.dtx v1.1m                                                                                            |     |
|                                                                                                                             | <code>\empty</code> : Use <code>\let</code> to save space . . . . .                                                     | 27  |
|                                                                                                                             | <code>\I</code> : Use <code>\let</code> to save space . . . . .                                                         | 26  |



|                                                                   |                                                                  |
|-------------------------------------------------------------------|------------------------------------------------------------------|
| 1995-09-14 ltplain.dtx v1.1o                                      | 1995-10-11 ltoutput.dtx v1.1r                                    |
| General: Moved <code>\multispan</code> to                         | <code>\clearpage</code> : Added a check so that it               |
| lttab.dtx . . . . . 14                                            | does not lose the argument of                                    |
| 1995-09-14 lttab.dtx v1.1c                                        | <code>\twocolumn[...]</code> . . . . . 730                       |
| <code>\cline</code> : (DPC) New implementation 549                | 1995-10-16 ltbibl.dtx v1.1j                                      |
| 1995-09-15 ltfssini.dtx v3.0e                                     | <code>\cite</code> : (DPC) Make robust . . . . . 625             |
| General: (DPC) Modify TeX2                                        | 1995-10-16 ltboxes.dtx v1.0w                                     |
| message . . . . . 387                                             | General: Clarify makebox description 512                         |
| 1995-09-19 ltmiscen.dtx v1.1a                                     | 1995-10-16 ltdefns.dtx v1.2u                                     |
| <code>\verb</code> : Put <code>\@noligs</code> after              | <code>\@ifstar</code> : (DPC) New                                |
| <code>\verbatim@font</code> where it belongs. 478                 | implementation, for /1910 . . . . . 95                           |
| 1995-10-01 ltfiles.dtx LaTeX2e                                    | <code>\new@command</code> : (DPC) Use <code>\@testopt</code>     |
| <code>\@addtofilelist</code> : Macro added . . . 210              | /1911 . . . . . 72                                               |
| 1995-10-02 ltdefns.dtx v1.2q                                      | <code>\new@environment</code> : (DPC) Use                        |
| <code>\@ifnch</code> : Use <code>\@let@token</code> for           | <code>\@testopt</code> /1911 . . . . . 75                        |
| internal/924, save <code>\reserved@e</code> . . 94                | <code>\typein</code> : (DPC) Use <code>\@testopt</code> /1911 71 |
| <code>\@ifnextchar</code> : Use <code>\@let@token</code> . . . 94 | 1995-10-16 ltfssini.dtx v3.0f                                    |
| <code>\@protected@testopt</code> : Macro added . 73               | <code>\reset@font</code> : Added <code>\relax</code> after       |
| <code>\@testopt</code> : Macro added . . . . . 73                 | <code>\usefont</code> , as the latter eats up                    |
| <code>\@xargdef</code> : New implementation,                      | spaces. . . . . 386                                              |
| using <code>\@test@opt</code> . . . . . 73                        | 1995-10-16 ltmath.dtx v1.0y                                      |
| 1995-10-03 fontdef.dtx v2.2l                                      | <code>\@yeqncr</code> : (DPC) Use <code>\@testopt</code>         |
| General: <code>\@@sqrt</code> from patch file for                 | /1911 . . . . . 490                                              |
| /1701 . . . . . 389                                               | <code>\sqrt</code> : (DPC) Make robust /1808 . . 489             |
| 1995-10-03 ltdefns.dtx v1.2r                                      | 1995-10-16 ltspace.dtx v1.2j                                     |
| <code>\typein</code> : Add missing <code>\@typein</code> for      | <code>\nolinebreak</code> : (DPC) Use <code>\@testopt</code>     |
| /1710 (from patch file) . . . . . 71                              | /1911 . . . . . 175                                              |
| 1995-10-03 ltpictur.dtx v1.1e                                     | <code>\nopagebreak</code> : (DPC) Use <code>\@testopt</code>     |
| General: New autoloader code . . . . . 551                        | /1911 . . . . . 175                                              |
| 1995-10-04 ltfssbas.dtx v3.0g                                     | 1995-10-16 ltthm.dtx v1.0g                                       |
| General: Modify autoloader code . . . . 267                       | General: Revert to previous                                      |
| 1995-10-04 ltfssstrc.dtx v3.0d                                    | <code>\newtheorem</code> behaviour . . . . . 583                 |
| General: (DPC) Modify autoloader                                  | 1995-10-17 ltclass.dtx v1.0r                                     |
| code . . . . . 311                                                | <code>\@providesfile</code> : Delay definition of                |
| 1995-10-04 lttab.dtx v1.1d                                        | <code>\ProvidesFile</code> till ltfinal . . . . . 643            |
| General: Modify autoloader support . 526                          | <code>\ProcessOptions*</code> : Reset                            |
| 1995-10-06 ltfiles.dtx v1.0w                                      | <code>\CurrentOption</code> for                                  |
| <code>\@missingfileerror</code> : Autoloader error 208            | graphics/1873 . . . . . 646                                      |
| 1995-10-09 lterror.dtx v1.2j                                      | 1995-10-17 ltdirchk.dtx v1.0l                                    |
| General: Modify autoloader support . 160                          | General: Modify initex version of                                |
| 1995-10-09 ltoutenc.dtx v1.7m                                     | <code>\ProvidesFile</code> . . . . . 4                           |
| <code>\@inmathwarn</code> : Autoloader error . . . . 217          | 1995-10-17 ltfinal.dtx v1.0v                                     |
| 1995-10-10 ltfssbas.dtx v3.0h                                     | <code>\@providesfile</code> : reset macro . . . . . 806          |
| <code>\showhyphens</code> : Use <code>\normalfont</code> and      | <code>\reserved@b</code> : reset here after the                  |
| make colour safe, and                                             | <code>\input</code> above . . . . . 805                          |
| autoloadable . . . . . 290                                        | 1995-10-17 ltplain.dtx v1.1s                                     |
| 1995-10-10 ltfssdcl.dtx v3.0c                                     | <code>\eject</code> : Move <code>\supereject</code> to compat    |
| <code>\non@alpherr</code> : (DPC) autoloader error                | file . . . . . 29                                                |
| message . . . . . 343                                             | 1995-10-17 lttab.dtx v1.1e                                       |
| 1995-10-10 ltplain.dtx v1.1r                                      | <code>\@cline</code> : (DPC) Use <code>\@multicnt</code> . . 549 |
| General: Autoloader tracing code . . . . 14                       | <code>\@multispan</code> : (DPC) Macro added. 549                |
| 1995-10-10 ltthm.dtx v1.0f                                        | 1995-10-19 ltfinal.dtx v1.0w                                     |
| General: Make <code>\newtheorem</code> ‘only                      | <code>\@filelist</code> : Move after <code>\reserved@a</code>    |
| preamble’ . . . . . 583                                           | setting:-) . . . . . 806                                         |

|                                                                                                                  |     |                                                                                                                                   |     |
|------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------|-----|
| 1995-10-20 ltbibl.dtx v1.1k                                                                                      |     | <code>\@setref</code> : Switch for redefined                                                                                      |     |
| <code>\@citex</code> : Removed redefined flag                                                                    | 625 | renamed                                                                                                                           | 456 |
| <code>\nocite</code> : Removed redefined flag                                                                    | 626 | <code>\if@multiplelabels</code> : Macro removed                                                                                   | 456 |
| 1995-10-20 ltclass.dtx v1.0s                                                                                     |     | 1995-10-25 ltalloc.dtx v1.1b                                                                                                      |     |
| <code>\@begindocumenthook</code> : Make setting conditional, for autoload version                                | 657 | General: General doc improvements                                                                                                 | 154 |
| 1995-10-20 ltfsbas.dtx v3.0i                                                                                     |     | 1995-10-25 ltfloat.dtx v1.1n                                                                                                      |     |
| General: (DPC) Modify autoload code, change <code>\undefined</code>                                              | 267 | <code>\@endfloatbox</code> : (CAR) macro added: to unify code for double and single versions                                      | 609 |
| 1995-10-20 ltfsstrc.dtx v3.0e                                                                                    |     | <code>\end@dblfloat</code> : (CAR) unify code for double and single versions                                                      | 608 |
| General: (DPC) Modify autoload code                                                                              | 311 | <code>\end@float</code> : (CAR) unify code for double and single versions                                                         | 607 |
| 1995-10-22 ltfsbas.dtx v3.0j                                                                                     |     | 1995-10-25 ltidxglo.dtx v1.1d                                                                                                     |     |
| General: (RmS) New size function macro <code>\genb@sfcnt</code> needs to be disabled at <code>\document.</code>  | 267 | General: Doc cleanup                                                                                                              | 621 |
| 1995-10-22 ltfsstrc.dtx v3.0f                                                                                    |     | 1995-10-25 ltsect.dtx v1.0q                                                                                                       |     |
| General: Added ‘genb’ and ‘sgenb’ size functions to support new DC font naming scheme.                           | 311 | <code>\subparagraphmark</code> : Use <code>\let</code> not <code>\def</code> to save space.                                       | 595 |
| 1995-10-23 lttab.dtx v1.1f                                                                                       |     | 1995-10-27 ltpictur.dtx v1.1f                                                                                                     |     |
| <code>\@settab</code> : (CAR)Ensure that <code>\@hightab</code> increases by at most one                         | 533 | General: Move initialisation to kernel from autoload file                                                                         | 578 |
| <code>\@startline</code> : (CAR)Ensure that <code>\@nxttabmar</code> is never larger than <code>\@hightab</code> | 531 | 1995-10-31 ltboxes.dtx v1.0x                                                                                                      |     |
| <code>\@poptabs</code> : (CAR)Ensure that <code>\@curtab</code> is never larger than <code>\@hightab</code>      | 534 | <code>\@finalstrut</code> : Add <code>\nobreak</code> in horizontal/1931                                                          | 525 |
| <code>\@tabbing</code> : (CAR)Make <code>\@hightab</code> consistently a local variable                          | 533 | 1995-11-01 fontdef.dtx v2.2m                                                                                                      |     |
| 1995-10-24 ltfiles.dtx v1.1a                                                                                     |     | General: add <code>\nfss@catcodes</code> for internal/1932                                                                        | 392 |
| <code>\document</code> : Removed multiplelabels switch                                                           | 195 | 1995-11-01 ltidirch.dtx v1.0n                                                                                                     |     |
| Removed redefined switch                                                                                         | 196 | General: Initialise <code>\@addtofilelist</code> to <code>\@gobble</code>                                                         | 4   |
| 1995-10-24 ltfsbas.dtx v3.0k                                                                                     |     | 1995-11-01 ltfinal.dtx v1.0x                                                                                                      |     |
| <code>\@@defaultsubs</code> : macro removed                                                                      | 286 | General: (DPC) Switch meaning of <code>\@addtofilelist</code> for cfg files                                                       | 797 |
| <code>\wrong@fontshape</code> : Make this code inline since it happens only here                                 | 285 | 1995-11-01 ltfsbas.dtx v3.0m                                                                                                      |     |
| 1995-10-24 ltmiscen.dtx v1.1b                                                                                    |     | <code>\DeclareFontShape@</code> : (DPC) Test for <code>\relax</code> not <code>\undefined</code> , internal/1933                  | 268 |
| <code>\@enddocument@kernel@warnings</code> : Changed logic for producing warning messages and removed switch     | 462 | 1995-11-01 ltfsini.dtx v3.0g                                                                                                      |     |
| Use <code>\@redefined</code> instead of switch                                                                   | 462 | General: (DPC) Switch meaning of <code>\@addtofilelist</code> for cfg files                                                       | 387 |
| 1995-10-24 ltxref.dtx v1.1h                                                                                      |     | 1995-11-02 ltfsbas.dtx v3.0n                                                                                                      |     |
| <code>\@multiplelabels</code> : Switch for multiplelabels removed                                                | 456 | <code>\wrong@fontshape</code> : (DPC) Remove extra space with <code>\string</code> for latex/1676                                 | 285 |
| <code>\@newl@bel</code> : Switch for multiplelabels replaced by inline code                                      | 456 | 1995-11-02 ltoutenc.dtx v1.7n                                                                                                     |     |
| <code>\@redefined</code> : Switch for redefined replaced                                                         | 455 | General: Changed internal name <code>\a</code> to <code>\@tabacckludge</code> to protect against redefinition by malicious users. | 224 |
|                                                                                                                  |     | 1995-11-07 ltlists.dtx v1.0k                                                                                                      |     |
|                                                                                                                  |     | <code>\@doendpe</code> : Enclosed <code>\setbox0</code> assignment by a group so that it leaves the contents of box 0 intact.     | 505 |



|                                                                                                                                                   |                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1995-11-07 ltoutenc.dtx v1.7o                                                                                                                     | 1995-11-29 ltoutenc.dtx v1.7t                                                                                                                                                                      |
| General: Added <code>\leavevmode</code> at start of <code>\c</code> , otherwise the output routine might be invoked within the macro. . . . . 228 | General: Added <code>\textasciicircum</code> , <code>\textasciitilde</code> , <code>\textbackslash</code> , <code>\textbar</code> , <code>\textgreater</code> and <code>\textless</code> . . . 232 |
| Changed <code>\char32</code> to <code>\@xxxii</code> (two tokens less). . . . . 229                                                               | Added <code>\textasciicircum</code> , <code>\textasciitilde</code> , <code>\textregistered</code> and <code>\texttrademark</code> . . . . . 226                                                    |
| Replaced octal number 27 by decimal number 23 to protect against the quote character being active. . . . . 229                                    | Added <code>\textbackslash</code> and <code>\textbar</code> . . . . . 225, 236                                                                                                                     |
| Replaced some 0's by <code>\z@</code> (faster). 229                                                                                               | Added <code>\textless</code> and <code>\textgreater</code> . . . . . 226, 237                                                                                                                      |
| 1995-11-10 ltoutput.dtx v1.1s                                                                                                                     | 1995-12-01 ltoutenc.dtx v1.7u                                                                                                                                                                      |
| <code>\@shipoutsetup</code> : Command removed 744                                                                                                 | General: Made <code>\SS</code> a Default, rather than having the default point to the OT1 definition. . . . . 226                                                                                  |
| <code>\@writesetup</code> : Command removed . 744                                                                                                 |                                                                                                                                                                                                    |
| In-lined . . . . . 744                                                                                                                            |                                                                                                                                                                                                    |
| 1995-11-14 ltclass.dtx v1.0t                                                                                                                      | 1995-12-04 ltspace.dtx v1.2k                                                                                                                                                                       |
| <code>\@unprocessedoptions</code> : Allow empty option . . . . . 658                                                                              | <code>\nobreakspace</code> : (Macro added . . . . 188                                                                                                                                              |
| <code>\loadwithoptions</code> : macro added . 648                                                                                                 | 1995-12-04 ltspace.dtx v1.2l                                                                                                                                                                       |
| <code>\LoadClassWithOptions</code> : macro added . . . . . 648                                                                                    | <code>\xobeysp</code> : (braces added to definition of tilde . . . . . 188                                                                                                                         |
| <code>\RequirePackageWithOptions</code> : macro added . . . . . 648                                                                               | 1995-12-04 preload.dtx v2.4e                                                                                                                                                                       |
| 1995-11-17 ltfssbas.dtx v3.0m                                                                                                                     | General: Ulrik Vieth. added 12pt OMS and OML preloads /1989 . 412                                                                                                                                  |
| <code>\@wrong@font@char</code> : (DPC) Macro added. latex/1676 . . . . . 286                                                                      | 1995-12-05 ltdefs.dtx 1.2w                                                                                                                                                                         |
| <code>\define@newfont</code> : Redefine <code>\typeout</code> latex/1676 . . . . . 279                                                            | <code>\@unexpandable@protect</code> : Removed <code>\unexpandable@noexpand</code> as never used. internal/1733 . . . . . 79                                                                        |
| <code>\@wrong@fontshape</code> : Support <code>\@wrong@font@char</code> latex/1676 . 285                                                          | 1995-12-05 ltfiles.dtx v1.1c                                                                                                                                                                       |
| 1995-11-17 ltoutenc.dtx v1.7p                                                                                                                     | <code>\document</code> : <code>\ignorespaces</code> added for latex/1933 . . . . . 196                                                                                                             |
| <code>\UseTextSymbol</code> : Support <code>\@wrong@font@char</code> latex/1676 . 221                                                             | 1995-12-05 ltfloat.dtx v1.1n                                                                                                                                                                       |
| 1995-11-18 ltoutenc.dtx v1.7q                                                                                                                     | <code>\@textsuperscript</code> : Use <code>\ensuremath</code> for latex/1984. . . . . 617                                                                                                          |
| <code>\UseTextSymbol</code> : Modify message slightly . . . . . 221                                                                               | 1995-12-05 ltoutenc.dtx v1.7v                                                                                                                                                                      |
| 1995-11-21 fontdef.dtx v2.2n                                                                                                                      | <code>\@inmathwarn</code> : Changed <code>\TextSymbolUnavailable</code> text . . 217                                                                                                               |
| General: Incorporate changed figures, as in plain.tex . . . . . 405                                                                               | 1995-12-06 ltfssbas.dtx v3.00                                                                                                                                                                      |
| 1995-11-27 ltfssbas.dtx v3.0n                                                                                                                     | <code>\nfss@catcodes</code> : Reset hat, for typeouts etc in fd files . . . . . 281                                                                                                                |
| <code>\nfss@catcodes</code> : Reset hash, for definitions in fd files . . . . . 281                                                               | 1995-12-07 ltbibl.dtx v1.1l                                                                                                                                                                        |
| 1995-11-28 ltfloat.dtx v1.1n                                                                                                                      | <code>\@citex</code> : Restored name of <code>\G@refundefinedtrue</code> . . . . . 625                                                                                                             |
| General: documentation fixes . . . . 600                                                                                                          | 1995-12-07 ltfloat.dtx v1.1m                                                                                                                                                                       |
| 1995-11-28 ltfsssrc.dtx v3.0g                                                                                                                     | <code>\@textsuperscript</code> : Move <code>\m@th</code> out of the <code>\ensuremath</code> for latex/1984. . . . . 617                                                                           |
| General: documentation fixes . . . . 311                                                                                                          | 1995-12-07 ltxref.dtx v1.1i                                                                                                                                                                        |
| 1995-11-28 ltoutenc.dtx v1.7r                                                                                                                     | <code>\@setref</code> : Switch for refundefined restored . . . . . 456                                                                                                                             |
| General: Added math mode checks to text commands. . . . . 216                                                                                     | <code>\G@refundefinedtrue</code> : Renamed (back) from <code>\G@refundefined</code> . . 455                                                                                                        |
| doc fixes . . . . . 212                                                                                                                           |                                                                                                                                                                                                    |
| Renamed <code>\@changed@x@err</code> to <code>\TextSymbolUnavailable</code> . . . . . 216                                                         |                                                                                                                                                                                                    |

|                                                                                                                                               |                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1995-12-11 ltoutenc.dtx v1.7w                                                                                                                 | 1996-05-21 ltoutenc.dtx v1.7y                                                                                                                                                                    |
| General: Modified <code>\copyright</code> . . . . . 226                                                                                       | General: Corrected error message (CAR) . . . . . 254                                                                                                                                             |
| 1995-12-13 ltdefs.dtx 1.2x                                                                                                                    | 1996-05-21 ltsect.dtx v1.0s                                                                                                                                                                      |
| <code>\-</code> : Documentation changed. . . . . 96                                                                                           | <code>\@sect:</code> (DPC) Added extra braces for internal/2148 . . . . . 591                                                                                                                    |
| 1996-01-10 ltfiles.dtx v1.1d                                                                                                                  | (DPC) Moved brace to allow commands like <code>\MakeUppercase</code> in 6th argument. Changed <code>\par</code> to <code>\endgraf</code> to allow non-long commands. internal/2148 . . . . . 591 |
| <code>\@iffilenamepath:</code> Change argument handling to not require doubled hash. latex/2024 . . . . . 206                                 | <code>\@ssect:</code> (DPC) Added extra braces for internal/2148 . . . . . 594                                                                                                                   |
| 1996-01-20 ltidxglo.dtx v1.1e                                                                                                                 | (DPC) Moved brace to allow commands like <code>\MakeUppercase</code> in 4th argument. Changed <code>\par</code> to <code>\endgraf</code> to allow non-long commands. internal/2148 . . . . . 594 |
| <code>\makeglossary:</code> Make no-op after use pr/2048 . . . . . 622                                                                        | 1996-05-23 ltoutenc.dtx v1.7z                                                                                                                                                                    |
| <code>\makeindex:</code> Make no-op after use pr/2048 . . . . . 622                                                                           | <code>\@strip@args:</code> <code>\expandafter</code> added to match other changes for latex/2133 . . . . . 221                                                                                   |
| 1996-01-20 ltspace.dtx v1.2m                                                                                                                  | <code>\add@accent:</code> macro added. latex/2133 . . . . . 218                                                                                                                                  |
| <code>\vspace:</code> Made robust . . . . . 185                                                                                               | <code>\DeclareTextAccent:</code> Reimplemented using <code>\add@accent</code> to save space latex/2133 . . . . . 218                                                                             |
| 1996-03-25 ltmath.dtx v1.1a                                                                                                                   | <code>\DeclareTextCompositeCommand:</code> Modified to cope with new <code>\add@accent</code> command: required removal of check for one argument-command . . . . . 219                          |
| <code>\@ensuredmath:</code> Macro added for amslatex/2104 . . . . . 492                                                                       | 1996-05-24 ltoutput.dtx v1.1t                                                                                                                                                                    |
| <code>\ensuremath:</code> Reimplement for amslatex/2104 . . . . . 491                                                                         | <code>\@specialoutput:</code> Check that <code>\@colroom</code> is less than <code>\vsize</code> , indicating that a float has been added . . . . . 735                                          |
| 1996-04-18 ltpage.dtx v1.0i                                                                                                                   | Cut-off point changed to <code>1.5\baselineskip</code> . . . . . 735                                                                                                                             |
| General: Improve documentation . . 628                                                                                                        | <code>\@topnewpage:</code> Cut-off point changed to <code>2.5\baselineskip</code> . . . . . 734                                                                                                  |
| 1996-04-22 ltmiscen.dtx v1.1c                                                                                                                 | 1996-05-25 ltoutput.dtx v1.1u                                                                                                                                                                    |
| General: Improve Documentation . . 459                                                                                                        | <code>\@specialoutput:</code> Correct the above check . . . . . 735                                                                                                                              |
| 1996-04-22 ltspace.dtx v1.2n                                                                                                                  | 1996-06-03 ltmiscen.dtx v1.1d                                                                                                                                                                    |
| General: Documentation Improvements . . . . . 172                                                                                             | <code>\@verbatim:</code> Exchanged the following two code lines so that <code>\dospecials</code> cannot reset the category code of characters handled by <code>\@noligs</code> . 474             |
| 1996-04-22 lttab.dtx v1.1g                                                                                                                    | General: Move setting of verbatim font and <code>\@noligs</code> . . . . . 459                                                                                                                   |
| <code>\@tabclassz:</code> (DPC) Extra <code>\hskip</code> keeps <code>tabcolsep</code> in empty columns internal/2122 . . . . . 546           | <code>\verb:</code> Put setting of verbatim font after <code>\dospecials</code> so that <code>\dospecials</code> cannot reset the                                                                |
| 1996-04-23 ltcounts.dtx v1.1d                                                                                                                 |                                                                                                                                                                                                  |
| General: Documentation improvements . . . . . 257                                                                                             |                                                                                                                                                                                                  |
| 1996-04-24 ltfiles.dtx v1.1e                                                                                                                  |                                                                                                                                                                                                  |
| <code>\document:</code> (DPC) Reset <code>\AtBeginDocument</code> eg for latex/1297 . . . . . 196                                             |                                                                                                                                                                                                  |
| 1996-05-08 ltfstsrc.dtx v3.0h                                                                                                                 |                                                                                                                                                                                                  |
| <code>\math@egroup:</code> Use <code>\bgroup</code> instead of <code>\begingroup</code> to match a kernel change made in 1994!! . . . . . 322 |                                                                                                                                                                                                  |
| 1996-05-09 ltfntcmd.dtx v3.3t                                                                                                                 |                                                                                                                                                                                                  |
| <code>\check@icr:</code> Default definitions added . . . . . 417                                                                              |                                                                                                                                                                                                  |
| 1996-05-17 fontdef.dtx v2.2o                                                                                                                  |                                                                                                                                                                                                  |
| General: <code>\@@sqrt</code> removed, at last . . . . . 389, 405                                                                             |                                                                                                                                                                                                  |
| 1996-05-17 ltfiles.dtx v1.1f                                                                                                                  |                                                                                                                                                                                                  |
| <code>\nofiles:</code> added <code>\write</code> to <code>\protected@write</code> for latex/2146 199                                          |                                                                                                                                                                                                  |
| 1996-05-18 ltoutenc.dtx v1.7x                                                                                                                 |                                                                                                                                                                                                  |
| General: Produce error if encoding not found. pr/2054 . . . . . 254                                                                           |                                                                                                                                                                                                  |

|                                                                                                                                              |     |                                                                                                                                                                                           |     |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| category code of characters<br>handled by <code>\@noligs</code> . . . . .                                                                    | 478 | <code>\nfss@catcodes</code> : omit <code>\relax</code> as not<br>needed . . . . .                                                                                                         | 281 |
| 1996-06-10 ltboxes.dtx v1.0y<br><code>\@parboxto</code> : (DPC) Changed<br><code>\endgraf</code> to <code>\@@par</code> . . . . .            | 519 | 1996-07-26 ltssdcl.dtx v3.0e<br><code>\init@restore@version</code> : Removed<br><code>\ifrestore@version</code> switch and<br>replaced by<br><code>\init@restore@version</code> . . . . . | 343 |
| 1996-06-10 ltsect.dtx v1.0t<br><code>\@sect</code> : (DPC) Changed <code>\endgraf</code> to<br><code>\@@par</code> . . . . .                 | 591 | 1996-07-26 ltfsstrc.dtx v3.0i<br><code>\init@restore@glb@settings</code> : macro<br>added replacing <code>\if@inmath</code><br>switch . . . . .                                           | 320 |
| <code>\@ssect</code> : (DPC) Changed <code>\endgraf</code> to<br><code>\@@par</code> . . . . .                                               | 594 | 1996-07-26 ltlists.dtx v1.0l<br><code>\@item</code> : Remove unnecessary <code>\global</code><br>before <code>\@minipage</code> ... . . . .                                               | 506 |
| 1996-06-13 ltdirchk.dtx v1.0r<br>General: documentation improvements<br>mainly from internal/2174 . . . . .                                  | 1   | Remove unnecessary <code>\global</code> before<br><code>\@nobreak</code> ... . . . .                                                                                                      | 507 |
| 1996-06-14 lttab.dtx v1.1h<br><code>\@tabclassz</code> : (DPC) Change<br>both <code>\z@skip</code> to 1sp for<br>latex/2160 . . . . .        | 546 | 1996-07-26 ltmath.dtx v1.1b<br>General: Removed <code>\global</code> before<br><code>\@ignoretrue</code> in various places. . .                                                           | 480 |
| 1996-06-22 ltspace.dtx v1.2o<br>General: Documentation of problems<br>added . . . . .                                                        | 172 | 1996-07-26 ltmiscen.dtx v1.1e<br><code>\@ignorefalse</code> : put <code>\global</code> into<br>definition . . . . .                                                                       | 460 |
| 1996-07-10 ltfinal.dtx v1.0y<br><code>\toks</code> : Free up memory from scratch<br>registers /2213 . . . . .                                | 805 | <code>\begin</code> : remove <code>\global</code> before<br><code>\@ignore</code> ... . . . .                                                                                             | 466 |
| 1996-07-19 ltoutenc.dtx v1.8a<br><code>\@strip@args</code> : Use char 0 not @ as<br>carrier for <code>\lowercase</code> /2197 . . .          | 221 | <code>\end</code> : remove <code>\global</code> before<br><code>\@ignore</code> ... . . . .                                                                                               | 469 |
| 1996-07-26 ltboxes.dtx v1.0z<br><code>\if@minipage</code> : put <code>\global</code> into<br>definition . . . . .                            | 521 | <code>\ignorespacesafterend</code> : user level<br>macro added . . . . .                                                                                                                  | 460 |
| 1996-07-26 ltclass.dtx v1.0u<br><code>\@classoptionslist</code> : made only<br>preamble . . . . .                                            | 636 | 1996-07-26 ltoutput.dtx v1.1v<br><code>\@testfp</code> : remove <code>\global</code> before<br><code>\@test</code> ... . . . .                                                            | 778 |
| <code>\@unusedoptionlist</code> : made only<br>preamble . . . . .                                                                            | 637 | <code>\@xtryfc</code> : remove <code>\global</code> before<br><code>\@test</code> ... . . . .                                                                                             | 752 |
| 1996-07-26 ltdefs.dtx v1.2y<br><code>\@reargdef</code> : third arg picked up by<br><code>\@yargdef</code> . . . . .                          | 74  | <code>\@ztryfc</code> : remove <code>\global</code> before<br><code>\@test</code> ... . . . .                                                                                             | 753 |
| <code>\@renew@command</code> : use <code>\noexpand</code><br>instead of <code>\string</code> . . . . .                                       | 75  | General: put <code>\global</code> into definition<br>remove <code>\global</code> before <code>\@test</code> ... .                                                                         | 727 |
| use <code>\relax</code> in place of empty arg . .                                                                                            | 75  | <code>\clearpage</code> : add number of missing<br>percents . . . . .                                                                                                                     | 730 |
| <code>\@renew@environment</code> : use <code>\relax</code> in<br>place of empty arg . . . . .                                                | 76  | 1996-07-26 ltplain.dtx v1.1t<br><code>\sh@ft</code> : replace <code>\dimen\z@</code> by <code>\dimen@</code>                                                                              | 30  |
| 1996-07-26 ltfloat.dtx v1.1n<br><code>\@endfloatbox</code> : remove unnecessary<br><code>\global</code> before <code>\@minipage</code> ... . | 609 | 1996-07-26 ltsect.dtx v1.0u<br><code>\@starttoc</code> : removed <code>\global</code> before<br><code>\@nobreak</code> ... . . . .                                                        | 596 |
| <code>\@savemarbox</code> : remove unnecessary<br><code>\global</code> before <code>\@minipage</code> ... .                                  | 613 | <code>\@xsect</code> : Removed <code>\global</code> before<br><code>\@nobreak</code> ... . . . .                                                                                          | 592 |
| <code>\@setminipage</code> : remove unnecessary<br><code>\global</code> before <code>\@minipage</code> ... .                                 | 607 | 1996-07-26 ltspace.dtx v1.2p<br><code>\if@nobreak</code> : put <code>\global</code> inside<br>definition . . . . .                                                                        | 178 |
| <code>\@setnobreak</code> : remove unnecessary<br><code>\global</code> before <code>\@nobreak</code> ... . .                                 | 607 | 1996-07-27 ltssbas.dtx v3.0q<br>General: <code>\if@inmath</code> switch removed                                                                                                           | 278 |
| 1996-07-26 ltssbas.dtx v3.0p<br><code>\@DeclareMathSizes</code> : use faster <code>\if</code><br>test . . . . .                              | 274 | 1996-07-27 ltspace.dtx v1.2q<br>General: Further documentation of<br>problems . . . . .                                                                                                   | 172 |

|                                                             |     |                                                                |          |
|-------------------------------------------------------------|-----|----------------------------------------------------------------|----------|
| 1996-07-27 ltspace.dtx v1.2r                                |     | 1996-10-21 lttab.dtx v1.1i                                     |          |
| General: Correct documentation of                           |     | <code>\@array</code> : Use <code>\set@typeset@protect</code>   | 539      |
| problems                                                    | 172 | General: Moved the code associated                             |          |
| 1996-08-02 ltfloat.dtx v1.1o                                |     | with <code>\@mkpream</code> into the group                     |          |
| <code>\@xympar</code> : Remove <code>\global</code> before  |     | provided by the box, for                                       |          |
| <code>\@ignore</code>                                       | 613 | robustness (latex/2183)                                        | 538      |
| 1996-08-02 ltsect.dtx v1.0v                                 |     | <code>\multicolumn</code> : Make <code>\multicolumn</code>     |          |
| <code>\@afterheading</code> : Removed <code>\global</code>  |     | long (latex/2180)                                              | 541      |
| before <code>\@nobreak</code>                               | 594 | <code>\tabbing</code> : Moved the <code>\indent</code> so that |          |
| 1996-08-02 ltspace.dtx v1.2s                                |     | the <code>\everypar</code> can remove it when                  |          |
| <code>\@Esphack</code> : Remove <code>\global</code> before |     | necessary; this is needed because                              |          |
| <code>\@ignore</code>                                       | 181 | the code for items in lists has                                |          |
| 1996-08-25 ltfssbas.dtx v3.0r                               |     | changed (see pr/22111)                                         | 533      |
| <code>\nfss@catcodes</code> : Reset the acute,              |     | 1996-10-23 ltlists.dtx v1.0m                                   |          |
| grave and double quote chars as                             |     | <code>\@item</code> : <code>\@nobreak</code> moved into the    |          |
| well                                                        | 281 | <code>\everypar</code> and not executed                        |          |
| 1996-09-21 ltoutput.dtx v1.1w                               |     | unconditionally, see above                                     | 507      |
| <code>\@writesetup</code> : Added                           |     | <code>\kern</code> changed to <code>\setbox</code>             | 507      |
| <code>\@parboxrestore</code> and made                       |     | Added setting of <code>\clubpenalty</code> and                 |          |
| consequent deletions: wait for the                          |     | set <code>\@nbreakfalse</code> only when                       |          |
| howls of protest                                            | 744 | necessary                                                      | 507      |
| 1996-09-25 ltdirchk.dtx v1.0t                               |     | 1996-10-23 ltsect.dtx v1.0x                                    |          |
| General: Move ltxcheck to separate file                     | 13  | <code>\@xsect</code> : Replaced <code>\hskip</code> with       |          |
| 1996-09-28 ltmiscen.dtx v1.1f                               |     | <code>\setbox</code> as used in                                |          |
| <code>\@xobeysp</code> : Moved to ltspace.dtx               | 473 | <code>\@afterheading</code>                                    | 592      |
| 1996-09-28 ltspace.dtx v1.2t                                |     | 1996-10-24 ltboxes.dtx v1.1a                                   |          |
| <code>\@xobeysp</code> : Moved from ltmiscen.dtx            |     | <code>\@arrayparboxrestore</code> : Added local                |          |
| and redefined to use                                        |     | settings of flags: dangerous!                                  | 520      |
| <code>\nobreakspace</code>                                  | 188 | <code>\@iiiminipage</code> : Use it or lose it                 |          |
| 1996-09-29 ltfiles.dtx v1.1g                                |     | ( <code>@setminpage</code> ): Frank will want to               |          |
| <code>\document</code> : Added disabling of                 |     | lose it                                                        | 522      |
| <code>\@nodocument</code>                                   | 196 | 1996-10-24 ltfloat.dtx v1.1p                                   |          |
| 1996-09-29 ltoutput.dtx v1.1x                               |     | <code>\@floatboxreset</code> : Added local                     |          |
| <code>\newpage</code> : Checks for noskipsec and            |     | settings of flags: dangerous!                                  | 607      |
| inlabel added                                               | 731 | <code>\@marginparreset</code> : Added local                    |          |
| 1996-09-29 ltsect.dtx 1.0w                                  |     | settings of flags: dangerous!                                  | 613      |
| <code>\@noskipsectrue</code> : Added                        |     | <code>\@xfloat</code> : Added <code>\@nodocument</code> to     |          |
| documentation                                               | 588 | trap floats in the preamble                                    | 604      |
| 1996-09-30 ltoutput.dtx v1.1y                               |     | 1996-10-24 ltoutput.dtx v1.1z                                  |          |
| <code>\newpage</code> : Checks for noskipsec and            |     | <code>\@addtocurcol</code> : Added <code>\nobreak</code> , etc |          |
| inlabel removed pending further                             |     | as appropriate                                                 | 758, 762 |
| tests                                                       | 731 | <code>\@specialoutput</code> : Added <code>\nobreak</code> as  |          |
| 1996-10-04 ltclass.dtx v1.0v                                |     | appropriate                                                    | 737      |
| <code>\RequirePackageWithOptions</code> : Reset             |     | <code>\@topnewpage</code> : Added <code>\@nodocument</code>    |          |
| <code>\@unprocessedoptions</code> for /2269                 | 648 | to trap <code>\twocolumn</code> in the                         |          |
| 1996-10-05 ltfiles.dtx v1.1h                                |     | preamble                                                       | 733      |
| <code>\@clubpenalty</code> : Added setting its              |     | <code>\newpage</code> : Better checks for noskipsec            |          |
| value                                                       | 194 | and inlabel added, plus nobreak                                | 731      |
| 1996-10-08 ltfntcmd.dtx v3.3u                               |     | 1996-10-25 ltlists.dtx v1.0n                                   |          |
| <code>\DeclareTextFontCommand</code> : Removed              |     | <code>\endtrivlist</code> : Change <code>\indent</code> to     |          |
| <code>\check@icr</code> when in vmode since                 |     | <code>\leavevmode</code>                                       | 504      |
| it causes various errors (see                               |     | Reset flags explicitly                                         | 504      |
| pr/2157)                                                    | 415 | 1996-10-25 ltoutput.dtx v1.2a                                  |          |
|                                                             |     | <code>\newpage</code> : Reset all flags explicitly             | 731      |

|                                                                 |                                                                |
|-----------------------------------------------------------------|----------------------------------------------------------------|
| 1996-10-26 ltlists.dtx v1.0o                                    | 1996-11-18 ltoutenc.dtx v1.8d                                  |
| <code>\endtrivlist</code> : Correct typo . . . . . 504          | General: (DPC) lowercase external file                         |
| 1996-10-27 ltoutenc.dtx v1.8c                                   | names. internal/1044 . . . . . 254                             |
| <code>\@strip@args</code> : Removed macro . . . 219             | 1996-11-20 fontdef.dtx v2.2p                                   |
| General: Added <code>\r A</code> . . . . . 229                  | General: lowercase fd and enc.def file                         |
| Added                                                           | names /1044 . . . . . 389                                      |
| <code>\textasteriskcentered</code> . . 225, 236                 | 1996-11-20 ltvers.dtx v1.0f                                    |
| Corrected syntax descriptions . . . 213                         | General: Check for old format                                  |
| Removed <code>\aa</code> and <code>\AA</code> . . 225, 229, 232 | modified /2319 . . . . . 34                                    |
| 1996-10-28 ltplain.dtx v1.1u                                    | 1996-11-23 ltoutenc.dtx v1.8e                                  |
| General: (CAR) More doc changes . . 14                          | General: Corrected description . . . . 213                     |
| <code>\dotfill</code> : Removed math mode . . . . 31            | Extended description . . . . . 214                             |
| 1996-10-29 ltplain.dtx v1.1v                                    | 1996-11-28 ltvers.dtx v1.0g                                    |
| <code>\dotfill</code> : Got arithmetic correct                  | General: Check for old format                                  |
| (CAR) . . . . . 31                                              | modified /2319 . . . . . 34                                    |
| 1996-10-29 ltspace.dtx v1.2u                                    | 1996-12-06 ltdirchk.dtx v1.0u                                  |
| <code>\@gnewline</code> : Added macro . . . . . 178             | <code>\IfFileExists</code> : *** removed from                  |
| <code>\@no@lnbk</code> : Macro replaces <code>\@lnbk</code> and | various messages for GNU Make.                                 |
| <code>\@no@lnbk</code> . . . . . 176                            | internal/2338 . . . . . 10                                     |
| <code>\:</code> : Corrected and rationalised code 176           | 1996-12-06 ltfloat.dtx v1.1r                                   |
| <code>\nolinebreak</code> : Reimplemented both                  | <code>\@caption</code> : Call <code>\@setminpage</code> if     |
| using <code>\@no@lnbk</code> . . . . . 175                      | needed. latex/2318 . . . . . 603                               |
| 1996-10-31 ltfinal.dtx v1.0z                                    | 1996-12-06 ltssini.dtx v3.0h                                   |
| General: Added extra <code>\lcode</code> , hoping               | General: (DPC) Remove *** from                                 |
| it does no harm in T1                                           | messages internal/2338 . . . . . 387                           |
| (pr/1969) . . . . . 797, 803                                    | 1996-12-17 ltdefs.dtx v1.0w                                    |
| 1996-10-31 ltlists.dtx v1.0p                                    | <code>\g@addto@macro</code> : Use <code>\begingroup</code> to  |
| <code>\@trivlist</code> : Added check for missing               | save making a mathord . . . . . 98                             |
| item in outer list . . . . . 503                                | 1996-12-20 ltsect.dtx v1.0z                                    |
| 1996-10-31 ltsect.dtx v1.0y                                     | <code>\@dottedtocline</code> : Added <code>\nobreak</code> for |
| General: Corrected and tidied                                   | latex/2343 . . . . . 598                                       |
| documentation; removed long                                     | 1997-01-08 fontdef.dtx v2.2q                                   |
| lines . . . . . 587                                             | General: Use <code>\DeclareMathDelimiter</code>                |
| 1996-11-03 ltplain.dtx v1.1w                                    | to set delimiter codes . . . . . 398                           |
| <code>\dotfill</code> : Saved tokens by using                   | <code>\mathparagraph</code> : Define using                     |
| <code>\hb@xt@</code> . . . . . 31                               | <code>\DeclareMathSymbol</code> . . . . . 407                  |
| 1996-11-04 ltterror.dtx v1.2m                                   | 1997-01-08 ltfiles.dtx v1.1j                                   |
| <code>\@nodocument</code> : Always define                       | <code>\@include</code> : reset <code>\deadcycles</code>        |
| <code>\@nodocument</code> in kernel, so that it                 | latex/2365 . . . . . 203                                       |
| can be cleared by <code>\document</code> . . . 166              | 1997-01-08 ltmath.dtx v1.1d                                    |
| 1996-11-04 ltlists.dtx v1.0q                                    | <code>\root</code> : (DPC) Remove spurious space               |
| <code>\@trivlist</code> : Moved check for missing               | tokens from plain T <sub>E</sub> X definition                  |
| item: only checked when not                                     | /2359 . . . . . 482                                            |
| inlabel flag is false . . . . . 503                             | 1997-02-05 ltdefs.dtx v1.0x                                    |
| 1996-11-05 ltfiles.dtx v1.1i                                    | <code>\g@addto@macro</code> : missing percent                  |
| <code>\nofiles</code> : Standard <code>\if@nobreak</code> test  | /2402 . . . . . 98                                             |
| added . . . . . 199                                             | 1997-02-21 ltlists.dtx v1.0r                                   |
| 1996-11-09 ltmath.dtx v1.1c                                     | <code>\@item</code> : <code>\ifvoid</code> check added for     |
| <code>\@ensuredmath</code> : Made long, as it was               | <code>\noindent</code> . latex/2414 . . . . . 507              |
| before. /2104 . . . . . 492                                     | 1997-03-21 ltcounts.dtx v1.1e                                  |
| 1996-11-18 ltssbas.dtx v3.0s                                    | <code>\fnsymbol</code> : Use <code>\mathsection</code> and     |
| <code>\define@newfont</code> : (DPC) lowercase fd               | <code>\mathparagraph</code> . latex/2445 . . . 261             |
| file names. internal/1044 . . . . . 280                         |                                                                |

|                                                                                                                                                                                                           |                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1997-04-14 ltfiles.dtx v1.1k                                                                                                                                                                              | 1997-08-29 ltoutenc.dtx v1.9f                                                                                                                                      |
| <code>\document</code> : Set the document space<br>factor defaults. latex/2404 . . . . . 195                                                                                                              | General: Added OT4 encoding,<br>provided by Marcin Woliński. . . . . 212                                                                                           |
| <code>\normalsfcodes</code> : Macro added (from<br>patch file) latex/2404 . . . . . 199                                                                                                                   | 1997-09-09 ltdefns.dtx v1.2z                                                                                                                                       |
| 1997-04-14 ltoutput.dtx v1.2b                                                                                                                                                                             | <code>\providecommand</code> : Use <code>\begingroup</code><br>to avoid generating math ords if<br>used in math mode. pr/2573 . . . . . 77                         |
| <code>\writsetup</code> : Call <code>\normalsfcodes</code><br>(from patch file) latex/2404 . . . . . 746                                                                                                  | 1997-09-15 ltpictur.dtx v1.1g                                                                                                                                      |
| Move <code>\label</code> and <code>\index</code> (from<br>patch file) . . . . . 746                                                                                                                       | <code>\@getcirc</code> : Warn if lines become<br>invisible pr/2524 . . . . . 572                                                                                   |
| 1997-04-24 ltbibl.dtx v1.1m                                                                                                                                                                               | <code>\@picture@warn</code> : Macro added<br>pr/2524 . . . . . 572                                                                                                 |
| <code>\@citex</code> : <code>\@empty</code> to avoid primitive<br>error on empty cite keys.<br>latex/2432 . . . . . 625                                                                                   | <code>\@sline</code> : Warn if lines become<br>invisible pr/2524 . . . . . 561                                                                                     |
| 1997-04-30 ltoutenc.dtx v1.9a                                                                                                                                                                             | 1997-10-06 ltcounts.dtx v1.1f                                                                                                                                      |
| General: Changed <code>\textsc</code> to<br><code>\scshape</code> . . . . . 226                                                                                                                           | <code>\@Roman</code> : Change <code>\@Roman</code> to be fully<br>expandable, so that the result is<br>written properly to files. . . . . 262                      |
| Introduced <code>\textcopyright</code> and<br>modified <code>\copyright</code> . . . . . 226                                                                                                              | <code>\@slowromancap</code> : Macro added. . . . . 262                                                                                                             |
| Introduced <code>\textcopyright</code> and<br>modify <code>\copyright</code> . . . . . 227                                                                                                                | 1997-10-08 ltlogos.dtx v1.1h                                                                                                                                       |
| Modified <code>\textunderscore</code> ,<br>removing <code>\mathunderscore</code> . . . . . 226                                                                                                            | <code>\LaTeX</code> : Simplify macro (force loading<br>of suitable math fonts once). . . . . 191                                                                   |
| Modified <code>\underscore</code> , removing<br><code>\mathunderscore</code> . . . . . 227                                                                                                                | 1997-10-10 ltclass.dtx v1.0y                                                                                                                                       |
| 1997-04-30 ltoutenc.dtx v1.9b                                                                                                                                                                             | <code>\endfilecontents</code> : <code>\@currenvir</code> in<br>banner . . . . . 661                                                                                |
| General: Added <code>\leavevmode</code> to<br><code>\textunderscore</code> . . . . . 226                                                                                                                  | <code>\reserved@e</code> not <code>\verbatim@out</code> to<br>save a csname . . . . . 660                                                                          |
| 1997-05-04 ltoutenc.dtx v1.9c                                                                                                                                                                             | Check for text before or after <code>\end</code><br>environment. latex/2636 . . . . . 661                                                                          |
| General: Added ‘hex index tabs’ . . . . . 233                                                                                                                                                             | Use <code>\@gobbletwo</code> . . . . . 660                                                                                                                         |
| Added TS1 encoding v2.2.beta . . . . . 239                                                                                                                                                                | 1997-10-17 ltfntcmd.dtx v3.3w                                                                                                                                      |
| 1997-05-07 ltoutenc.dtx v1.9d                                                                                                                                                                             | <code>\check@nocorr@</code> : Check for vertical<br>mode moved here, from<br><code>\DeclareTextFontCommand</code> (see<br>PR/2646). . . . . 417                    |
| General: Added <code>\leavevmode</code> to<br><code>\textcompwordmark</code> . . . . . 226                                                                                                                | <code>\DeclareTextFontCommand</code> :<br>Reinstalled <code>\check@icr</code> as check is<br>now done in <code>\check@nocorr@</code> (see<br>PR/2646). . . . . 415 |
| 1997-05-07 ltspace.dtx v1.2v                                                                                                                                                                              | 1997-10-20 ltfinal.dtx v1.1a                                                                                                                                       |
| <code>\newline</code> : Made completely robust. 177                                                                                                                                                       | <code>\@uclclist</code> : Removed <code>\aa</code> and <code>\AA</code><br>from <code>\@uclclist</code> as these are<br>macros. . . . . 803                        |
| 1997-05-29 ltfsssrc.dtx v3.0j                                                                                                                                                                             | 1997-10-21 ltdefns.dtx v1.2z1                                                                                                                                      |
| General: Replaced <code>\@</code> by<br><code>\MessageBreak</code> , as suggested by<br>Donald Arseneau. . . . . 313                                                                                      | <code>\renewcommand</code> : Use<br><code>\begingroup/\endgroup</code> rather<br>than braces for grouping, to avoid<br>generating empty math atom. . . . . 75      |
| 1997-05-29 ltlogos.dtx v1.1f                                                                                                                                                                              | 1997-10-21 ltfssbas.dtx v3.0t                                                                                                                                      |
| <code>\LaTeXe</code> : Added <code>\m@th</code> so that the<br>$\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}_{\text{E}}$ logo works with non-zero<br>values of <code>\mathsurround</code> . . . . . 191 | <code>\define@newfont</code> : Move<br><code>\makeatletter</code> to<br><code>\nfss@catcodes</code> . . . . . 280                                                  |
| 1997-06-16 ltdirchk.dtx v1.0v                                                                                                                                                                             |                                                                                                                                                                    |
| General: documentation improvements<br>mainly from internal/2520 . . . . . 1                                                                                                                              |                                                                                                                                                                    |
| 1997-06-16 ltfloat.dtx v1.1s                                                                                                                                                                              |                                                                                                                                                                    |
| General: documentation fixes . . . . . 600                                                                                                                                                                |                                                                                                                                                                    |
| 1997-06-16 ltfntcmd.dtx v3.3v                                                                                                                                                                             |                                                                                                                                                                    |
| General: Fix typo in documentation. 413                                                                                                                                                                   |                                                                                                                                                                    |
| 1997-08-05 ltoutenc.dtx v1.9e                                                                                                                                                                             |                                                                                                                                                                    |
| General: Corrected order of arguments<br>in <code>\UseTextSymbol</code> example. . . . . 213                                                                                                              |                                                                                                                                                                    |



|                                                                                                                                                                                                                                 |                                                                                              |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----|
| <code>\nfss@catcodes</code> : Moved                                                                                                                                                                                             | Removed default settings, see next section. . . . .                                          | 239 |
| <code>\makeatletter</code> from                                                                                                                                                                                                 |                                                                                              |     |
| <code>\try@load@font@shape</code> . . . . .                                                                                                                                                                                     | 1997-12-19 ltoutenc.dtx v1.9i                                                                |     |
| 1997-11-09 ltoutput.dtx v1.2c                                                                                                                                                                                                   | General: Documentation corrections.                                                          | 212 |
| <code>\@specialoutput</code> : Remove incorrect code: only one <code>\@emptycol</code> is needed here . . . . .                                                                                                                 | 1997-12-20 fontdef.dtx v2.2s                                                                 |     |
|                                                                                                                                                                                                                                 | General: Added documentation . . .                                                           | 391 |
| <code>\@topnewpage</code> : Documentation of <code>vsize</code> check enhanced . . . . .                                                                                                                                        | 1997-12-31 ltoutenc.dtx v1.9k                                                                |     |
|                                                                                                                                                                                                                                 | General: Further correction . . . . .                                                        | 213 |
| 1997-11-13 ltssdcl.dtx v3.0f                                                                                                                                                                                                    | 1998-01-12 ltoutenc.dtx v1.9k                                                                |     |
| <code>\DeclareSymbolFont</code> : (DPC) Really update <code>\group@list</code> dont leave new version in <code>\toks@</code> . latex/2661                                                                                       | General: Added <code>\ProvidesPackage</code> for textcomp.sty . . . . .                      | 212 |
|                                                                                                                                                                                                                                 | Adding missing braces and <code>\ushape</code> . . . . .                                     | 241 |
| <code>\stepcounter</code> : (DPC) Remove as never used. (Re)defined in ltcounts . . . . .                                                                                                                                       | 1998-01-16 ltoutenc.dtx v1.9m                                                                |     |
|                                                                                                                                                                                                                                 | General: fixed decimal codes. latex/2734 . . . . .                                           | 237 |
| 1997-11-19 ltfloat.dtx v1.1t                                                                                                                                                                                                    | 1998-03-04 ltdefns.dtx v1.2z2                                                                |     |
| <code>\@footnotetext</code> : Missing percent, again . . . . .                                                                                                                                                                  | <code>\@xargdef</code> : Unnecessary <code>\expandafter</code> removed: pr/2758 .            | 73  |
| 1997-11-19 ltoutput.dtx v1.2d                                                                                                                                                                                                   | 1998-03-05 ltoutenc.dtx v1.9n                                                                |     |
| <code>\@vtryfc</code> : Reindent code, to be understandable(DPC). . . . .                                                                                                                                                       | General: Added masc/fem ords as in pr/2579 . . . . .                                         | 226 |
| 1997-11-20 ltssdcl.dtx v3.0g                                                                                                                                                                                                    | 1998-03-20 ltdefns.dtx v1.2z3                                                                |     |
| <code>\document@select@group</code> : (DPC) inline use of <code>\stepcounter</code> (faster, and saves a cname per math version as no reset list) . . . . .                                                                     | <code>\@thirdofthree</code> : Macro added . . . . .                                          | 78  |
|                                                                                                                                                                                                                                 | 1998-03-20 ltoutenc.dtx v1.9o                                                                |     |
| <code>\select@group</code> : (DPC) inline use of <code>\stepcounter</code> (faster, and saves a cname per math version as no reset list) . . . . .                                                                              | General: Documentation added about order of decls . . . . .                                  | 215 |
|                                                                                                                                                                                                                                 | Documentation added for pr/2783 . . . . .                                                    | 214 |
| 1997-11-23 ltoutenc.dtx v1.9g                                                                                                                                                                                                   | <code>\UndeclareTextCommand</code> : Macro added for pr/2783 . . . . .                       | 223 |
| General: Use <code>\textperthousand</code> , <code>\textpertenthousand</code> and <code>\textfractionsolidus</code> not <code>\textpermill</code> , <code>\textpertenmill</code> and <code>\textfraction</code> . /2673 . . . . | 1998-03-20 lttextcomp.dtx v1.9o                                                              |     |
|                                                                                                                                                                                                                                 | General: Added various <code>\UndeclareTextCommand</code> declarations for pr/2783 . . . . . | 449 |
| 1997-12-17 ltoutenc.dtx v1.9h                                                                                                                                                                                                   | Load decls after defaults for speed. . . . .                                                 | 449 |
| General: Added <code>\textperthousand</code> and <code>\textpertenthousand</code> . . . . .                                                                                                                                     | 1998-03-21 ltclass.dtx v1.0z                                                                 |     |
| Added code for textcomp.sty. . . . .                                                                                                                                                                                            | General: Added to documentation of filecontents . . . . .                                    | 632 |
| Added section. . . . .                                                                                                                                                                                                          | 1998-03-21 ltclass.dtx v1.1a                                                                 |     |
| Added textcomp.sty. . . . .                                                                                                                                                                                                     | <code>\@providesfile</code> : Allow &. Internal/2702 . . . . .                               | 643 |
| As in OT1, Added <code>\leavevmode</code> at start of <code>\c</code> , otherwise the output routine might be invoked within the macro. . . . .                                                                                 | General: Correct to new onlypreamble command list . . . . .                                  | 675 |
|                                                                                                                                                                                                                                 | 1998-03-25 ltssbas.dtx v3.0u                                                                 |     |
| Changed to decimal codes in <code>\oalign</code> . . . . .                                                                                                                                                                      | <code>\showhyphens</code> : Suppress unnecessary error when used in preamble . . .           | 290 |
| Changed to decimal codes. . . . .                                                                                                                                                                                               | 1998-04-11 fontdef.dtx v2.2t                                                                 |     |
| Documentation changes and additions. . . . .                                                                                                                                                                                    | General: Added <code>\mathring</code> accent (pr2785) . . . . .                              | 405 |
| Example corrected, braces removed. . . . .                                                                                                                                                                                      | 1998-04-15 fontdef.dtx v2.2u                                                                 |     |
|                                                                                                                                                                                                                                 | General: Use new syntax for <code>\DeclareMathDelimiter</code> . . . . .                     | 398 |

|                                                                |                                                                    |
|----------------------------------------------------------------|--------------------------------------------------------------------|
| 1998-04-15 ltffssdcl.dtx v3.0h                                 | 1998-08-17 ltfontcmd.dtx v3.3x                                     |
| <code>\@xxDeclareMathDelimiter</code> : Macro                  | General: (RmS) Minor documentation                                 |
| added (pr/2662) . . . . . 358                                  | fixes. . . . . 413                                                 |
| 1998-04-17 fontdef.dtx v2.2v                                   | 1998-08-17 ltffssbas.dtx v3.0v                                     |
| General: Reinsert symbol defs for <                            | General: (RmS) Documentation fixes. 267                            |
| and > chars. . . . . 399                                       | 1998-08-17 ltffssdcl.dtx v3.0i                                     |
| 1998-04-18 fontdef.dtx v2.2w                                   | General: (RmS) Corrected minor                                     |
| General: Reinsert symbol def for /                             | glitches in changes entries. . . . . 339                           |
| char. . . . . 399                                              | 1998-08-17 ltffssini.dtx v3.0i                                     |
| 1998-05-07 ltclass.dtx v1.1b                                   | General: (RmS) Minor documentation                                 |
| <code>\load@onefilewithoptions</code> : Modify                 | fixes. . . . . 366                                                 |
| help message for latex/2805 . . . . 652                        | 1998-08-17 ltlogos.dtx v1.1i                                       |
| 1998-05-18 lttab.dtx v1.1j                                     | General: (RmS) Minor documentation                                 |
| <code>\@endpbox</code> : Use <code>\setlength</code> to set    | fixes. . . . . 191                                                 |
| <code>\hsize</code> , so that the changes in the               | 1998-08-17 ltmath.dtx v1.1c                                        |
| calc package apply here. . . . . 549                           | General: (RmS) Minor documentation                                 |
| <code>\tabular*</code> : Use <code>\setlength</code> , so that | fixes. . . . . 480                                                 |
| calc extensions apply. . . . . 538                             | 1998-08-17 ltmiscen.dtx v1.1g                                      |
| 1998-05-20 ltfinal.dtx v1.1b                                   | General: (RmS) Minor documentation                                 |
| General: Set up lccodes before loading                         | fixes. . . . . 459                                                 |
| hyphenation files: pr/2639 . . . . 796                         | 1998-08-17 ltspaced.dtx v1.2w                                      |
| Set up uc/lccodes after loading                                | General: Documentation fixes. . . . . 172                          |
| hyphenation files: pr/2639 . . . . 802                         | 1998-08-17 preload.dtx v2.1g                                       |
| 1998-05-28 lterror.dtx v1.2n                                   | General: (RmS) Minor documentation                                 |
| <code>\@notdefinable</code> : Added message re                 | fixes. . . . . 410                                                 |
| ‘end...’ pr/1555 . . . . . 166                                 | 1998-09-19 ltoutenc.dtx v1.9r                                      |
| 1998-06-04 ltboxes.dtx v1.1c                                   | <code>\a</code> : Added <code>\string</code> (pr/2878) . . . . 224 |
| <code>\@rule</code> : Support calc-expressions . . 523         | 1998-11-13 lttab.dtx v1.1m                                         |
| 1998-06-12 ltoutenc.dtx v1.9p                                  | <code>\@array</code> : Check for hmode to see if                   |
| General: Corrected 130 and 131, see                            | something went wrong during                                        |
| pr/2834 . . . . . 241                                          | parsing (pr/2884) . . . . . 539                                    |
| Renamed <code>\textmacron</code> pr/2840 . . 242               | 1999-01-05 fontdef.dtx v2.2x                                       |
| 1998-06-12 ltoutenc.dtx v1.9q                                  | General: Need special protection for                               |
| <code>\add@accent</code> : Explicitly set                      | character > in <code>\changes</code> entry. . . 389                |
| <code>\spacefactor</code> after <code>\accent</code>           | 1999-01-06 ltffssbas.dtx v3.0w                                     |
| (pr/2877) . . . . . 219                                        | <code>\DeclareFontEncoding</code> : Added                          |
| 1998-06-12 lttextcomp.dtx v1.9p                                | <code>\LastDeclaredEncoding</code> to                              |
| General: Renamed <code>\textmacron</code>                      | support cyrillic integration                                       |
| pr/2840 . . . . . 446                                          | (pr/2988) . . . . . 271                                            |
| 1998-06-18 lttab.dtx v1.1k                                     | <code>\LastDeclaredEncoding</code> : Added                         |
| General: Small addition to                                     | <code>\LastDeclaredEncoding</code> to                              |
| documentation . . . . . 526                                    | support cyrillic integration                                       |
| 1998-07-06 lttab.dtx v1.1l                                     | (pr/2988) . . . . . 271                                            |
| General: Small correction to                                   | 1999-01-06 ltoutenc.dtx v1.9r                                      |
| documentation . . . . . 526                                    | <code>\@strip@args</code> : New impl for                           |
| 1998-08-17 ltboxes.dtx v1.1e                                   | latex/2930 . . . . . 221                                           |
| General: (RmS) Minor Documentation                             | General: Minor documentation fix. . 241                            |
| fixes. . . . . 511                                             | 1999-01-06 ltoutput.dtx v1.2e                                      |
| 1998-08-17 ltclass.dtx v1.1c                                   | <code>\@makecol</code> : Added negative vskip, as                  |
| General: (RmS) Minor documentation                             | when processing outputbox below:                                   |
| fixes. . . . . 632                                             | suggested by Fred Bartlett                                         |
| 1998-08-17 ltdirchk.dtx v1.0w                                  | pr/2892 . . . . . 741                                              |
| General: (RmS) Documentation                                   | 1999-01-07 ltdefns.dtx v1.3a                                       |
| improvements. . . . . 1                                        | <code>\@ifnextchar</code> : made long . . . . . 94                 |



|                                                                                                                                                                        |          |                                                                                                                                                                                                                                                                  |                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <code>\@newenvb</code> : made long and brace<br>optional arg. latex/2896 . . . . .                                                                                     | 75       | 1999-06-12 ltoutenc.dtx v1.9v<br>General: Extend <code>\@uclclist</code> only<br>once . . . . .                                                                                                                                                                  | 255                   |
| <code>\@testopt</code> : made long and brace<br>optional arg. latex/2896 . . . . .                                                                                     | 73       | 1999-10-09 ltmath.dtx v1.1e<br><code>\active@math@prime</code> : Macro added,<br>see PR 3104. . . . .                                                                                                                                                            | 486                   |
| 1999-01-07 ltdefns.dtx v1.3b<br><code>\@ifnextchar</code> : extra <code>\long</code> .<br>latex/2902 . . . . .                                                         | 94       | <code>\prime@s</code> : Introduce<br><code>\active@math@prime</code> . . . . .                                                                                                                                                                                   | 486                   |
| 1999-01-07 ltoutenc.dtx v1.9r<br>General: Hackery to allow using<br>fontenc several times . . . . .                                                                    | 256      | 1999-10-09 ltoutput.dtx 1.2f<br><code>\@activechar@info</code> : Reset definition<br>of active prime character (used in<br>math mode) . . . . .                                                                                                                  | 744                   |
| Hackery to temp support cyrillic<br>uc/lc . . . . .                                                                                                                    | 254      | 1999-10-28 ltoutenc.dtx v1.9w<br><code>\add@accent</code> : Give<br><code>\accent@spacefactor</code> a default<br>definition (pr/3084) . . . . .                                                                                                                 | 219                   |
| 1999-01-13 ltoutenc.dtx v1.9s<br><code>\@strip@args</code> : Simplified solution for<br>latex/2930 . . . . .                                                           | 221      | 1999-12-08 ltoutenc.dtx v1.9x<br>General: Changed <code>\CYRRHOOK</code> and<br><code>\cyrrhook</code> to <code>\CYRRHK</code> and <code>\cyrrhk</code><br>as name changed in the cyrillic<br>bundle for naming consistency<br>with other “hook” glyphs. . . . . | 254                   |
| 1999-01-18 ltdefns.dtx v1.3c<br><code>\@yargd@f</code> : New implementation DPC<br>/2942 . . . . .                                                                     | 74       | 2000-01-07 ltmiscen.dtx v1.1h<br><code>\@verbatim</code> : Disable hyphenation even<br>if the font allows it. . . . .                                                                                                                                            | 474                   |
| 1999-02-09 ltdefns.dtx v1.3d<br><code>\@yargd@f</code> : catch bad argument forms<br>by re-inserting #3 . . . . .                                                      | 74       | 2000-01-15 ltpictur.dtx v1.1i<br><code>\@upvector</code> : Removed space at<br>end-of-line, CAR . . . . .                                                                                                                                                        | 564                   |
| 1999-02-12 lttextcomp.dtx v3.0j<br><code>\legacyoldstylenums</code> : Use<br><code>\rmdefault</code> instead of <code>cmm</code><br>(pr/2954) . . . . .                | 422      | 2000-01-30 ltfntcmd.dtx v3.3y<br><code>\DeclareTextFontCommand</code> : Use<br><code>\hmode@bgroup</code> now (pr/3160) . .                                                                                                                                      | 415                   |
| 1999-02-24 ltoutenc.dtx v1.9t<br>General: Corrected hackery cyrillic<br>uc/lc list . . . . .                                                                           | 254      | 2000-01-30 ltoutenc.dtx v1.9y<br>General: Use <code>\hmode@bgroup</code> where<br>applicable<br>(pr/3160) . . . . .                                                                                                                                              | 228–231, 236–239, 241 |
| 1999-03-01 ltdefns.dtx v1.3e<br><code>\@ifnextchar</code> : remove extra <code>\long</code> .<br>internal/2967 . . . . .                                               | 94       | <code>\add@accent</code> : Use <code>\hmode@bgroup</code><br>where applicable (pr/3160) . . . .                                                                                                                                                                  | 218                   |
| 1999-04-15 ltpictur.dtx v1.1h<br><code>\@getlarrow</code> : Replaced octal number,<br>CAR . . . . .                                                                    | 563      | <code>\hmode@bgroup</code> : Macro added . . . .                                                                                                                                                                                                                 | 219                   |
| <code>\@upvector</code> : Replaced octal number,<br>CAR . . . . .                                                                                                      | 564      | 2000-01-30 ltoutenc.dtx v1.9z<br><code>\@use@text@encoding</code> : Macro<br>reimplemented (pr/3160) . . . . .                                                                                                                                                   | 221, 222              |
| General: Replaced octal number,<br>CAR . . . . .                                                                                                                       | 563, 564 | <code>\add@accent</code> : Macro reimplemented<br>(pr/3160) . . . . .                                                                                                                                                                                            | 218                   |
| Replaced octal numbers, CAR . . . .                                                                                                                                    | 551      | <code>\hmode@start@before@group</code> : Macro<br>added (pr/3160) . . . . .                                                                                                                                                                                      | 222                   |
| 1999-04-19 ltfloat.dtx v1.1u<br><code>\caption</code> : Made caption an error<br>outside a float: latex/2815 . . . . .                                                 | 603      | 2000-05-19 ltmiscen.dtx v1.1i<br><code>\enddocument</code> : Reset <code>\AtEndDocument</code><br>for latex/3060 . . . . .                                                                                                                                       | 460                   |
| 1999-04-27 ltboxes.dtx v1.1f<br><code>\@parboxto</code> : (CAR) Changed <code>\@empty</code><br>to <code>\relax</code> as flag for natural<br>width: pr/2975 . . . . . | 519      | 2000-05-26 ltpage.dtx v1.0j<br><code>\@markright</code> : Reimplementation to fix<br>expansion error (pr/3203). . . . .                                                                                                                                          | 630                   |
| 1999-04-29 ltdefns.dtx v1.3f<br><code>\@yargd@f</code> : Full expansion and<br>conversion needed for digit in new<br>version, see pr/3013 . . . . .                    | 74       | <code>\leftmark</code> : Use <code>\@empty</code> instead of<br>brace group (pr/3203). . . . .                                                                                                                                                                   | 630                   |
| New macro added . . . . .                                                                                                                                              | 74       |                                                                                                                                                                                                                                                                  |                       |
| 1999-06-10 ltoutenc.dtx v1.9u<br>General: Ensure that we also forget<br>old options (pr/2888) . . . . .                                                                | 256      |                                                                                                                                                                                                                                                                  |                       |

|                                                                                                                        |     |                                                                                                    |     |
|------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------|-----|
| <code>\markright</code> : Reimplementation to fix expansion error (pr/3203). . . . .                                   | 629 | (pr/3334) . . . . .                                                                                | 643 |
| <code>\rightmark</code> : Use <code>\@empty</code> instead of brace group (pr/3203). . . . .                           | 630 | 2001-05-25 <code>ltdirchk.dtx</code> v1.0x                                                         |     |
| 2000-06-02 <code>ltpage.dtx</code> v1.0k                                                                               |     | General: Explicitly set catcode of <code>\endlinechar</code> to 10 (pr/3334) . . .                 | 4   |
| <code>\@markright</code> : Small adjustment to give slightly less expansion, CAR                                       | 630 | 2001-05-28 <code>ltoutenc.dtx</code> v1.93                                                         |     |
| <code>\markright</code> : Small adjustment to give slightly less expansion, CAR . . .                                  | 629 | General: Added composites for compatibility with T1, pr/3295 .                                     | 230 |
| Tidied 1.0j reimplementation, CAR                                                                                      | 629 | Changed the effect of <code>\.i</code> , pr/3295 . . . . .                                         | 233 |
| 2000-07-11 <code>ltmiscen.dtx</code> v1.1j                                                                             |     | 2001-06-02 <code>fontdef.dtx</code> v2.2y                                                          |     |
| <code>\@enddocument@kernel@warnings</code> : Fix typo in warning . . . . .                                             | 462 | General: Provide default cfg files (pr/3264) . . . . .                                             | 408 |
| 2000-07-12 <code>ltoutput.dtx</code> 1.2g                                                                              |     | 2001-06-04 <code>fontdef.dtx</code> v2.2z                                                          |     |
| General: Ensure that rule is in <code>\normalcolor</code> . . . . .                                                    | 784 | General: Guard against math active equal and pipe sign in <code>\models</code> (pr/3333) . . . . . | 404 |
| 2000-07-12 <code>ltoutput.dtx</code> 1.2i                                                                              |     | Guard against math active equal sign in <code>\Relbar</code> (pr/3333) . . . .                     | 404 |
| <code>\@makecol</code> : Removed negative vskip, as it gives unacceptable results when the depth is large: pr/3189     | 741 | 2001-06-04 <code>ltclass.dtx</code> v1.1e                                                          |     |
| 2000-07-19 <code>ltoutput.dtx</code> v1.2h                                                                             |     | <code>\@providesfile</code> : But only if it is a char (pr/3334) . . . . .                         | 643 |
| <code>\@writeseup</code> : Reset and restore <code>\@if@newlist</code> for internal/3231 .                             | 745 | 2001-06-04 <code>ltdirchk.dtx</code> v1.0y                                                         |     |
| 2000-08-23 <code>ltfinal.dtx</code> v1.1c                                                                              |     | General: But only if it is a char (pr/3334) . . . . .                                              | 4   |
| General: Fix typo in warning . . . . .                                                                                 | 798 | 2001-06-04 <code>ltpictur.dtx</code> v1.1j                                                         |     |
| 2000-08-30 <code>ltoutenc.dtx</code> v1.91                                                                             |     | <code>\@sline</code> : Don't warn for exactly zero pr/3318 . . . . .                               | 561 |
| <code>\@use@text@encoding</code> : Rearranged but no change to final code, CAR (pr/3160) . . . . .                     | 221 | 2001-06-04 <code>ltvers.dtx</code> v1.0i                                                           |     |
| <code>\add@accent</code> : Rearranged but no change to final code, CAR (pr/3160) . . . . .                             | 218 | General: Check for old format disabled                                                             | 34  |
| 2000-09-01 <code>ltfinal.dtx</code> v1.1d                                                                              |     | 2001-06-05 <code>ltoutenc.dtx</code> v1.94                                                         |     |
| <code>\errhelp</code> : Set error help empty at very end (pr/449 done correctly). .                                    | 806 | General: Text composite Commands need kludges for ‘,’ – see <code>tlb1903.lvt</code> . . . . .     | 230 |
| 2000-09-24 <code>ltfloat.dtx</code> v1.2b                                                                              |     | 2001-08-26 <code>ltclass.dtx</code> v1.1f                                                          |     |
| <code>\end@dblfloat</code> : FMI: use output routine to defer float . . . . .                                          | 608 | <code>\@providesfile</code> : Readdded setting of space char (pr/3353) . . . . .                   | 643 |
| 2000-09-24 <code>ltoutput.dtx</code> v1.2b                                                                             |     | 2002-02-24 <code>ltplain.dtx</code> v1.1x                                                          |     |
| <code>\doclearpage</code> : FMI: ensure <code>\doclearpage</code> is called again until all floats are output. . . . . | 739 | <code>\loggingall</code> : Macro added . . . . .                                                   | 31  |
| 2000-09-24 <code>ltoutput.dtx</code> v1.2n                                                                             |     | <code>\loggingoutput</code> : Macro added . . . . .                                                | 31  |
| <code>\addtocurcol</code> : FMI: test for wide float was in wrong place . . . . .                                      | 757 | <code>\showoutput</code> : Use newly added <code>\loggingoutput</code> . . . . .                   | 31  |
| 2001-01-07 <code>ltoutput.dtx</code> v1.2j                                                                             |     | <code>\tracingall</code> : Use newly added <code>\loggingoutput</code> . . . . .                   | 31  |
| <code>\@writeseup</code> : And do it in the right macro (pr/3286) . . . . .                                            | 745 | 2002-06-16 <code>ltoutenc.dtx</code> v1.95                                                         |     |
| 2001-02-16 <code>ltxref.dtx</code> v1.1k                                                                               |     | General: Added <code>\textbardbl</code> (pr/3400) . . . . .                                        | 236 |
| <code>\@newl@bel</code> : Added an extra grouplevel (PR3250), jlb . . . . .                                            | 456 | Added default for <code>\textbardbl</code> (pr/3400) . . . . .                                     | 225 |
| 2001-05-25 <code>ltclass.dtx</code> v1.1d                                                                              |     | 2002-06-17 <code>ltoutenc.dtx</code> v1.95                                                         |     |
| <code>\@providesfile</code> : Explicitly set catcode of <code>\endlinechar</code> to 10                                |     | General: Corrected <code>\c</code> for T1 (pr/3442) . . . . .                                      | 231 |
|                                                                                                                        |     | Definition of <code>\textexclamdown</code> changed (pr/3368) . . . . .                             | 229 |

|                                                                                                                                                                                                                                                                              |          |                                                                                                                                      |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------|-----|
| Definition of <code>\textquestiondown</code><br>changed (pr/3368) . . . . .                                                                                                                                                                                                  | 229      | 2004-01-04 ltbibl.dtx v1.1p<br><code>\nocite</code> : Changed error message . . .                                                    | 627 |
| 2002-06-18 ltoutenc.dtx v1.95<br>General: Changed def for<br><code>\textregistered</code> to avoid small<br>caps (pr/3420) . . . . .                                                                                                                                         | 226      | 2004-01-04 ltoutenc.dtx v1.99c<br>General: More adjustments for ogonek<br>(pr/3532) . . . . .                                        | 231 |
| 2002-10-01 ltfloat.dtx v1.1v<br><code>\thempfootnote</code> : Use braces around<br><code>\itshape</code> to keep font change local<br>(pr/3460). . . . .                                                                                                                     | 617      | 2004-01-23 ltdefns.dtx v1.1g<br><code>\@newenva</code> : Use kernel version of<br><code>\@ifnextchar</code> (pr/3501) . . . . .      | 75  |
| 2002-10-02 ltffsbas.dtx v3.0x<br><code>\DeclareFontSubstitution</code> : Adding<br><code>\LastDeclaredEncoding</code><br>introduced a bug as on some<br>occasions that macro name was<br>stored in the internal lists instead<br>of the actual encoding. (pr/3459) . . . . . | 271      | <code>\@testopt</code> : Use kernel version of<br><code>\@ifnextchar</code> (pr/3501) . . . . .                                      | 73  |
| 2002-10-28 ltlists.dtx v1.0s<br><code>\endtrivlist</code> : Check for math mode<br>(pr/3437) . . . . .                                                                                                                                                                       | 505      | <code>\@xargdef</code> : Use kernel version of<br><code>\@ifnextchar</code> (pr/3501) . . . . .                                      | 72  |
| 2002-10-28 ltoutenc.dtx v1.96<br>General: coding change, to follow bug<br>fix by DEK in plain.tex<br>(pr/3469) . . . . .                                                                                                                                                     | 229, 238 | <code>\@xdblarg</code> : Use kernel version of<br><code>\@ifnextchar</code> (pr/3501) . . . . .                                      | 95  |
| 2002-12-13 ltbibl.dtx v1.1n<br><code>\@citex</code> : Added <code>\leavevmode</code> in case<br>citation is at start of paragraph<br>(pr/3486) . . . . .                                                                                                                     | 625      | 2004-01-23 ltdefns.dtx v1.3g<br><code>\kernel@ifnextchar</code> : Added macro<br>(pr/3501) . . . . .                                 | 94  |
| 2003-01-01 ltfntcmd.dtx v3.3z<br>General: Code checked and<br>documentation extended by Chris . . . . .                                                                                                                                                                      | 415      | 2004-01-28 ltclass.dtx v1.1g<br><code>\@providesfile</code> : Use kernel version of<br><code>\@ifnextchar</code> (pr/3501) . . . . . | 643 |
| 2003-05-18 ltbibl.dtx v1.1o<br><code>\nocite</code> : Check if we are after<br><code>\document</code> . . . . .                                                                                                                                                              | 627      | 2004-01-28 ltvers.dtx v1.0k<br>General: Check for old format made 5<br>years (pr/3601) . . . . .                                     | 34  |
| 2003-08-27 ltpictur.dtx v1.1k<br><code>\@bezier</code> : added missing displacement<br>pr/3566 . . . . .                                                                                                                                                                     | 580      | 2004-02-02 fontdef.dtx v2.3<br>General: Many things from here on<br>made robust . . . . .                                            | 403 |
| <code>\@sline</code> : check for <code>\@linechar</code> being<br>empty pr/3570 . . . . .                                                                                                                                                                                    | 561      | 2004-02-02 ltoutenc.dtx v1.99<br>General: Added <code>\textbigcircle</code> . . .                                                    | 236 |
| 2003-10-13 ltfinal.dtx v1.1e<br>General: Added extra <code>\lccode</code> for <code>\-</code><br>and <code>\textcompwordmark</code> . . . . .                                                                                                                                | 797      | 2004-02-04 fontdef.dtx v2.3a<br>General: Added bigtriangle synonyms<br>for stmaryrd . . . . .                                        | 401 |
| 2003-12-16 ltoutput.dtx v1.2k<br><code>\@makecol</code> : Ensure that <code>\@elt</code> has a<br>defined state (pr/3586) . . . . .                                                                                                                                          | 741      | 2004-02-04 ltspc.dtx v1.3<br><code>\nobreakdashes</code> : (Macro added . . .                                                        | 187 |
| 2003-12-30 ltpictur.dtx v1.1j<br><code>\@getcirc</code> : issue warning if circle size<br>can't be met pr/3473 . . . . .                                                                                                                                                     | 572      | 2004-02-06 ltoutenc.dtx v1.99d<br><code>\@inmathwarn</code> : New command added<br>to fix severe bug: pr/3563 . . . . .              | 216 |
| 2004-01-03 ltoutenc.dtx v1.99b<br>General: Added <code>\textogonekcentered</code><br>(pr/3532) . . . . .                                                                                                                                                                     | 231      | 2004-02-07 ltoutput.dtx v1.2l<br><code>\@doclearpage</code> : Empty kludgeins box<br>if necessary, pr/3528 . . . . .                 | 739 |
| Added composites for <code>\k</code> (pr/3532) . . . . .                                                                                                                                                                                                                     | 235      | 2004-02-13 ltoutenc.dtx v1.99e<br>General: Documentation fixes: typos . . .                                                          | 212 |
| Use <code>\ooalign</code> for <code>\k</code> (pr/3532) . . . . .                                                                                                                                                                                                            | 231      | 2004-02-15 ltbibl.dtx v1.1q<br><code>\@cite@ofmt</code> : Added hook with<br>default value <code>\hbox</code> . . . . .              | 627 |
|                                                                                                                                                                                                                                                                              |          | <code>\@citex</code> : Changed to use a hook with<br>default value <code>\hbox</code> . . . . .                                      | 626 |
|                                                                                                                                                                                                                                                                              |          | 2004-02-15 ltspc.dtx v1.3a<br><code>\nobreakdashes</code> : (Added spacefactor<br>setting . . . . .                                  | 187 |
|                                                                                                                                                                                                                                                                              |          | 2004-10-20 ltoutput.dtx v1.2m<br><code>\@makecol</code> : Removed dead code . . .                                                    | 741 |
|                                                                                                                                                                                                                                                                              |          | 2005-07-27 ltssdcl.dtx v3.0j<br><code>\DeclareMathAlphabet</code> : (MH) Make<br>document commands robust . . .                      | 350 |

|                                                                                                                                                                            |               |                                                                                                                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <code>\DeclareSymbolFontAlphabet:</code> (MH)<br>Make document commands robust                                                                                             | 363           | <code>\t@st@ic:</code> Use switch <code>\ifmaybe@ic</code><br>instead of <code>\if@tempswa</code>                                                                                                                    | 419 |
| <code>\new@mathalphabet:</code> (MH) Make<br>document commands robust                                                                                                      | 351           | 2010-08-17 ltmiscen.dtx v1.1k<br><code>\enddocument:</code> Use braces around<br><code>\input arg (pr/4124)</code>                                                                                                   | 461 |
| <code>\non@alpherr:</code> (MH) Change because<br>command is now properly robust                                                                                           | 343           | 2010-08-17 ltmiscen.dtx v1.1l<br><code>\enddocument:</code> Change of plan: use<br><code>\@@input</code> instead (pr/4124)                                                                                           | 461 |
| <code>\SetMathAlphabet:</code> (MH) Make<br>document commands robust                                                                                                       | 352           | 2011-05-08 ltfssdcl.dtx v3.0n<br><code>\in@:</code> Simplified thanks to Bruno.                                                                                                                                      | 339 |
| 2005-09-27 ltoutenc.dtx v1.99g<br>General: Replace <code>\sh@ft</code> by<br><code>\ltx@sh@ft</code>                                                                       | 228, 231, 237 | 2011-08-19 ltclass.dtx v1.1i<br><code>\@ifclasswith:</code> Re-jig definition after<br>more stringent <code>\in@</code> test.                                                                                        | 641 |
| 2005-09-27 ltplain.dtx v1.1y<br><code>\ltx@sh@ft:</code> New macro                                                                                                         | 30            | 2011-09-03 ltfssdcl.dtx v3.0o<br><code>\new@mathversion:</code> (Will) Remove<br><code>\global</code> before <code>\newcount</code><br>(unnecessary and caused etex<br>bug).                                         | 347 |
| <code>\sh@ft:</code> Macro no longer used but left<br>for compatibility                                                                                                    | 30            | 2012-01-20 ltplain.dtx v2.0b<br><code>\loggingall:</code> etex tracing if available                                                                                                                                  | 31  |
| 2005-11-08 ltoutenc.dtx v1.99h<br>General: Added <code>\ij</code> and <code>\IJ</code> from<br>babel. (pr/3771)                                                            | 225, 229, 232 | 2013-07-07 ltclass.dtx v1.1i<br>General: Correctly describe how the<br>date in <code>\@ifpackagelater</code> is used                                                                                                 | 635 |
| 2005-11-10 ltmath.dtx v1.1g<br><code>\l:</code> (MH) Fixed potential problem in<br><code>\l</code> (pr/3399).                                                              | 487           | 2014-04-18 ltoutput.dtx v1.1o<br>General: Handle infinite glue from<br><code>\enlargethispage</code> (pr/4023)                                                                                                       | 785 |
| General: (MH) Minor documentation<br>fixes.                                                                                                                                | 480           | 2014-04-24 ltoutput.dtx v1.2n<br><code>\fl@tracemessage:</code> Renamed internal<br>trace commands; provide as<br>package                                                                                            | 775 |
| 2006-05-18 ltboxes.dtx v1.1g<br><code>\@parboxto:</code> Ensure <code>\@parboxto</code> holds<br>the value of <code>\@tempdima</code> not the<br>register itself (pr/3867) | 519           | 2014-04-27 ltfloating.dtx v1.2b<br><code>\end@dblfloat:</code> Inline the code to<br>allow some coexistence with<br>packages that hook into<br><code>\end@float</code> and do not know<br>about the algorithm change | 608 |
| 2006-09-13 ltoutput.dtx v1.1m<br>General: Ensure that rule is in<br><code>\normalcolor</code>                                                                              | 785           | 2014-06-10 ltfloating.dtx v1.2b<br><code>\end@dblfloat:</code> missing <code>\fi</code> added                                                                                                                        | 608 |
| 2007-08-05 ltclass.dtx v1.1h<br><code>\@fileswithoptions:</code> Prevent loss of<br>brackets PR/3965                                                                       | 650           | 2014-12-30 ltfinal.dtx v2.0a<br><code>\newmarks:</code> macro added                                                                                                                                                  | 792 |
| 2007-08-06 ltctrl.dtx v1.0h<br><code>\@fornoop:</code> Really make defs long                                                                                               | 159           | <code>\newXeTeXintercharclass:</code> macro<br>added                                                                                                                                                                 | 792 |
| 2007-08-31 ltfssdcl.dtx v3.0l<br><code>\SetSymbolFont@:</code> Font warning<br>changed to info for encoding<br>change (pr/3975)                                            | 349           | 2014-12-30 ltfloating.dtx v1.2a<br><code>\@textsubscript:</code> Command added<br>(latexrelease)                                                                                                                     | 618 |
| 2009-09-24 ltvers.dtx v1.0l<br>General: Stop checking for old format                                                                                                       | 34            | <code>\textsubscript:</code> Command added<br>(latexrelease)                                                                                                                                                         | 618 |
| 2009-10-20 ltfssdcl.dtx v3.0m<br><code>\in@:</code> More robust thanks to Heiko.                                                                                           | 339           | 2014-12-30 ltfssbas.dtx v3.0y<br><code>\mathgroup:</code> move allocation to<br>ltplain.                                                                                                                             | 267 |
| 2009-10-28 lttextcomp.dtx v1.99k<br>General: Added Latin Modern and<br>TeX Gyre subsets                                                                                    | 451           | 2014-12-30 ltoutput.dtx v1.2m<br>General: Command updated<br>(latexrelease)                                                                                                                                          | 784 |
| 2009-11-04 lttextcomp.dtx v1.99l<br>General: Added more Latin Modern<br>and TeX Gyre subsets                                                                               | 451           |                                                                                                                                                                                                                      |     |
| 2009-12-14 ltfntcmd.dtx v3.4a<br><code>\ifmaybe@ic:</code> Macro added                                                                                                     | 418           |                                                                                                                                                                                                                      |     |
| <code>\maybe@ic@:</code> Use switch <code>\ifmaybe@ic</code><br>instead of <code>\if@tempswa</code>                                                                        | 418           |                                                                                                                                                                                                                      |     |

|                                                               |                                                    |
|---------------------------------------------------------------|----------------------------------------------------|
| 2014-12-30 ltplain.dtx v2.0a                                  | 2015-01-11 ltcounts.dtx v1.1h                      |
| <code>\e@alloc</code> : macro added . . . . . 19              | <code>\TextOrMath</code> : Add command to solve    |
| <code>\e@alloc@chardef</code> : macro added . . . 18          | robustness issues (pr/3752)                        |
| <code>\e@alloc@top</code> : macro added . . . . . 18          | (latexrelease) . . . . . 263                       |
| <code>\e@ch@ck</code> : macro added . . . . . 19              | 2015-01-11 ltfloat.dtx v1.2b                       |
| <code>\extrafloats</code> : macro added . . . . . 20          | <code>\dblfloatplacement</code> : float order in   |
| <code>\newlanguage</code> : New engine-specific               | 2-column (latexrelease) . . . . . 610              |
| allocation scheme (latexrelease) . . 17                       | <code>\xfloat</code> : Check for valid option      |
| 2014-12-30 ltspace.dtx v1.3b                                  | (latexrelease) . . . . . 604                       |
| <code>\@</code> : <code>\@</code> discards spaces when moving | <code>\end@dblfloat</code> : float order in        |
| (pr3039)(latexrelease) . . . . . 188                          | 2-column (latexrelease) . . . . . 608              |
| 2015-01-03 ltdefs.dtx v1.4a                                   | 2015-01-11 ltfssbas.dtx v3.0y                      |
| <code>\typein</code> : use modified definition in             | <code>\DeclareMathSizes</code> : Allow arbitrary   |
| luatex . . . . . 71                                           | units (latexrelease) . . . . . 274                 |
| 2015-01-03 ltdirchk.dtx v1.1                                  | 2015-01-11 ltspace.dtx v1.3d                       |
| General: Enable extra primitives when                         | <code>\Esphack</code> : Allow hyphenation          |
| LuaTeX is used . . . . . 3                                    | (Donald Arseneau pr/3498)                          |
| 2015-01-03 ltfinal.dtx v2.0a                                  | (latexrelease) . . . . . 181                       |
| General: Skip resetting codes with                            | <code>\esphack</code> : Allow hyphenation          |
| Unicode engines . . . . . 802                                 | (Donald Arseneau pr/3498)                          |
| Unicode data loading added . . . . 794                        | (latexrelease) . . . . . 180                       |
| 2015-01-07 ltvers.dtx v1.0n                                   | 2015-01-14 ltoutput.dtx v1.2n                      |
| <code>\IncludeInRelease</code> : macro added . . 35           | <code>\addtocurcol</code> : float order in         |
| 2015-01-08 ltboxes.dtx v1.1h                                  | 2-column (latexrelease) . . . . . 756              |
| <code>\framebox</code> : Make Robust                          | <code>\addtodblcol</code> : float order in         |
| (latexrelease) . . . . . 517                                  | 2-column (latexrelease) . . . . . 767              |
| <code>\makebox</code> : Make Robust (latexrelease) 512        | <code>\addtonextcol</code> : float order in        |
| <code>\parbox</code> : Make Robust (latexrelease) 519         | 2-column (latexrelease) . . . . . 763              |
| <code>\raisebox</code> : Make Robust                          | <code>\docclearpage</code> : Empty kludgeins box   |
| (latexrelease) . . . . . 524                                  | if necessary, pr/3528 . . . . . 738                |
| <code>\rule</code> : Make Robust (latexrelease) . 523         | float order in 2-column                            |
| <code>\savebox</code> : Make Robust (latexrelease) 515        | (latexrelease) . . . . . 738                       |
| 2015-01-08 ltdefs.dtx v1.4a                                   | <code>\startdblcolumn</code> : float order in      |
| <code>\MakeRobust</code> : Added macro . . . . . 81           | 2-column (latexrelease) . . . . . 750              |
| 2015-01-08 ltlength.dtx v1.1c                                 | <code>\xtryfc</code> : float order in 2-column     |
| <code>\setlength</code> : to ensure first length              | (latexrelease) . . . . . 752                       |
| argument is terminated.                                       | <code>\ztryfc</code> : float order in 2-column     |
| (latexrelease) . . . . . 265                                  | (latexrelease) . . . . . 753                       |
| 2015-01-08 ltmath.dtx v1.1h                                   | 2015-01-14 ltspace.dtx v1.3e                       |
| <code>\)</code> : Make Robust (latexrelease) . . . 487        | <code>\addpenalty</code> : Avoid adding redundant  |
| <code>\]</code> : Make Robust (latexrelease) . . . 487        | skips (DPC) . . . . . 184                          |
| 2015-01-09 ltfssini.dtx v3.1a                                 | 2015-01-17 ltvers.dtx v1.0m                        |
| <code>\em</code> : Allow <code>\emph</code> to produce small  | <code>\IncludeInRelease</code> : modified with     |
| caps (latexrelease) . . . . . 383                             | <code>\@currname</code> . . . . . 35               |
| <code>\eminnershape</code> : macro added                      | 2015-01-19 ltvers.dtx v1.0o                        |
| (latexrelease) . . . . . 383                                  | <code>\IncludeInRelease</code> : Optional          |
| 2015-01-09 ltspace.dtx v1.1h                                  | argument . . . . . 35                              |
| <code>\addpenalty</code> : Donald Arseneau's fix              | 2015-01-20 ltoutput.dtx v1.2m                      |
| from PR/377703 (latexrelease) . . 184                         | <code>\fl@tracemessage</code> : Reset              |
| 2015-01-10 ltcounts.dtx v1.1h                                 | <code>\IncludeInRelease</code> flags . . . . . 776 |
| <code>\@fnsymbol</code> : Unse <code>\TextOrMath</code>       | 2015-01-22 ltvers.dtx v1.0p                        |
| (latexrelease) . . . . . 262                                  | General: Preserve any <code>\everyjob</code>       |
| <code>\@stpelt</code> : Reset all within counters in          | material inserted by a loader ( <code>.ini</code>  |
| one go (latexrelease) . . . . . 259                           | file) . . . . . 35                                 |

|                                                                      |                                                              |
|----------------------------------------------------------------------|--------------------------------------------------------------|
| 2015-01-23 ltfinal.dtx v2.0b                                         | 2015-02-21 ltvers.dtx v1.0r                                  |
| <code>\newmarks</code> : use reserved count 256 . . . 792            | General: Removed autoload code . . . 34                      |
| <code>\newXeTeXintercharclass</code> : use                           | 2015-02-21 ltvers.dtx v1.0w                                  |
| reserved count 257 . . . . . 792                                     | <code>\IncludeInRelease</code> : set <code>\@currname</code> |
| 2015-01-23 ltplain.dtx v2.0c                                         | empty here (in case                                          |
| <code>\extrafloats</code> : reserve counts 256–265 20                | <code>\IncludeInRelease</code> input early) . 35             |
| 2015-01-24 ltfinal.dtx v2.0c                                         | 2015-02-22 ltfsscmp.dtx v3.0e                                |
| General: Skip T1-code entirely with                                  | General: Moved all code into                                 |
| Unicode engines . . . . . 794                                        | <code>latexrelease</code> - obsolete commands                |
| 2015-02-03 ltfinal.dtx v2.0d                                         | are no longer automatically part of                          |
| General: Set <code>\lccode</code> for – with                         | the kernel . . . . . 334                                     |
| Unicode engines . . . . . 795                                        | 2015-03-02 ltplain.dtx v2.0f                                 |
| 2015-02-16 ltoutenc.dtx v1.99m                                       | <code>\e@mathgroup@top</code> : macro added . . . 19         |
| General: Added <code>\textcommabelow</code>                          | <code>\newlanguage</code> : allow 255 math groups            |
| <code>latex/4414</code> . . . . . 227                                | in Unicode engines . . . . . 17                              |
| 2015-02-16 ltoutenc.dtx v1.99n                                       | 2015-03-10 ltplain.dtx v2.0g                                 |
| General: Added <code>\textcommaabove</code> . . 228                  | <code>\hideoutput</code> : macro added . . . . . 32          |
| Added composites for <code>ç</code> . . . . . 235                    | <code>\loggingall</code> : Reorganise to be less             |
| Added composites for <code>\c</code> . . . . . 230                   | noisy . . . . . 31                                           |
| 2015-02-16 lttextcomp.dtx v1.99m                                     | <code>\tracingnone</code> : macro added . . . . . 32         |
| General: Added <code>lmtt</code> (Heiko Oberdiek)                    | 2015-03-12 ltoutput.dtx v1.2m                                |
| <code>latex/4415</code> . . . . . 451                                | General: initialise <code>\@dbldeferlist</code>              |
| 2015-02-19 ltvers.dtx v1.0q                                          | again . . . . . 728                                          |
| <code>\IncludeInRelease</code> : Swap argument                       | 2015-03-18 ltfssdcl.dtx v3.0q                                |
| order . . . . . 35                                                   | <code>\DeclareSymbolFont</code> : Restrict Symbol            |
| 2015-02-20 ltplain.dtx v2.0d                                         | fonts to 0–15 . . . . . 348                                  |
| <code>\loggingall</code> : Spell commands                            | <code>\document@select@group</code> : Introduce              |
| correctly :-) . . . . . 31                                           | <code>\e@mathgroup@top</code> . . . . . 344                  |
| 2015-02-21 ltdefs.dtx v1.4b                                          | <code>\select@group</code> : Introduce                       |
| General: Removed autoload support . 69                               | <code>\e@mathgroup@top</code> . . . . . 342                  |
| 2015-02-21 lterror.dtx v1.2o                                         | 2015-03-26 ltfinal.dtx v2.0d                                 |
| General: Removed autoload support 160                                | General: Use renamed                                         |
| 2015-02-21 ltfiles.dtx v1.1m                                         | <code>unicode-letters.def</code> . . . . . 794               |
| General: Removed autoload support 192                                | 2015-04-07 ltfssbas.dtx v3.1a                                |
| 2015-02-21 ltfssbas.dtx v3.0z                                        | <code>\wrong@fontshape</code> : Try loading fd file          |
| General: Removed autoload code . . 267                               | if family has changed . . . . . 284                          |
| 2015-02-21 ltfsscmp.dtx v3.0d                                        | 2015-04-28 ltfinal.dtx v2.0f                                 |
| General: Removed autoload code . . 334                               | <code>\newXeTeXintercharclass</code> : define                |
| 2015-02-21 ltfssdcl.dtx v3.0p                                        | <code>\xe@alloc@intercharclass</code> for                    |
| General: Removed autoload code . . 339                               | compatibility with older xelatex                             |
| 2015-02-21 ltfssstrc.dtx v3.0k                                       | initialisation . . . . . 792                                 |
| General: Removed autoload code . . 311                               | 2015-05-10 ltlists.dtx v1.0t                                 |
| 2015-02-21 ltoutenc.dtx v1.99m                                       | <code>\@doendpe</code> : Explicitly reset                    |
| General: Removed autoload code . . 212                               | <code>\clubpenalty</code> before clearing                    |
| 2015-02-21 ltoutput.dtx v1.2n                                        | <code>\everypar</code> ; see also pr/0462 and                |
| General: Removed autoload code . . 717                               | pr/4065 . . . . . 505                                        |
| <code>\f@depth</code> : macro added( <code>latexrelease</code> ) 737 | 2015-06-19 ltfinal.dtx v2.0g                                 |
| 2015-02-21 ltpictur.dtx v1.1k                                        | <code>\e@alloc@intercharclass@top</code> : Use               |
| General: Removed autoload code . . 551                               | –1 for first range to get contiguous                         |
| 2015-02-21 ltplain.dtx v2.0e                                         | allocation . . . . . 793                                     |
| General: Removed autoload code . . . 14                              | <code>\newmarks</code> : Use –1 for first range to           |
| 2015-02-21 lttab.dtx v1.1n                                           | get contiguous allocation . . . . . 792                      |
| General: Removed autoload code . . 526                               |                                                              |



|                                                                 |     |                                                                    |
|-----------------------------------------------------------------|-----|--------------------------------------------------------------------|
| 2015-06-19 ltplain.dtx v2.0h                                    |     | <code>create_callback</code> : Function added . . 60               |
| General: delete spurious old definition                         |     | <code>provides_module</code> : Function added . . 50               |
| of <code>\newtoks</code> . . . . .                              | 23  | <code>luatexbase</code> : Table added . . . . . 49                 |
| <code>\e@alloc</code> : extra braces in case                    |     | 2015-10-02 ltdirchk.dtx v1.2a                                      |
| arguments not single token . . . . .                            | 19  | General: Allow backing out of                                      |
| <code>\newlanguage</code> : Use <code>—1</code> for first range |     | unprefixed names . . . . . 3                                       |
| to get contiguous allocation . . . . .                          | 17  | 2015-10-02 ltluatex.dtx v1.0b                                      |
| 2015-06-23 ltfinal.dtx v2.0h                                    |     | General: Fix backing out of T <sub>E</sub> X code 48               |
| General: set <code>\patch@level</code> in ltvers                |     | 2015-10-02 ltluatex.dtx v1.0c                                      |
| rather than in ltfinal/ltpatch . . .                            | 804 | General: Allow backing out of Lua                                  |
| 2015-06-23 ltvers.dtx v1.0t                                     |     | code . . . . . 48                                                  |
| General: set <code>\patch@level</code> in ltvers                |     | 2015-10-02 ltluatex.dtx v1.0e                                      |
| rather than in ltfinal/ltpatch . . .                            | 34  | <code>uninstall</code> : Function added . . . . . 63               |
| 2015-08-06 ltplain.dtx v2.0i                                    |     | 2015-10-03 ltluatex.dtx v1.0f                                      |
| <code>\extrafloats</code> : Add <code>\string</code> in case    |     | <code>provides_module</code> : use <code>luatexbase_</code> log 50 |
| argument is not an unexpandable                                 |     | 2015-10-27 ltplain.dtx v2.1b                                       |
| primitive . . . . .                                             | 20  | <code>\extrafloats</code> : Use global assignment                  |
| 2015-08-23 ltdirchk.dtx v1.2                                    |     | when switching to extended range 20                                |
| General: Do not use luatex prefix . . .                         | 3   | 2015-11-07 ltspace.dtx v1.3f                                       |
| 2015-08-23 ltvers.dtx v1.0v                                     |     | <code>\esphack</code> : Only space if there is no                  |
| General: Allow negative patchlevel for                          |     | space at the end of the hlist                                      |
| pre-release . . . . .                                           | 35  | latex/4443 . . . . . 180                                           |
| 2015-08-30 ltplain.dtx v2.1a                                    |     | 2015-11-14 ltluatex.dtx v1.0g                                      |
| <code>\newinsert</code> : new <code>\newinsert</code>           |     | General: Track LuaT <sub>E</sub> X changes for                     |
| implementation . . . . .                                        | 22  | <code>(new)token.create</code> . . . . . 51                        |
| 2015-09-205 ltoutput.dtx v1.3a                                  |     | 2015-11-18 ltplain.dtx v2.2a                                       |
| General: extended <code>\@freelist</code> . . . .               | 727 | <code>\newlanguage</code> : Extended stream                        |
| 2015-09-24 ltluatex.dtx v1.0a                                   |     | allocation in luatex (0.85) . . . . . 17                           |
| <code>call_callback</code> : Function added . . . .             | 60  | 2015-11-19 ltplain.dtx v2.2b                                       |
| <code>callback.register</code> : Function                       |     | <code>\newlanguage</code> : Only extend allocation                 |
| modified . . . . .                                              | 57  | of write streams (see luatex list) . 17                            |
| <code>callback_descriptions</code> : Function                   |     | 2015-11-27 ltluatex.dtx v1.0h                                      |
| added . . . . .                                                 | 63  | <code>callback_descriptions</code> : Match test                    |
| <code>\catcodetable@atletter</code> : Macro                     |     | in in-callback latex/4445 . . . . . 63                             |
| added . . . . .                                                 | 45  | <code>in_callback</code> : Guard against undefined                 |
| <code>\catcodetable@initex</code> : Macro added 45              |     | list latex/4445 . . . . . 63                                       |
| <code>\catcodetable@latex</code> : Macro added . 45             |     | 2015-11-29 ltluatex.dtx v1.0i                                      |
| <code>\catcodetable@string</code> : Macro added 45              |     | General: Declare this as local before                              |
| <code>add_to_callback</code> : Function added . . 61            |     | used in the module error                                           |
| <code>remove_from_callback</code> : Function                    |     | definitions (PHG) . . . . . 49                                     |
| added . . . . .                                                 | 62  | <code>call_callback</code> : Check name is not nil                 |
| <code>new_attribute</code> : Function added . . . .             | 52  | in error message (PHG) . . . . . 60                                |
| <code>disable_callback</code> : Function added . 63             |     | <code>create_callback</code> : Check name is not                   |
| <code>in_callback</code> : Function added . . . . . 63          |     | nil in error message (PHG) . . . . . 60                            |
| <code>\newattribute</code> : Macro added . . . . . 44           |     | 2015-12-02 ltluatex.dtx v1.0j                                      |
| <code>\newcatcodetable</code> : Macro added . . . 44            |     | General: Adjust hashtokens to store                                |
| <code>\newluabytecode</code> : Macro added . . . .              | 47  | the result of <code>tex.hashtokens()</code> , not                  |
| <code>\newluachunkname</code> : Macro added . . . 47            |     | the function (PHG) . . . . . 51                                    |
| <code>\newluafunction</code> : Macro added . . . .              | 46  | Assorted typos fixed (PHG) . . . . . 42                            |
| <code>\newwhatsit</code> : Macro added . . . . . 47             |     | Declaration/use of <code>first_</code> head fixed                  |
| <code>module_error</code> : Function added . . . .              | 51  | (PHG) . . . . . 50                                                 |
| <code>module_info</code> : Function added . . . . . 51          |     | Remove nonlocal iteration variables                                |
| <code>module_warning</code> : Function added . . . 51           |     | (PHG) . . . . . 42                                                 |
| <code>modules</code> : Function modified . . . . . 49           |     |                                                                    |

|                                                                                                |     |                                                                                                  |          |
|------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------|----------|
| Remove unreachable code after calls to error() (PHG) . . . . .                                 | 42  | <code>\DeclareMathAccent</code> : Check for mathaccent not <code>\mathaccent</code> . . .        | 354      |
| 2015-12-02 ltluatex.dtx v1.0k                                                                  |     | <code>\DeclareMathRadical</code> : Check for radical not <code>\radical</code> . . . . .         | 361      |
| General: resolve name and i.description (PHG) . . . . .                                        | 58  | <code>\DeclareMathSymbol</code> : Check for mathchar not <code>\mathchar</code> . . . . .        | 356      |
| <code>call_callback</code> : Give more specific error messages (PHG) . . . . .                 | 60  | 2016-03-13 ltluatex.dtx v1.0n                                                                    |          |
| <code>add_to_callback</code> : Give more specific error messages (PHG) . . . . .               | 61  | General: contribute_ filter added . . .                                                          | 56       |
| <code>remove_from_callback</code> : adjust initialisation of cb local (PHG) . .                | 62  | insert_ local_ par added . . . . .                                                               | 56       |
| Give more specific error messages (PHG) . . . . .                                              | 62  | 2016-03-29 ltpictur.dtx v1.1l                                                                    |          |
| <code>create_callback</code> : Give more specific error messages (PHG) . . . . .               | 60  | <code>\@oval</code> : add setting of line tests . . .                                            | 573, 574 |
| 2015-12-10 ltfinal.dtx v2.0i                                                                   |     | initialise tests . . . . .                                                                       | 573      |
| General: Use new common Unicode data loaders . . . . .                                         | 794 | <code>\@ovhorz</code> : use glue not leaders if horizontal line not required . . . .             | 576      |
| 2015-12-18 ltluatex.dtx v1.0l                                                                  |     | <code>\@ovvert</code> : use glue not leaders if vertical line not required . . . . .             | 575      |
| General: Load Unicode data from source . . . . .                                               | 45  | <code>\if@ovhline</code> : macro added (latex/4452) . . . . .                                    | 573      |
| 2016-01-04 ltfinal.dtx v2.0j                                                                   |     | <code>\if@ovvline</code> : macro added (latex/4452) . . . . .                                    | 573      |
| General: Do not set up inter character classes for XeTeX . . . . .                             | 794 | 2016-04-22 ltfinal.dtx v2.0q                                                                     |          |
| <code>\e@alloc@intercharclass@top</code> : Start allocation at one not three . . . .           | 792 | <code>\e@alloc@intercharclass@top</code> : XeTeX 0.99996 has 4096 char classes not 256 . . . . . | 793      |
| 2016-01-05 ltfinal.dtx v2.0k                                                                   |     | 2016-06-19 ltoutenc.dtx v1.99m                                                                   |          |
| <code>\e@alloc@intercharclass@top</code> : Remove duplicated code . . . . .                    | 792 | General: OT1 definition (was duplicate T1 definition) . . . . .                                  | 230      |
| 2016-01-05 ltfinal.dtx v2.0l                                                                   |     | 2016-06-20 ltclass.dtx v1.1j                                                                     |          |
| General: Correct latexrelease guards . . . . .                                                 | 794 | General: don't declare as <code>\@onlypreamble</code> . . . . .                                  | 640      |
| Ensure old definitions for inter-character class toks are available using latexrelease . . . . | 794 | 2016-07-29 ltplain.dtx v2.2c                                                                     |          |
| Missing brace . . . . .                                                                        | 794 | <code>\extrafloats</code> : use <code>\global \chardef</code> . . .                              | 20       |
| 2016-01-05 ltfinal.dtx v2.0m                                                                   |     | <code>\newinsert</code> : fix for tlb-newinsert-001 . . .                                        | 22       |
| General: Undefine XeTeX classes when using patching an older kernel . .                        | 794 | 2016-10-02 ltclass.dtx v1.2a                                                                     |          |
| 2016-01-05 ltfinal.dtx v2.0p                                                                   |     | <code>\@ifclasswith</code> : Ignore spaces while checking for option clash . . . . .             | 641      |
| General: Only apply XeTeX change if XeTeX is in use . . . . .                                  | 794 | <code>\ExecuteOptions</code> : Ignore spaces in argument . . . . .                               | 647      |
| 2016-02-11 ltluatex.dtx v1.0m                                                                  |     | 2016-10-15 ltdirchk.dtx v1.2b                                                                    |          |
| General:                                                                                       |     | General: Require eTeX . . . . .                                                                  | 4        |
| pdf_ stream_ filter_ callback removed . . . . .                                                | 57  | 2016-10-15 lterror.dtx v1.2p                                                                     |          |
| process_ rule, [hv]pack_ quality append_ to_ vlist_ filter added . .                           | 56  | General: Require eTeX . . . . .                                                                  | 160      |
| read_ cidmap_ file added . . . . .                                                             | 56  | 2016-10-15 ltfinal.dtx v2.0r                                                                     |          |
| show_ warning_ message added . .                                                               | 56  | General: Require eTeX . . . . .                                                                  | 792      |
| token_ filter removed . . . . .                                                                | 56  | 2016-10-15 ltfinal.dtx v2.0s                                                                     |          |
| 2016-02-18 ltfsdcl.dtx v3.0r                                                                   |     | General: Tidy up status of char 127 . . .                                                        | 792      |
| <code>\DeclareMathDelimiter</code> : Check for delimiter not <code>\delimiter</code> . . . .   | 359 | 2016-10-15 ltfsini.dtx v3.1b                                                                     |          |
|                                                                                                |     | General: Require eTeX . . . . .                                                                  | 366      |
|                                                                                                |     | 2016-10-15 ltplain.dtx v2.2d                                                                     |          |
|                                                                                                |     | General: Require eTeX . . . . .                                                                  | 14       |
|                                                                                                |     | 2016-10-16 ltplain.dtx v2.3a                                                                     |          |
|                                                                                                |     | <code>\newlanguage</code> : Allow languages up to 16383 in luatex . . . . .                      | 17       |



|                                |  |                                                                                                                                                   |     |
|--------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 2016-10-19 ltcounts.dtx v1.1j  |  | declare composites with empty base for hat and tilde, use same slots for <code>\textasciicircum</code> ans <code>\textasciitilde</code> . . . . . | 243 |
| 2016-11-06 ltplain.dtx v2.3b   |  | declare straight quotes using new <code>\remove@tlig</code> command . . . . .                                                                     | 243 |
| 2016-11-09 ltclass.dtx v2.1b   |  | 2017-02-22 ltoutenc.dtx v2.0g                                                                                                                     |     |
| 2016-11-17 ltluatex.dtx v1.0p  |  | 2017-02-24 ltoutenc.dtx v2.0h                                                                                                                     |     |
| 2016-12-03 fontdef.dtx v3.0a   |  | General: introduce <code>\DeclareUnicodeAccent</code> . . . . .                                                                                   | 243 |
| 2016-12-04 ltoutenc.dtx v2.0a  |  | <code>\DeclareTextCompositeCommand</code> : add check whether the accent command is defined for this encoding . . . .                             | 219 |
| 2017-01-01 ltoutput.dtx v1.3b  |  | 2017-03-08 ltclass.dtx v1.2c                                                                                                                      |     |
| 2017-01-10 ltffssbas.dtx v3.2a |  | General: add <code>\@parse@version@dash</code> to support yyyy-mm-dd as well as yyyy/mm/dd . . . . .                                              | 640 |
| 2017-01-23 ltoutenc.dtx v2.0b  |  | 2017-03-09 ltfinal.dtx v2.0t                                                                                                                      |     |
| 2017-01-24 ltoutenc.dtx v2.0c  |  | <code>\l@nohyphenation</code> : ensure <code>\l@nohyphenation</code> is defined. . .                                                              | 797 |
| 2017-02-12 ltoutenc.dtx v2.0e  |  | 2017-03-09 ltmiscen.dtx v1.1m                                                                                                                     |     |
| 2017-02-18 ltluatex.dtx v1.1c  |  | <code>\@verbatim</code> : Use <code>\language</code> not <code>\hyphenchar</code> . . . . .                                                       | 474 |
| 2017-03-08 ltclass.dtx v1.2c   |  | <code>\verb</code> : Use <code>\language</code> to stop hyphenation . . . . .                                                                     | 478 |
| 2017-03-10 ltoutput.dtx v1.3c  |  | 2017-03-10 ltfiles.dtx v1.1n                                                                                                                      |     |
| 2017-03-13 ltdefns.dtx v1.5a   |  | <code>\document</code> : Save language default . .                                                                                                | 195 |
| 2017-03-27 ltdefns.dtx v1.5b   |  | 2017-03-10 ltoutput.dtx v1.3c                                                                                                                     |     |
| 2017-04-05 ltoutenc.dtx v2.0i  |  | <code>\@writersetup</code> : Reset <code>\language</code> . . .                                                                                   | 745 |
| 2017-04-10 ltplain.dtx v2.3c   |  | 2017-03-13 ltdefns.dtx v1.5a                                                                                                                      |     |
| 2017-04-11 ltoutput.dtx v2.4a  |  | <code>\-</code> : Define <code>\-</code> in terms of <code>\hyphenchar</code> .                                                                   | 96  |
| 2017-12-17 ltoutput.dtx v1.4b  |  | 2017-03-27 ltdefns.dtx v1.5b                                                                                                                      |     |
|                                |  | <code>\@dischyph</code> : Define <code>\@dischyph</code> after <code>\-</code> . . . . .                                                          | 96  |
|                                |  | 2017-03-28 ltluatex.dtx v1.1e                                                                                                                     |     |
|                                |  | General: <code>glyph_</code> <code>stream_</code> provider added . . . . .                                                                        | 57  |
|                                |  | 2017-03-29 ltboxes.dtx v1.3a                                                                                                                      |     |
|                                |  | <code>\@arrayparboxrestore</code> : Reset <code>\lineskiplimit</code> . . . . .                                                                   | 520 |
|                                |  | 2017-04-05 ltoutenc.dtx v2.0i                                                                                                                     |     |
|                                |  | <code>\DeclareTextCompositeCommand</code> : Declare accent command if not already declared when declaring a composite. . . . .                    | 219 |
|                                |  | 2017-04-10 ltplain.dtx v2.3c                                                                                                                      |     |
|                                |  | <code>\newlanguage</code> : Correction to code to skip write18 in luatex . . . . .                                                                | 17  |
|                                |  | 2017-04-11 ltoutput.dtx v2.4a                                                                                                                     |     |
|                                |  | <code>\newpage</code> : account for the depth of the last row of the page . . . . .                                                               | 731 |
|                                |  | 2017-12-17 ltoutput.dtx v1.4b                                                                                                                     |     |
|                                |  | <code>\@addtonextcol</code> : fix doc guards . . .                                                                                                | 763 |
| 2016-10-19 ltcounts.dtx v1.1j  |  |                                                                                                                                                   |     |
| 2016-11-06 ltplain.dtx v2.3b   |  |                                                                                                                                                   |     |
| 2016-11-09 ltclass.dtx v2.1b   |  |                                                                                                                                                   |     |
| 2016-11-17 ltluatex.dtx v1.0p  |  |                                                                                                                                                   |     |
| 2016-12-03 fontdef.dtx v3.0a   |  |                                                                                                                                                   |     |
| 2016-12-04 ltoutenc.dtx v2.0a  |  |                                                                                                                                                   |     |
| 2017-01-01 ltoutput.dtx v1.3b  |  |                                                                                                                                                   |     |
| 2017-01-10 ltffssbas.dtx v3.2a |  |                                                                                                                                                   |     |
| 2017-01-23 ltoutenc.dtx v2.0b  |  |                                                                                                                                                   |     |
| 2017-01-24 ltoutenc.dtx v2.0c  |  |                                                                                                                                                   |     |
| 2017-02-12 ltoutenc.dtx v2.0e  |  |                                                                                                                                                   |     |
| 2017-02-18 ltluatex.dtx v1.1c  |  |                                                                                                                                                   |     |
| 2017-03-08 ltclass.dtx v1.2c   |  |                                                                                                                                                   |     |
| 2017-03-10 ltoutput.dtx v1.3c  |  |                                                                                                                                                   |     |
| 2017-03-13 ltdefns.dtx v1.5a   |  |                                                                                                                                                   |     |
| 2017-03-27 ltdefns.dtx v1.5b   |  |                                                                                                                                                   |     |
| 2017-04-05 ltoutenc.dtx v2.0i  |  |                                                                                                                                                   |     |
| 2017-04-10 ltplain.dtx v2.3c   |  |                                                                                                                                                   |     |
| 2017-04-11 ltoutput.dtx v2.4a  |  |                                                                                                                                                   |     |
| 2017-12-17 ltoutput.dtx v1.4b  |  |                                                                                                                                                   |     |

|                                         |                                                                                                                       |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 2018-01-06 ltdefs.dtx 1.5c              | 2018-05-29 ltclass.dtx v1.2j                                                                                          |
| \@ifundefined: Avoid defining           | \endfilecontents: use \curname not                                                                                    |
| undefined commands to \relax .. 92      | \@undefined ..... 662                                                                                                 |
| 2018-02-18 ltclass.dtx v1.2d            | 2018-08-11 ltoutenc.dtx v2.0j                                                                                         |
| \@ifl@ter: Added 0 up front to make     | General: Provide \guillemetleft and                                                                                   |
| bad data come out as 0. .... 640        | \guillemetright 232, 238, 246, 247                                                                                    |
| General: Introduce rollback concept 667 | 2018-08-18 ltluatex.dtx v1.1h                                                                                         |
| 2018-03-08 ltcounts.dtx v1.1k           | General: append_ to_ vlist_ filter is                                                                                 |
| \@ifbothcounters: Interface added 260   | exclusive ..... 56                                                                                                    |
| \@removefromreset: Interface added 259  | 2018-08-24 ltfinal.dtx v2.1f                                                                                          |
| \counterwithin: Interface added .. 260  | \document@default@language: Add to                                                                                    |
| \counterwithout: Interface added . 260  | latexrelease (github/68) ..... 797                                                                                    |
| 2018-03-24 ltclass.dtx v1.2e            | 2018-09-02 ltsect.dtx v1.1b                                                                                           |
| \pkgcls@use@this@release: Use full      | \@dottedtocline: Prevent protrusion                                                                                   |
| file name for old release ..... 672     | ( <a href="https://tex.stackexchange.com/q/172785/10109">https://tex.stackexchange.com/q/172785/10109</a> ) ..... 598 |
| 2018-03-25 ltfinal.dtx v2.1a            | 2018-09-24 fontdef.dtx v3.0b                                                                                          |
| General: default to UTF-8 ..... 798     | General: Start LR-mode if necessary                                                                                   |
| \UseRawInputEncoding: Macro added 799   | (git/49) ..... 407                                                                                                    |
| 2018-03-27 ltclass.dtx v1.2f            | 2018-09-24 ltmath.dtx v1.2b                                                                                           |
| \endfilecontents: Use full file name    | \smash: Start LR-mode if necessary                                                                                    |
| for old release ..... 661               | (git/49) ..... 483                                                                                                    |
| 2018-04-06 ltfinal.dtx v2.1b            | \vpantom: Start LR-mode if                                                                                            |
| \UseRawInputEncoding: Undo changes      | necessary (git/49) ..... 483                                                                                          |
| to \DeclareFontEncoding@ and            | 2018-09-24 ltspace.dtx v1.3h                                                                                          |
| definition of                           | \enspace: Start LR-mode if necessary                                                                                  |
| \DeclareUnicodeCharacter .... 799       | (git/49) ..... 189                                                                                                    |
| 2018-04-07 ltfinal.dtx v2.1c            | \leavevmode@ifvmode: Macro added                                                                                      |
| \UseRawInputEncoding: Undefine          | (git/49) ..... 189                                                                                                    |
| \inputencodingname ..... 799            | 2018-09-26 ltdefs.dtx v1.5e                                                                                           |
| 2018-04-08 ltclass.dtx v1.2g            | \renew@command: Always explicitly                                                                                     |
| \@ifl@ter: Strip leading spaces from    | generate a space after the curname                                                                                    |
| dates. .... 640                         | and not rely on \noexpand to save                                                                                     |
| 2018-04-08 ltclass.dtx v1.2h            | tokens (git/41) ..... 75                                                                                              |
| \@onefilewithoptions: Pass              | 2018-09-26 ltmiscen.dtx v1.1n                                                                                         |
| expanded date ..... 668                 | \@writefile: Sometimes mask the                                                                                       |
| 2018-04-08 ltfinal.dtx v2.1d            | endline char when writing to files                                                                                    |
| General: Delay full UTF-8 handling to   | (github/73) ..... 465                                                                                                 |
| \everyjob ..... 800                     | \add@percent@to@temptokena:                                                                                           |
| 2018-04-11 ltcounts.dtx v1.1l           | Sometimes mask the endline char                                                                                       |
| \counterwithin: Correct default         | when writing to files (github/73) 464                                                                                 |
| (issue/38) ..... 260                    | \protected@file@percent: Sometimes                                                                                    |
| 2018-05-02 ltluatex.dtx v1.1g           | mask the endline char when                                                                                            |
| General: find_ sfd_ file removed ... 55 | writing to files (github/73) .... 464                                                                                 |
| finish_ synctex_ callback added .. 56   | 2018-09-26 ltsect.dtx v1.1c                                                                                           |
| glyph_ not_ found added ..... 57        | \addcontentsline: Sometimes mask                                                                                      |
| read_ sfd_ file removed ..... 55        | the endline char when writing to                                                                                      |
| 2018-05-08 ltclass.dtx v1.2i            | files (github/73) ..... 596                                                                                           |
| \pkgcls@parse@date@arg: Make            | 2018-10-10 ltspace.dtx v1.3i                                                                                          |
| suspicious rollback a warning not       | \@esphack: Don't introduce                                                                                            |
| error: github issue 43 ..... 670        | breakpoints if @nobreak is true                                                                                       |
| 2018-05-11 ltfinal.dtx v2.18            | and after sections ..... 180                                                                                          |
| General: Make invalid UTF-8 also safe,  |                                                                                                                       |
| for legacy filesystem encodings .. 800  |                                                                                                                       |

|                                                                                                                    |     |                                                                                                      |     |
|--------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------|-----|
| 2018-10-11 ltmiscen.dtx v1.1o                                                                                      |     | font__descriptor__objnum__-<br>provider<br>added . . . . .                                           | 57  |
| \@@sverb: Provide visible space in<br>\verb* also for XeTeX and<br>LuaTeX (github/69) . . . . .                    | 477 | make__extensible added . . . . .                                                                     | 57  |
| \@setupverbvisibleospace: Provide<br>visible space in \verb* also for<br>XeTeX and LuaTeX (github/69) . . . . .    | 476 | new__graf added . . . . .                                                                            | 56  |
| \@verbvisibleospacebox: Provide<br>visible space in \verb* also for<br>XeTeX and LuaTeX (github/69) . . . . .      | 476 | page__objnum__provider added . . . . .                                                               | 56  |
| \asciispace: Provide visible space in<br>\verb* also for XeTeX and<br>LuaTeX (github/69) . . . . .                 | 475 | process__pdf__image__content<br>added . . . . .                                                      | 56  |
| verbatim*: Provide visible space in<br>\verb* also for XeTeX and<br>LuaTeX (github/69) . . . . .                   | 476 | wrapup__run added . . . . .                                                                          | 56  |
| \verbvisibleospace: Provide<br>\verbvisibleospace such that it is<br>usable in normal text (github/70) . . . . .   | 475 | 2019-07-01 ltclass.dtx v1.3a                                                                         |     |
| Provide visible space in \verb* also<br>for XeTeX and LuaTeX<br>(github/69) . . . . .                              | 475 | \endfilecontents: Support UTF8<br>and spaces in filecontents<br>environment file name . . . . .      | 659 |
| 2018-10-21 ltuatex.dtx v1.1i                                                                                       |     | 2019-07-01 ltfiles.dtx v1.2a                                                                         |     |
| new_luafunction: Function added . . . . .                                                                          | 54  | \IfFileExists: Support UTF-8 . . . . .                                                               | 205 |
| 2018-11-09 ltbib1.dtx LaTeX2e                                                                                      |     | \includeonly: Support UTF-8 . . . . .                                                                | 200 |
| \bibliography: Zap spaces in the<br>argument as BibTeX doesn't<br>support them (github/88) . . . . .               | 626 | \set@curr@file: Support UTF-8 . . . . .                                                              | 204 |
| 2018-11-18 ltoutenc.dtx v2.0k                                                                                      |     | 2019-07-09 ltfssbas.dtx v3.2c                                                                        |     |
| General: Provide \Hwithstroke and<br>\hwithstroke . . . . .                                                        | 248 | \DeclareErrorFont: Don't set any<br>\font... macros . . . . .                                        | 283 |
| 2018-11-19 ltoutenc.dtx v2.0k                                                                                      |     | 2019-07-09 ltfssini.dtx v3.1c                                                                        |     |
| General: Added \Hwithstroke and<br>\hwithstroke . . . . .                                                          | 231 | General: Explicitly set some defaults . . . . .                                                      | 387 |
| 2018-11-28 ltoutput.dtx v1.4d                                                                                      |     | 2019-08-22 ltxref.dtx v1.11                                                                          |     |
| \@combinedblfloats: Unbox<br>\@outputbox to preserve boxing<br>level (github/94) . . . . .                         | 750 | \labelformat: Commanded moved<br>from varioref.sty . . . . .                                         | 457 |
| 2018-12-30 lttab.dtx v1.1p                                                                                         |     | \Ref: Commanded moved from<br>varioref.sty . . . . .                                                 | 457 |
| \@tabclassz: Add extra \hskip to<br>guard against an \unskip at the<br>start of a c-column cell (gh/102) . . . . . | 546 | \refstepcounter: Allow \p@... to<br>have an argument . . . . .                                       | 457 |
| 2019-02-07 ltfilehook.dtx v1.1o                                                                                    |     | 2019-08-27 fontdef.dtx v3.0c                                                                         |     |
| \InputIfFileExists: Expand<br>\@filef@und before executing<br>second argument (github/109) . . . . .               | 684 | General: Various commands made<br>robust throughout the file . . . . .                               | 400 |
| 2019-02-07 ltfiles.dtx v1.1o                                                                                       |     | 2019-08-27 ltboxes.dtx v1.3b                                                                         |     |
| \@swaptwoargs: Helper macro added . . . . .                                                                        | 207 | General: Various commands made<br>robust . . . . .                                                   | 511 |
| 2019-02-07 ltfssbas.dtx v3.2b                                                                                      |     | 2019-08-27 ltclass.dtx v1.3b                                                                         |     |
| \define@newfont: Changed wording of<br>warning (github/107) . . . . .                                              | 280 | \endfilecontents: Make various<br>commands robust . . . . .                                          | 659 |
| 2019-06-18 ltuatex.dtx v1.1j                                                                                       |     | 2019-08-27 ltdefs.dtx v1.5f                                                                          |     |
| General: finish__synctex__callback<br>renamed finish__synctex . . . . .                                            | 56  | General: Make various commands<br>robust . . . . .                                                   | 97  |
|                                                                                                                    |     | \MakeRobust: Make the assignments<br>global as we may need to apply<br>them inside a group . . . . . | 81  |
|                                                                                                                    |     | 2019-08-27 ltfilehook.dtx v1.2b                                                                      |     |
|                                                                                                                    |     | \InputIfFileExists: Make command<br>robust . . . . .                                                 | 684 |
|                                                                                                                    |     | 2019-08-27 ltfiles.dtx v1.2b                                                                         |     |
|                                                                                                                    |     | \IfFileExists: Make command<br>robust . . . . .                                                      | 205 |
|                                                                                                                    |     | 2019-08-27 ltfssbas.dtx v3.2d                                                                        |     |
|                                                                                                                    |     | General: Make various commands<br>robust . . . . .                                                   | 267 |

|                                                                                                                                     |                                  |          |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------|
| 2019-08-27 ltfsdcl.dtx v3.0s                                                                                                        | command already robust . . . . . | 356      |
| <code>\DeclareMathAccent</code> : Make math accents robust . . . . .                                                                |                                  | 354      |
| <code>\set@mathdelimiter</code> : Make math delimiters robust . . . . .                                                             |                                  | 361      |
| 2019-08-27 ltfsini.dtx v3.1d                                                                                                        |                                  |          |
| General: Make various commands robust . . . . .                                                                                     |                                  | 366      |
| 2019-08-27 ltidxglo.dtx v1.1f                                                                                                       |                                  |          |
| General: Make <code>\index</code> and <code>\glossary</code> robust . . . . .                                                       |                                  | 621      |
| 2019-08-27 ltlength.dtx v1.1d                                                                                                       |                                  |          |
| General: Make various command robust . . . . .                                                                                      |                                  | 265      |
| 2019-08-27 ltlogos.dtx v1.1j                                                                                                        |                                  |          |
| <code>\TeX</code> : Make <code>\TeX</code> command robust . . . . .                                                                 |                                  | 191      |
| 2019-08-27 ltmath.dtx v1.2c                                                                                                         |                                  |          |
| General: Make various commands robust . . . . .                                                                                     |                                  | 480      |
| 2019-08-27 ltmiscen.dtx v1.1p                                                                                                       |                                  |          |
| General: Make various commands robust . . . . .                                                                                     |                                  | 459      |
| <code>\begin</code> : Make command robust . . . . .                                                                                 |                                  | 466      |
| <code>\end</code> : Make command robust . . . . .                                                                                   |                                  | 469      |
| 2019-08-27 ltoutput.dtx v1.4e                                                                                                       |                                  |          |
| <code>\@begindvibox</code> : Make <code>\AtBeginDvi</code> robust . . . . .                                                         |                                  | 729      |
| 2019-08-27 ltpage.dtx v1.0l                                                                                                         |                                  |          |
| General: Make various commands robust . . . . .                                                                                     |                                  | 628      |
| 2019-08-27 ltpictur.dtx v1.1m                                                                                                       |                                  |          |
| General: Make various commands robust . . . . .                                                                                     |                                  | 551      |
| Remove several unnecessary <code>\gdef</code> definitions . . . . .                                                                 |                                  | 551      |
| 2019-08-27 ltsect.dtx v1.1d                                                                                                         |                                  |          |
| General: Make various commands robust . . . . .                                                                                     |                                  | 587      |
| 2019-08-27 ltspc.dtx v1.3j                                                                                                          |                                  |          |
| General: Make various commands robust . . . . .                                                                                     |                                  | 172      |
| 2019-08-27 lttab.dtx v1.1q                                                                                                          |                                  |          |
| General: Make various commands robust . . . . .                                                                                     |                                  | 526      |
| Remove several unnecessary <code>\gdef</code> definitions . . . . .                                                                 |                                  | 526      |
| 2019-08-30 lterror.dtx v1.2q                                                                                                        |                                  |          |
| <code>\conditionally@traceoff</code> : Macro added . . . . .                                                                        |                                  | 169      |
| <code>\conditionally@traceon</code> : Macro added . . . . .                                                                         |                                  | 169      |
| 2019-09-09 ltfsdcl.dtx v3.0s                                                                                                        |                                  |          |
| <code>\DeclareMathSymbol</code> : Allow definition if the math symbol was a                                                         |                                  |          |
| 2019-09-11 ltclass.dtx v1.3c                                                                                                        |                                  |          |
| <code>\endfilecontents</code> : Support optional argument for filecontents . . . . .                                                |                                  | 659      |
| 2019-09-14 ltfinal.dtx v2.1h                                                                                                        |                                  |          |
| <code>\euclclist</code> : Expand UTF8 chrs when case changing (github/177) . . . . .                                                |                                  | 804      |
| 2019-09-16 ltxref.dtx v1.1m                                                                                                         |                                  |          |
| General: Correctly revert the <code>\p@...</code> change . . . . .                                                                  |                                  | 457      |
| 2019-09-21 fontdef.dtx v3.0d                                                                                                        |                                  |          |
| General: Distangle alias (gh/184) . . . . .                                                                                         |                                  | 402, 406 |
| 2019-10-02 ltxexpl.dtx v0.0                                                                                                         |                                  |          |
| General: Initial version . . . . .                                                                                                  |                                  | 65       |
| 2019-10-02 ltfinal.dtx v2.2                                                                                                         |                                  |          |
| General: Load <code>ltxexpl</code> . . . . .                                                                                        |                                  | 805      |
| 2019-10-02 lthuatex.dtx v1.1k                                                                                                       |                                  |          |
| General: <code>linebreak_filter</code> is <b>exclusive</b> . . . . .                                                                |                                  | 56       |
| <code>mlist_to_hlist</code> is <b>exclusive</b> . . . . .                                                                           |                                  | 56       |
| <code>process_rule</code> is <b>exclusive</b> . . . . .                                                                             |                                  | 56       |
| 2019-10-07 lttab.dtx v1.1q                                                                                                          |                                  |          |
| <code>\extracolsep</code> : This needs to expand . . . . .                                                                          |                                  | 538      |
| 2019-10-11 ltfiles.dtx v1.2c                                                                                                        |                                  |          |
| <code>\set@curr@file</code> : Remove one brace group . . . . .                                                                      |                                  | 204      |
| 2019-10-11 ltfsstrc.dtx v3.0l                                                                                                       |                                  |          |
| <code>\@font@aliasinfo</code> : Added 'alias' size function . . . . .                                                               |                                  | 332      |
| 2019-10-18 ltclass.dtx v1.3d                                                                                                        |                                  |          |
| <code>\load@onefilewithoptions</code> : Initialize <code>\...-h@@k</code> only when loading the package or class (gh/198) . . . . . |                                  | 652      |
| 2019-10-22 lthuatex.dtx v1.1j                                                                                                       |                                  |          |
| General: <code>page_objnum_provider</code> and <code>process_pdf_image_content</code> classified data . . . . .                     |                                  | 56       |
| 2019-10-25 ltmiscen.dtx v1.1q                                                                                                       |                                  |          |
| <code>\add@percent@to@temptokena</code> : Allow unbalanced conditionals in #1 (gh/202) . . . . .                                    |                                  | 464      |
| 2019-10-26 ltfiles.dtx v1.2d                                                                                                        |                                  |          |
| <code>\@iffilenamepath</code> : quote on openin . . . . .                                                                           |                                  | 206      |
| <code>\IfFileExists</code> : dont quote name . . . . .                                                                              |                                  | 205      |
| <code>\IfFileExists@</code> : quote on openin . . . . .                                                                             |                                  | 205      |
| <code>\set@curr@file</code> : remove quotes . . . . .                                                                               |                                  | 204      |
| 2019-11-01 ltdirchk.dtx v1.3a                                                                                                       |                                  |          |
| <code>\filename@parse</code> : take last . not first . . . . .                                                                      |                                  | 12       |
| 2019-11-02 ltmiscen.dtx v1.1s                                                                                                       |                                  |          |
| <code>\@centercr</code> : Make <code>\@centercr</code> robust (gh/203) . . . . .                                                    |                                  | 471      |
| 2019-11-02 ltspc.dtx v1.3k                                                                                                          |                                  |          |
| <code>\@normalcr</code> : Make also <code>\@normalcr</code> robust . . . . .                                                        |                                  | 176      |

|                                     |                                        |
|-------------------------------------|----------------------------------------|
| 2019-11-09 ltfiles.dtx v1.2e        | 2020-01-22 lttextcomp.dtx v1.0b        |
| \set@curr@file: expand and \string  | \tc@subst: The overall default is      |
| before removing quotes . . . . .    | \textcompsubstdefault not              |
| 2019-11-10 ltmiscen.dtx v1.1r       | \substdefault . . . . .                |
| \add@percent@to@temptokena: fix to  | 2020-01-25 fontdef.dtx v3.0f           |
| special comment catcodes            | General: Load tlenc.def last (gh/255)  |
| (gh/202) . . . . .                  | 2020-01-25 ltoutenc.dtx v2.0m          |
| 2019-11-11 ltfiles.dtx v1.2f        | General: Load each encoding file only  |
| \iffileonpath: make \@filef@und     | once (gh/255) . . . . .                |
| match quoting used on \openin .     | 2020-01-27 ltclass.dtx v1.3g           |
| 2019-11-22 ltoutenc.dtx v2.0l       | \endfilecontents: Fix typo in error    |
| General: Avoid spurious if fontenc  | message . . . . .                      |
| selects LY1 as default encoding     | 2020-01-28 ltclass.dtx v1.3h           |
| (gh/199) . . . . .                  | \endfilecontents: Allow spaces in      |
| 2019-11-29 ltclass.dtx v1.3e        | option string and display only         |
| \@pr@videpackage: Protect package   | unknown options not the whole          |
| info text (gh/52) . . . . .         | option list (gh/256) . . . . .         |
| 2019-12-17 fontdef.dtx v3.0e        | 2020-01-31 ltvers.dtx v1.1e            |
| \mddefault: Set \bfdefault to “b”   | General: Allow for upcoming format as  |
| \shapedefault: Set \shapedefault    | pre-release 0 . . . . .                |
| explicitly to “n” . . . . .         | 2020-02-02 ltluatex.dtx v1.1l          |
| \updefault: Set \updefault to “up”  | General: Add reverselist callback type |
| 2019-12-17 ltfntcmd.dtx v3.4c       | glyph_ info added . . . . .            |
| textssc: Macro added . . . . .      | page_ order_ index added . . . . .     |
| 2019-12-17 ltfssbas.dtx v3.2e       | post_ linebreak_ filter is             |
| \usefont: Don’t call \fontseries or | reverselist . . . . .                  |
| \fontshape . . . . .                | create_callback: Provide proper        |
| 2019-12-17 ltfssini.dtx v3.1e       | fallbacks for user-defined callbacks   |
| General: Provide custom series      | without user-provided default          |
| settings a la mweights . . . . .    | handler . . . . .                      |
| \DeclareEmphSequence: Provide \emph | 2020-02-05 ltfssini.dtx v3.1g          |
| sequences . . . . .                 | \DeclareFontSeriesDefault:             |
| 2019-12-18 ltoutenc.dtx v2.0m       | Clarified error text . . . . .         |
| General: Don’t fake                 | Corrected misspelled csname            |
| \textcompwordmark; take default     | (gh/264) . . . . .                     |
| from T1 instead . . . . .           | 2020-02-05 lttextcomp.dtx v2.0n        |
| \add@accent: Avoid code that breaks | General: Changed the package default   |
| \accent . . . . .                   | to info (gh/262) . . . . .             |
| 2019-12-21 fontdef.dtx v3.0e        | Ensure we are on a new format          |
| General: Distangle alias (gh/184)   | (gh/260) . . . . .                     |
| 2020-01-05 ltclass.dtx v1.3f        | 2020-02-07 ltfssini.dtx v3.1h          |
| \endfilecontents: Support more      | \symbol: XeTeX-specific version to     |
| write streams in LuaTeX gh/238      | avoid bug in maths mode. . . . .       |
| 2020-01-11 ltfssini.dtx v3.1f       | 2020-02-10 ltfssaxes.dtx v1.0c         |
| \rmfamily: Streamlined              | \fontseries: Switch                    |
| implementation with hook . . . . .  | \if@forced@series added . . . . .      |
| \ttfamily: Streamlined              | \fontseriesforce: Switch               |
| implementation with hook . . . . .  | \if@forced@series added . . . . .      |
| 2020-01-20 ltfssdcl.dtx v3.0t       | \if@forced@series: Switch              |
| \set@mathdelimater: fix for gh/251  | \if@forced@series added . . . . .      |
| 2020-01-20 ltoutenc.dtx v2.0n       | 2020-02-10 ltfssini.dtx v3.1h          |
| General: fix for gh/251 . . . . .   | \@defaultfamilyhook: Add               |
|                                     | \@defaultfamilyhook to                 |
|                                     | \normalfont (gh/269) . . . . .         |

|                                                               |                                                                   |
|---------------------------------------------------------------|-------------------------------------------------------------------|
| <code>\reset@font</code> : Add                                | <code>\update@series@target@value</code> : Drop                   |
| <code>\@defaultfamilyhook</code> to                           | surplus “m” from <code>\reserved@</code>                          |
| <code>\normalfont</code> (gh/269) . . . . . 386               | (gh/291) . . . . . 371                                            |
| 2020-02-10 lttextcomp.dtx v1.0c                               | 2020-02-27 ltdefns.dtx v1.5g                                      |
| General: Use <code>\@tabacckludge</code> for                  | <code>\@gobblethree</code> : Macro added . . . . . 78             |
| tabbing where necessary (gh/271) 428                          | 2020-02-27 ltfssaxes.dtx v1.0d                                    |
| 2020-02-11 fontdef.dtx v3.0g                                  | <code>\series@maybe@drop@one@m</code> : Drop                      |
| General: Provide value for                                    | “m” in certain values from a fixed                                |
| <code>\@fontenc@load@list</code> (gh/273) . 391               | list (gh/293) . . . . . 304                                       |
| 2020-02-11 ltfssini.dtx v3.1h                                 | <code>\set@target@series</code> : Drop “m” only                   |
| General: Provide default value for                            | in a specific set of values (gh/293) 304                          |
| <code>\@fontenc@load@list</code> (gh/273) . 387               | 2020-02-27 ltfssbas.dtx v3.2g                                     |
| 2020-02-11 ltoutenc.dtx v2.0o                                 | <code>\DeclareFontShape@</code> : Only “m” if the                 |
| General: Update                                               | series value is a member of a fixed                               |
| <code>\@fontenc@load@list</code> with option                  | list and issue warning if doing it                                |
| list (gh/273) . . . . . 256                                   | (gh/293) . . . . . 268                                            |
| 2020-02-14 ltpictur.dtx v1.1n                                 | 2020-03-02 ltexpl.dtx v1.0a                                       |
| <code>\linethickness</code> : Suppress spaces                 | General: Don’t load expl3 if already in                           |
| following the declaration (gh/274) 556                        | the format (gh/295) . . . . . 65                                  |
| 2020-02-18 ltfssini.dtx v3.1i                                 | 2020-03-05 ltexpl.dtx v1.1                                        |
| <code>\bfseries</code> : Make the <code>\ifx</code> selection | General: Load xparse.ltx if                                       |
| outside of <code>\fontseries</code> argument                  | <code>\NewDocumentCommand</code> is not                           |
| so that it is not done several times 374                      | defined by expl3.ltx . . . . . 65                                 |
| <code>\mdseries</code> : Make the <code>\ifx</code> selection | 2020-03-06 ltboxes.dtx v1.3c                                      |
| outside of <code>\fontseries</code> argument                  | <code>\clap</code> : Macro <code>\clap</code> added . . . . . 525 |
| so that it is not done several times 375                      | 2020-03-07 ltluatex.dtx v1.1m                                     |
| <code>\prepare@family@series@update</code> : No               | <code>remove_from_callback</code> : Do not call                   |
| series auto-update when forced                                | callback.register for user-defined                                |
| (gh/277) . . . . . 369                                        | callbacks . . . . . 62                                            |
| Recognize current family if it is not                         | 2020-03-07 ltmath.dtx v1.2e                                       |
| a “meta” family and auto-update                               | <code>\negthickspace</code> : Add <code>amsmath</code>            |
| series using <code>\bfdefault</code> (gh/277) 370             | math/text spacing commands to                                     |
| 2020-02-18 ltmath.dtx v1.2d                                   | the kernel (gh/303) . . . . . 485                                 |
| <code>\mathindent</code> : Make <code>\mathindent</code> a    | 2020-03-07 ltspace.dtx v1.3l                                      |
| skip register to match <code>amsmath</code>                   | General: Moved <code>\thinspace</code> ,                          |
| (gh/252) . . . . . 492                                        | <code>\negthinspace</code> and <code>\,</code> to                 |
| <code>equation</code> : Separate formula and eqn              | ltmath.dtx (gh/303) . . . . . 172                                 |
| number by at least a space in fleqn                           | 2020-03-19 fontdef.dtx v3.0h                                      |
| option . . . . . 493                                          | General: Support legacy use of                                    |
| 2020-02-20 ltclass.dtx v1.3j                                  | <code>\bfdefault</code> and <code>\mddefault</code>               |
| <code>\endfilecontents</code> : Fix missing quotes            | (gh/306) . . . . . 394                                            |
| around file name (gh/284) . . . . 661                         | 2020-03-19 ltfssdcl.dtx v3.0u                                     |
| 2020-02-24 ltfssbas.dtx v3.2f                                 | <code>\document@select@group</code> : fix for                     |
| <code>\DeclareFontShape@</code> : Drop surplus                | (gnats/3357) . . . . . 344                                        |
| “m” in series when defining                                   | 2020-03-19 ltfssini.dtx v3.1k                                     |
| fontshape (gh/289) . . . . . 268                              | <code>\bfseries</code> : Support legacy use of                    |
| 2020-02-25 ltfssini.dtx v3.1j                                 | <code>\bfdefault</code> and <code>\mddefault</code>               |
| <code>\bf@def@ult</code> : Drop surplus “m” from              | (gh/306) . . . . . 374                                            |
| <code>\bfdef@ult</code> and <code>\mddef@ult</code>           | <code>\DeclareFontSeriesDefault</code> : Support                  |
| (gh/291) . . . . . 373                                        | legacy use of <code>\bfdefault</code> and                         |
| <code>\prepare@family@series@update</code> :                  | <code>\mddefault</code> (gh/306) . . . . . 368                    |
| Drop surplus “m” from                                         | <code>\mdseries</code> : Support legacy use of                    |
| <code>\target@series@value</code> (gh/291) 370                | <code>\bfdefault</code> and <code>\mddefault</code>               |
|                                                               | (gh/306) . . . . . 375                                            |



|                                       |                                           |
|---------------------------------------|-------------------------------------------|
| 2020-04-06 ltffssini.dtx v3.1m        | 2020-04-22 ltmiscen.dtx v1.1u             |
| \bf@def@ult: Hook added (gh/306) 374  | \@@sverb: Drop spaces before \verb        |
| \bfseries: Hook added (gh/306) .. 374 | delimiter (gh/327) ..... 477              |
| \mdseries: Hook added (gh/306) .. 375 | 2020-04-22 ltoutenc.dtx v2.0p             |
| 2020-04-07 ltclass.dtx v1.3k          | General: y unicode value in tuenc.def 212 |
| \IfFormatAtLeastTF: Macro added;      | 2020-04-29 lttextcomp.dtx v1.0d           |
| also in rollback (gh/168) ..... 639   | General: Make all captial accents text    |
| \load@onefile@withoptions: Use        | commands for hyperref (gh/332) 428        |
| different method to ignore            | 2020-05-02 ltfiles.dtx v1.2g              |
| unprocessed options (gh/22) 654, 655  | \@include: Support spaces in              |
| \ProcessOptions*: Use different       | filenames by enclosing the names          |
| method to ignore unprocessed          | of .aux-files in quotes (gh/217) . 202    |
| options (gh/22) ..... 646             | \includeonly: Get rid of leading and      |
| \RequirePackageWithOptions: Use       | trailing spaces from the filename         |
| different method to ignore            | (gh/217) ..... 200                        |
| unprocessed options (gh/22) ... 649   | Improved support for spaces in            |
| 2020-04-09 ltfloat.dtx v1.2d          | filenames (gh/217) ..... 200              |
| \@textsubscript: Set non-zero         | Pass the filename to \@include by         |
| baseline (gh/249) ..... 618           | value instead of by reference             |
| \textsubscript: Set non-zero baseline | (gh/217) ..... 200                        |
| (gh/249) ..... 618                    | 2020-05-05 ltxref.dtx v1.1n               |
| 2020-04-13 ltffsdcl.dtx v3.0v         | \refstepcounter: record the counter       |
| \process@table: Small update for      | name in \@currentcounter .... 457         |
| speed. .... 346                       | 2020-05-06 ltspaced.dtx v1.3n             |
| 2020-04-13 ltffssini.dtx v3.1n        | General: Made softthyphen active in       |
| \init@series@setup: Handling          | TU engines ..... 190                      |
| \seriesdefault changes (gh/315) 372   | 2020-05-09 ltdefns.dtx v1.5j              |
| \seriesdefault@kernel: Handling       | \@if@DeclareRobustCommand: Added          |
| \seriesdefault changes (gh/315) 388   | \DeclareCommandCopy (gh/239) .. 89        |
| 2020-04-21 ltmath.dtx v1.2f           | \DeclareCommandCopy: Added                |
| \@yeqncr: Support calc syntax         | \DeclareCommandCopy (gh/239) .. 87        |
| (gh/152) ..... 490                    | 2020-05-11 ltdefns.dtx v1.5j              |
| 2020-04-21 ltmiscen.dtx v1.1t         | \@dischyph: Do not overwrite \-           |
| \@icentercr: Support calc syntax      | under LuaTeX ..... 96                     |
| (gh/152) ..... 471                    | 2020-05-15 ltdefns.dtx v1.5g              |
| 2020-04-21 ltpictur.dtx v1.1o         | \typeout: Allow \par in the argument      |
| \@istackcr: Support calc syntax       | (gh/335) ..... 69                         |
| (gh/152) ..... 556                    | 2020-05-19 ltffsaxes.dtx v1.0e            |
| 2020-04-21 ltspaced.dtx v1.3m         | \series@maybe@drop@one@m: Need to         |
| \@hspace: Support calc syntax         | use \edef (gh/336) ..... 304              |
| (gh/152) ..... 189                    | 2020-05-19 ltffssini.dtx v3.2a            |
| \@newline: Support calc syntax        | \IfFontSeriesContextTF: Macros            |
| (gh/152) ..... 177                    | added (gh/335) ..... 379                  |
| \@vspace@calcify: Support calc        | 2020-05-31 ltmiscen.dtx v1.1u             |
| syntax (gh/152) ..... 177             | \centering: Added                         |
| \@vspacer: Support calc syntax        | \finalhyphendemerits setting              |
| (gh/152) ..... 186                    | (gh/247) ..... 472                        |
| \addvspace: Support calc syntax       | \raggedleft: Added                        |
| (gh/152) ..... 183                    | \finalhyphendemerits setting              |
| 2020-04-21 lttab.dtx v1.1r            | (gh/247) ..... 472                        |
| \@itabcr: Support calc syntax         | \raggedright: Added                       |
| (gh/152) ..... 532                    | \finalhyphendemerits setting              |
| \@yargarraycr: Support calc syntax    | (gh/247) ..... 472                        |
| (gh/152) ..... 540                    |                                           |

|                                               |          |  |                                        |    |
|-----------------------------------------------|----------|--|----------------------------------------|----|
| 2020-06-04 ltexpl.dtx v1.2c                   |          |  |                                        |    |
| General: Define a local version of some       |          |  |                                        |    |
| $\LaTeX$ 2 $\epsilon$ basic macros to support |          |  |                                        |    |
| package loading                               | 65       |  |                                        |    |
| 2020-06-04 ltfinal.dtx v2.2a                  |          |  |                                        |    |
| General: Load ltexpl in ltdefs                | 805      |  |                                        |    |
| 2020-06-05 ltclass.dtx v1.3l                  |          |  |                                        |    |
| $\@currnamestack$ : Added                     |          |  |                                        |    |
| $\@expl@pop@filename@$                        | 638      |  |                                        |    |
| Added $\@expl@push@filename@$                 |          |  |                                        |    |
| and                                           |          |  |                                        |    |
| $\@expl@push@filename@aux@$                   | 637      |  |                                        |    |
| 2020-06-05 ltfiles.dtx v1.2h                  |          |  |                                        |    |
| $\document$ : Added hook to load              |          |  |                                        |    |
| l3backend code                                | 195      |  |                                        |    |
| 2020-06-10 ltluatex.dtx v1.1n                 |          |  |                                        |    |
| General: Define                               |          |  |                                        |    |
| $\@gobble/\@firstofone$ even for              |          |  |                                        |    |
| $\LaTeX$ to allow early loading.              | 42       |  |                                        |    |
| 2020-07-04 ltoutenc.dtx v2.0q                 |          |  |                                        |    |
| General: Implement $\remove@tlig$ in          |          |  |                                        |    |
| Lua $\TeX$ without font reloading             | 244      |  |                                        |    |
| 2020-07-08 ltexpl.dtx v1.2d                   |          |  |                                        |    |
| General: Add a last-minute hook for           |          |  |                                        |    |
| expl3                                         | 65       |  |                                        |    |
| 2020-07-08 ltfinal.dtx v2.2b                  |          |  |                                        |    |
| General: Add a last-minute hook for           |          |  |                                        |    |
| expl3                                         | 797      |  |                                        |    |
| 2020-07-27 ltmath.dtx v1.2g                   |          |  |                                        |    |
| $\cases$ : Don't make the command             |          |  |                                        |    |
| $\long$ (gh/354)                              | 484      |  |                                        |    |
| $\matrix$ : Don't make the command            |          |  |                                        |    |
| $\long$ (gh/354)                              | 484      |  |                                        |    |
| $\pmatrix$ : Don't make the command           |          |  |                                        |    |
| $\long$ (gh/354)                              | 484      |  |                                        |    |
| 2020-07-27 ltoutenc.dtx v2.0r                 |          |  |                                        |    |
| $\@use@text@encoding$ : Don't make the        |          |  |                                        |    |
| command $\long$ (gh/354)                      | 221, 222 |  |                                        |    |
| 2020-07-27 ltpage.dtx v1.0m                   |          |  |                                        |    |
| $\markright$ : Don't make the command         |          |  |                                        |    |
| $\long$ (gh/354)                              | 629      |  |                                        |    |
| 2020-07-27 ltpictur.dtx v1.1p                 |          |  |                                        |    |
| $\linethickness$ : Don't make the             |          |  |                                        |    |
| command $\long$ (gh/354)                      | 556      |  |                                        |    |
| 2020-07-27 ltsect.dtx v1.1e                   |          |  |                                        |    |
| $\author$ : Don't make the command            |          |  |                                        |    |
| $\long$ (gh/354)                              | 587      |  |                                        |    |
| $\date$ : Don't make the command              |          |  |                                        |    |
| $\long$ (gh/354)                              | 587      |  |                                        |    |
| 2020-08-01 ltluatex.dtx v1.1p                 |          |  |                                        |    |
| General: new_ graf is <b>exclusive</b>        | 56       |  |                                        |    |
| 2020-08-02 ltluatex.dtx v1.1q                 |          |  |                                        |    |
| $\newattribute$ : Move reset to 0 inside      |          |  |                                        |    |
| conditional                                   | 44       |  |                                        |    |
|                                               |          |  | $\newluabytecode$ : Move reset to 0    |    |
|                                               |          |  | inside conditional                     | 47 |
|                                               |          |  | $\newluachunkname$ : Move reset to 0   |    |
|                                               |          |  | inside conditional                     | 47 |
|                                               |          |  | $\newluafunction$ : Move reset to 0    |    |
|                                               |          |  | inside conditional                     | 46 |
|                                               |          |  | $\newwhatsit$ : Move reset to 0 inside |    |
|                                               |          |  | conditional                            | 47 |
| 2020-08-08 ltclass.dtx v1.3m                  |          |  |                                        |    |
| $\endfilecontents$ : define                   |          |  |                                        |    |
| $\qcurr@file$ directly as the                 |          |  |                                        |    |
| quotes have already been removed              |          |  |                                        |    |
| (gh/220)                                      | 660      |  |                                        |    |
| 2020-08-10 ltluatex.dtx v1.1r                 |          |  |                                        |    |
| General: Load ltluatex Lua module             |          |  |                                        |    |
| during format building                        | 47       |  |                                        |    |
| 2020-08-15 ltpictur.dtx v1.2a                 |          |  |                                        |    |
| $\@defaultunitsset$ : Macro added             | 553      |  |                                        |    |
| 2020-08-19 ltdefs.dtx v1.5k                   |          |  |                                        |    |
| $\@carcube$ : Made $\long$ for                |          |  |                                        |    |
| $\NewCommandCopy$                             | 72       |  |                                        |    |
| $\robust@command@act$ : Made                  |          |  |                                        |    |
| $\robust@command@act$ (was                    |          |  |                                        |    |
| $\declare@command@copy$ ) more                |          |  |                                        |    |
| generic                                       | 85       |  |                                        |    |
| $\ShowCommand$ : Added $\ShowCommand$         |          |  |                                        |    |
| (gh/373)                                      | 88       |  |                                        |    |
| 2020-08-19 ltexpl.dtx v1.2e                   |          |  |                                        |    |
| General: Add                                  |          |  |                                        |    |
| $\@expl@cs@<thing>@spec@N$ for                |          |  |                                        |    |
| $\ShowCommand$ (gh/373)                       | 68       |  |                                        |    |
| Add $\@expl@cs@to@str@N$ and                  |          |  |                                        |    |
| $\@expl@str@if@eq@nnTF$ for                   |          |  |                                        |    |
| $\NewCommandCopy$ (gh/239)                    | 68       |  |                                        |    |
| 2020-08-20 ltplain.dtx v2.3d                  |          |  |                                        |    |
| $\alloc@$ : Define $\alloc@$ in terms of      |          |  |                                        |    |
| $\e@alloc$                                    | 21       |  |                                        |    |
| 2020-08-21 ltclass.dtx v1.3o                  |          |  |                                        |    |
| General: Integration of new hook              |          |  |                                        |    |
| management interface                          | 632      |  |                                        |    |
| 2020-08-21 ltdefs.dtx v1.5l                   |          |  |                                        |    |
| General: Integration of new hook              |          |  |                                        |    |
| management interface                          | 69       |  |                                        |    |
| 2020-08-21 ltdefs.dtx v1.5m                   |          |  |                                        |    |
| $\MakeRobust$ : Make $\MakeRobust$            |          |  |                                        |    |
| produce the same command                      |          |  |                                        |    |
| structure as                                  |          |  |                                        |    |
| $\DeclareRobustCommand$                       | 81       |  |                                        |    |
| 2020-08-21 ltexpl.dtx v1.2d                   |          |  |                                        |    |
| General: Dropped unused command               | 65       |  |                                        |    |
| 2020-08-21 ltfiles.dtx v1.2i                  |          |  |                                        |    |
| General: Integration of new hook              |          |  |                                        |    |
| management interface                          | 192      |  |                                        |    |



|                                                                                    |                                                               |
|------------------------------------------------------------------------------------|---------------------------------------------------------------|
| 2020-08-21 ltfinal.dtx v2.2i                                                       | 2020-09-09 ltshipout.dtx v1.0b                                |
| General: Integration of new hook                                                   | <code>\_shipout_picture_overlay:n</code> :                    |
| management interface . . . . . 792                                                 | Prevent overfull box warnings                                 |
| 2020-08-21 ltffssaxes.dtx v1.0g                                                    | (gh/387) . . . . . 708                                        |
| General: Integration of new hook                                                   | 2020-09-26 ltfinal.dtx v2.2j                                  |
| management interface . . . . . 310                                                 | General: Load first aid file if existing 806                  |
| 2020-08-21 ltffssini.dtx v3.2b                                                     | 2020-09-30 ltffssini.dtx v3.2d                                |
| <code>\bf@default</code> : Integration of new hook                                 | <code>\bfseries</code> : <code>\bfdefault@previous</code> not |
| management interface . . . . . 374                                                 | <code>\bfseries@previous</code> (gh/395) .. 374               |
| <code>\bfseries</code> : Integration of new hook                                   | <code>\mdseries</code> : <code>\mddefault@previous</code> not |
| management interface . . . . . 374                                                 | <code>\mdseries@previous</code> (gh/395) .. 375               |
| <code>mdseries/defaults</code> : Integration of                                    | 2020-10-01 ltclass.dtx v1.3r                                  |
| new hook management interface 377                                                  | <code>\pr@videpackage</code> : Allow for package              |
| <code>\mdseries</code> : Integration of new hook                                   | substitution . . . . . 642                                    |
| management interface . . . . . 375                                                 | 2020-10-01 ltsect.dtx v1.1e                                   |
| <code>\reset@font</code> : Integration of new hook                                 | <code>\addcontentsline</code> : add a fourth                  |
| management interface . . . . . 386                                                 | argument for better hyperref                                  |
| <code>\rmfamily</code> : Integration of new hook                                   | compability . . . . . 596                                     |
| management interface . . . . . 377                                                 | 2020-10-04 ltfiles.dtx v1.2j                                  |
| <code>\ttfamily</code> : Integration of new hook                                   | <code>\@include</code> : Quotes around the aux file           |
| management interface . . . . . 377                                                 | name removed, they are not                                    |
| 2020-08-21 ltmiscen.dtx v1.1v                                                      | needed and upset BibTeX                                       |
| General: Integration of new hook                                                   | (gh/400) . . . . . 202                                        |
| management interface . . . . . 459                                                 | 2020-10-04 lthooks.dtx v1.0d                                  |
| 2020-08-21 ltoutput.dtx v1.4f                                                      | General: Definition <code>\AddToHookNext</code>               |
| <code>\@begindivbox</code> : Integration of new                                    | was supposed to be for <code>\AddToHook</code>                |
| hook management interface . . . . 729                                              | vize versa (gh/401) . . . . . 152                             |
| 2020-08-23 ltxref.dtx v1.1o                                                        | 2020-10-08 ltclass.dtx v1.3s                                  |
| <code>\refstepcounter</code> : add default                                         | <code>\@currnamestack</code> : Added missing                  |
| definition of <code>\@currentcounter</code> . 457                                  | 2020/02/02 <code>\IncludeInRelease</code> . 637               |
| 2020-09-06 ltclass.dtx v1.3q                                                       | 2020-10-11 ltclass.dtx v1.3t                                  |
| <code>\load@onefilewithoptions</code> : Save                                       | <code>\load@onefilewithoptions</code> : Restore               |
| <code>\@currpkg@reqd</code> so that we don't                                       | <code>\@currpkg@reqd</code> after finished                    |
| lose track of package                                                              | loading a package file (gh/408). . 653                        |
| substitutions. . . . . 653                                                         | 2020-10-18 ltclass.dtx v1.3t                                  |
| 2020-09-06 ltdefns.dtx v1.5n                                                       | <code>\PassOptionsToClass</code> : Drop path                  |
| <code>\char@if@alph</code> : Macro added . . . . . 95                              | from <code>\input@path</code> (gh/414). . . 644               |
| 2020-09-06 ltexpl.dtx v1.2f                                                        | 2020-10-23 ltmiscen.dtx v1.1w                                 |
| General: Add                                                                       | <code>\enddocument</code> : Make                              |
| <code>\@expl@str@map@function@CNN</code> and <code>\@expl@char@generate@CNN</code> | <code>enddocument/afteraux</code> one-time 461                |
| for <code>\string@makeletter</code> (gh/386) 68                                    | 2020-12-02 ltluatex.dtx v1.1s                                 |
|                                                                                    | <code>\char@generate@CNN</code> value of list                 |
|                                                                                    | callbacks . . . . . 58                                        |

# Index

The italic numbers denote the pages where the corresponding entry is described, numbers underlined point to the definition, all others indicate the places where it is used.

| Symbols                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\!</code> . . . . .                             | <code>b364, b366, <u>E201</u>, U421</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>\"</code> . . . . .                             | <code>o226, o378, o416, o454, o465, o573, o605, o632, o640, o646, o650, o656, o660, o666, o672, o679, o680, o686, o690, o740, o786, o1210, o1228, o1234, o1238, o1244, o1248, o1254, o1260, o1267, o1268, o1274, o1278, o1280, o1387, r387, A185, A202, U422</code>                                                                                                                                                                                                                                                                                      |
| <code>\#</code> . . . . .                             | <code>a62, a75, b6, b14, b431, f686, r374, U405</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <code>\\$</code> . . . . .                            | <code>a74, b4, b13, f685, o307, o441, o448, o562, o798, o805, A547, A554, U406</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <code>\%</code> . . . . .                             | <code>a75, a105, a107, a127, b14, b429, f686, o488, o490, r376, A556, A670, D124, P1197, P1198, U407</code>                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <code>\&amp;</code> . . . . .                         | <code>a74, b5, b13, b430, f685, P278, U408</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>\'</code> . . . . .                             | <code>b451, o227, o379, o418, o452, o462, o575, o585, o591, o593, o596, o598, o606, o612, o618, o620, o623, o625, o633, o637, o644, o648, o653, o658, o661, o663, o670, o675, o676, o683, o688, o691, o741, o788, o807, o809, o810, o811, o814, o816, o817, o818, o820, o821, o1204, o1225, o1232, o1236, o1241, o1246, o1249, o1251, o1258, o1263, o1264, o1271, o1276, o1279, o1287, o1288, o1335, o1336, o1341, o1342, o1353, o1354, o1359, o1360, o1388, o1389, o1413, o1414, r386, w588, x253, A180, D562, E238, G271, G292, H72, S584, U423</code> |
| <code>\(</code> . . . . .                             | <code><u>E255</u>, <u>E329</u></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <code>\)</code> . . . . .                             | <code>b451, <u>E255</u>, E330</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <code>\*</code> . . . . .                             | <code>r379, <u>E235</u>, P878, P1009, P1123, P1199</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <code>\+</code> . . . . .                             | <code>H72</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <code>\,</code> . . . . .                             | <code>b365, b367, x506, D562, E7, E8, E40, E154, E156, E159, E184, E207, E208, E224</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>\-</code> . . . . .                             | <code>97, 190, b333, f24, <u>f720</u>, l416, l478, o413, o414, o568, o782, o783, r381, D562, G270, G291, H72, U157, U197</code>                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\.</code> . . . . .                             | <code>b364, b366, n47, n116, n174, o228, o380, o449, o450, o471, o581, o582, o608, o609, o635, o742, o812, o819, o1209, o1291, o1292, o1301, o1302, o1311, o1312, o1329, o1390, o1391, o1421, o1422, r380, A186, A203</code>                                                                                                                                                                                                                                                                                                                             |
| <code>\..default</code> . . . . .                     | <code>294</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <code>\/</code> . . . . .                             | <code>a97, f25, r328, r382, P277</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <code>\:</code> . . . . .                             | <code>b365, b367, f680, f681, <u>E201</u>, <u>E236</u></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <code>\;</code> . . . . .                             | <code>485, b365, b367, x500, E185, <u>E201</u></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <code>\&lt;</code> . . . . .                          | <code>o569, o733, r377, D562, H71, H109</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\=</code> . . . . .                             | <code>o229, o381, o470, o743, o1207, o1281, o1282, o1297, o1298, o1320, o1321, o1322, o1347, o1348, o1373, o1374, o1403, o1404, o1419, o1420, o1427, o1428, w588, A189, G271, G292, H71</code>                                                                                                                                                                                                                                                                                                                                                           |
| <code>\&gt;</code> . . . . .                          | <code>o566, o734, r378, D562, E213, E228, E229, E236, H71</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <code>\?</code> . . . . .                             | <code>b364, b366, U423</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| @@ commands:                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@@_set_curr_file:nNN</code> . . . . .          | <code><u>Q257</u></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <code>\@@_set_curr_file_assign:nnnNN</code> . . . . . | <code><u>Q257</u></code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <code>\@@par</code> . . . . .                         | <code>170</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <code>\@TeXversion</code> . . . . .                   | <code>1, 6</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| @botlist commands:                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@botlist:</code> . . . . .                     | <code>S1029, S1123, S1282</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| @botnum commands:                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@botnum:</code> . . . . .                      | <code>S1003</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\@car</code> . . . . .                          | <code>71</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@cdr</code> . . . . .                          | <code>71</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| @citeb commands:                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@citeb:</code> . . . . .                       | <code>N16, N41</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| @colht commands:                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@colht:</code> . . . . .                       | <code>S541, S555</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| @colnum commands:                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@colnum:</code> . . . . .                      | <code>S1188, S1356</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <code>\@cons</code> . . . . .                         | <code>71</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@currrdir</code> . . . . .                     | <code>1, 6</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| @currname commands:                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@currname:</code> . . . . .                    | <code>n614</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>\@dblarg</code> . . . . .                       | <code>70</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| @dbldeferlist commands:                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@dbldeferlist:</code> . . . . .                | <code>S1755, S1797</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| @dbltopnum commands:                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@dbltopnum:</code> . . . . .                   | <code>S1654, S1781</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| @deferlist commands:                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@deferlist:</code> . . . . .                   | <code>S1114, S1211, S1272, S1380, S1424, S1453, S1511, S1543, S1629, S1669</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>\@ifclasslater</code> . . . . .                 | <code>635</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <code>\@ifclassloaded</code> . . . . .                | <code>635</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <code>\@ifclasswith</code> . . . . .                  | <code>635</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <code>\@ifdefinable</code> . . . . .                  | <code>70</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@ifnextchar</code> . . . . .                   | <code>70</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\@ifpackagelater</code> . . . . .               | <code>635</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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|                                                        |                                    |                                                        |
|--------------------------------------------------------|------------------------------------|--------------------------------------------------------|
| <code>\@ifpackageloaded</code> .....                   | 635                                | U190, U191, U192, U193, U194,                          |
| <code>\@ifpackagewith</code> .....                     | 635                                | U195, U196, U410, U416, U417,                          |
| <code>\@ifstar</code> .....                            | 70                                 | U418, U419, U453, U454, U455,                          |
| <code>\@ifundefined</code> .....                       | 70                                 | U456, U457, U458, U459, U460, U461                     |
| <code>\@missingfileerror</code> .....                  | 636                                | <code>\_</code> .....                                  |
| <code>\@namedef</code> .....                           | 70                                 | a75, b8, b14,                                          |
| <code>\@nameuse</code> .....                           | 70                                 | f686, o314, x254, E253, E254, U411                     |
| <code>\@restorepar</code> .....                        | 170                                | <code>\‘</code> ..                                     |
| <code>\@setpar</code> .....                            | 170                                | o232, o383, o417, o451, o461, o574,                    |
| <code>@topnum</code> commands:                         |                                    | o636, o643, o647, o652, o657, o662,                    |
| <code>\@topnum:</code> .....                           | S1049                              | o669, o673, o674, o682, o687, o745,                    |
| <code>\[</code> r383, w40, w51, E273, E331, E428, U424 |                                    | o787, o1203, o1224, o1231, o1235,                      |
| <code>\]</code> .....                                  | 172                                | o1240, o1245, o1250, o1257, o1261,                     |
| <code>\]</code> .....                                  | a45, a46, a74, a247,               | o1262, o1270, o1275, r385, w588,                       |
| a248, a249, a250, a253, a260, a261,                    |                                    | A187, D562, G271, G292, H72, U426                      |
| a262, a263, a266, a273, a274, a275,                    |                                    | <code>\ </code> ....                                   |
| a276, a279, a286, a292, a293, a297,                    |                                    | o558, p135, p146, x573, x574, U427                     |
| a299, a300, a304, a309, a310, a313,                    |                                    | <code>\~</code> .....                                  |
| a319, b13, d264, d416, f209, f266,                     |                                    | a75, b10, b14, f686, j20,                              |
| f427, f515, f533, f685, g575, g586,                    |                                    | l422, o239, o287, o384, o464, o556,                    |
| g874, g895, j227, l52, l480, n607,                     |                                    | o639, o651, o655, o665, o681, o685,                    |
| n622, o557, r371, x251, D344, D349,                    |                                    | o746, o1206, o1223, o1227, o1239,                      |
| D354, D364, D368, D372, D396,                          |                                    | o1243, o1253, o1269, o1273, o1317,                     |
| E353, E488, G303, G411, G413,                          |                                    | o1318, o1319, o1371, o1372, A193,                      |
| H73, H170, H180, H194, U409, I139                      |                                    | A211, D493, D508, D523, D566, U414                     |
| <code>\{</code> .....                                  | a3,                                | <code>\sqcup</code> ....                               |
| a7, a74, b2, b13, j22, o308, o559,                     |                                    | a74, a91, b13, b370, b388, f685,                       |
| r372, x249, D395, E59, E154, U412                      |                                    | j19, j20, j21, j22, j25, l421, r368,                   |
| <code>\}</code> .....                                  | a8, a74, b3, b13, j21, o309,       | r618, r654, r679, x252, D392, D393,                    |
| o560, r373, x250, D395, E59, U413                      |                                    | D498, D513, J36, J38, N17, P271, U404                  |
| <code>\&lt;addto-cmd&gt;</code> .....                  | 100                                | <b>A</b>                                               |
| <code>\&lt;env&gt;</code> .....                        | 115                                | <code>\A</code> .....                                  |
| <code>\&lt;filename&gt;</code> .....                   | 688                                | U185, U429, U450                                       |
| <code>\&lt;name&gt;</code> internal commands:          |                                    | <code>\a</code> .....                                  |
| <code>\__hook next_&lt;name&gt;</code> .....           | 121                                | o223, H1, U176, U430, U441                             |
| <code>\]</code> ...                                    | b451, r384, E273, E332, E452, U425 | <code>\AA</code> .....                                 |
| <code>\^</code> .....                                  | a63, a72,                          | b376, o240, o425, o523                                 |
| a75, a119, a330, b7, b9, b11, b14,                     |                                    | <code>\aa</code> .....                                 |
| b370, b371, b385, b386, f20, f686,                     |                                    | b376, o245, o419, o533                                 |
| l480, l482, l484, o231, o286, o382,                    |                                    | <code>\abovedisplayshortskip</code> .....              |
| o453, o463, o555, o638, o645, o649,                    |                                    | b351, E496                                             |
| o654, o659, o664, o671, o677, o678,                    |                                    | <code>\abovedisplayskip</code> .....                   |
| o684, o689, o744, o1205, o1222,                        |                                    | b350,                                                  |
| o1226, o1233, o1237, o1242, o1247,                     |                                    | E489, E491, E493, E494, E495, E496                     |
| o1252, o1259, o1265, o1266, o1272,                     |                                    | <code>\accent</code> ..                                |
| o1277, o1289, o1290, o1307, o1308,                     |                                    | 304, o73, o393, o420, o476, o757                       |
| o1315, o1316, o1330, o1331, o1332,                     |                                    | <code>\active</code> .....                             |
| o1361, o1362, o1383, o1384, o1385,                     |                                    | a64, a119,                                             |
| o1386, r369, r370, r375, A184,                         |                                    | a330, b10, b11, b385, b386, b388,                      |
| A201, D116, D125, P879, P880,                          |                                    | D392, D393, D492, D498, D507,                          |
| P881, P963, P966, P969, P1010,                         |                                    | D513, D522, D564, E238, E253,                          |
| P1011, P1012, P1094, P1097,                            |                                    | P879, P880, P881, P963, P966,                          |
| P1100, P1124, P1125, P1126,                            |                                    | P969, P1010, P1011, P1012, P1094,                      |
| P1184, P1187, P1190, U188, U189,                       |                                    | P1097, P1100, P1124, P1125,                            |
|                                                        |                                    | P1126, P1184, P1187, P1190, S584                       |
|                                                        |                                    | <code>\acute</code> .....                              |
|                                                        |                                    | x516                                                   |
|                                                        |                                    | add commands:                                          |
|                                                        |                                    | <code>add_to_callback</code> .....                     |
|                                                        |                                    | d704                                                   |
|                                                        |                                    | <code>\add_to_callback</code> .....                    |
|                                                        |                                    | 41                                                     |
|                                                        |                                    | <code>\addcontentsline</code> 463, K70, K80, K159, L16 |
|                                                        |                                    | <code>\addpenalty</code> .....                         |
|                                                        |                                    | 184, l270, F124,                                       |
|                                                        |                                    | F170, F175, K50, S338, S1153, S1319                    |
|                                                        |                                    | <code>\addtocontents</code> .....                      |
|                                                        |                                    | 464, K164, K171, K177, K180                            |

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------|
| <code>\addtocounter</code> .....                                                                                                                                                                                                       | 257                                                                                                                                                                                         | <code>\arg</code> .....                               | E26                                                                    |
| <code>\addtocounter</code> .....                                                                                                                                                                                                       | p6, p18                                                                                                                                                                                     | <code>array</code> (environment) .....                | H168                                                                   |
| <code>\AddToHook</code> 99, 100, 101, 101, 102, 105,<br>109, 112, 113, 114, 699, 699, 699,<br>699, g901, g963, D37, D38, D289,<br>D290, D291, D292, P784, P785,<br>P786, Q419, Q421, Q431, Q432,<br>Q433, Q434, R114, R390, R413, R439 |                                                                                                                                                                                             | <code>\array</code> .....                             | H168                                                                   |
| <code>\AddToHookNext</code> .....                                                                                                                                                                                                      | 102,<br>102, 105, 109, 143, 694, 697, 699,<br>699, g903, g961, Q420, R414, R440                                                                                                             | <code>\arraycolsep</code> .....                       | E356, E357, E501, E502, H258, H338                                     |
| <code>\addtolength</code> .....                                                                                                                                                                                                        | 265                                                                                                                                                                                         | <code>\arrayrulewidth</code> ..                       | H324, H338, H346,<br>H347, H359, H363, H366, H376, H378                |
| <code>\addtolength</code> .....                                                                                                                                                                                                        | q16, E491, E493                                                                                                                                                                             | <code>\arraystretch</code> .....                      | H186, H187, H342                                                       |
| <code>\addtoversion</code> .....                                                                                                                                                                                                       | u20, u139                                                                                                                                                                                   | <code>\Arrowvert</code> .....                         | x569                                                                   |
| <code>\addvspace</code> .....                                                                                                                                                                                                          | l233, D322,<br>F124, F171, F172, F176, F224, K50                                                                                                                                            | <code>\arrowvert</code> .....                         | x567                                                                   |
| <code>\adjdemerits</code> .....                                                                                                                                                                                                        | b330                                                                                                                                                                                        | <code>\asciispace</code> .....                        | D452, D454, D457, D460, D461, D480                                     |
| <code>\AE</code> .....                                                                                                                                                                                                                 | o241,<br>o398, o524, o762, o1102, o1403, U482                                                                                                                                               | <code>\ast</code> .....                               | x232, x395                                                             |
| <code>\ae</code> .....                                                                                                                                                                                                                 | o246,<br>o401, o534, o766, o1108, o1404, U482                                                                                                                                               | <code>\asymp</code> .....                             | x449                                                                   |
| <code>\afterassignment</code> .....                                                                                                                                                                                                    | 82, b401, b404,<br>f246, f252, f295, o212, o220, r299, E186                                                                                                                                 | <code>\AtBeginDocumement</code> .....                 | 114                                                                    |
| <code>\AfterEndEnvironment</code> .....                                                                                                                                                                                                | 115, D285                                                                                                                                                                                   | <code>\AtBeginDocument</code> .....                   | 100, 113, 114, 114, 115, 116,<br>308, n127, n182, s619, N34, N48, P775 |
| <code>\aftergroup</code> .....                                                                                                                                                                                                         | r91, r313, t156, t222,<br>v114, v121, v129, z64, D496, D511,<br>D526, G129, S604, S605, S662, S663                                                                                          | <code>\atbegindocumenthook</code> .....               | 196                                                                    |
| <code>\AfterLastShipout</code> .....                                                                                                                                                                                                   | Q431                                                                                                                                                                                        | <code>\AtBeginDvi</code> .....                        | 114,<br>697, 699, 704, 704, R327, R357, S86                            |
| <code>\afterpreamble</code> .....                                                                                                                                                                                                      | 196                                                                                                                                                                                         | <code>\AtBeginEnvironment</code> .....                | 115, D285                                                              |
| <code>\aleph</code> .....                                                                                                                                                                                                              | x308                                                                                                                                                                                        | <code>\AtBeginShipout</code> .....                    | 699, R362, R413                                                        |
| <code>\allocationnumber</code> .....                                                                                                                                                                                                   | b37, b57, b69, b71, b143, b144,<br>b145, b195, b196, b237, b238, b239,<br>b252, b253, b254, b271, b277, b283,<br>b284, b297, b298, b299, d52, d53,<br>d54, d91, d205, H4, H9, U44, U45, U46 | <code>\AtBeginShipoutAddToBox</code> .....            | 699, R373, R418                                                        |
| <code>\allowbreak</code> b408, f762, f763, f782, f784, E40                                                                                                                                                                             |                                                                                                                                                                                             | <code>\AtBeginShipoutAddToBoxForeground</code> ..     | 699, R374, R418                                                        |
| <code>\Alph</code> .....                                                                                                                                                                                                               | 257                                                                                                                                                                                         | <code>\AtBeginShipoutBox</code> .....                 | 699, R411                                                              |
| <code>\Alph</code> .....                                                                                                                                                                                                               | 698, p106                                                                                                                                                                                   | <code>\AtBeginShipoutDiscard</code> ..                | 699, R371, R417                                                        |
| <code>\alph</code> .....                                                                                                                                                                                                               | 257                                                                                                                                                                                         | <code>\AtBeginShipoutFirst</code> ..                  | 699, R365, R415                                                        |
| <code>\alph</code> .....                                                                                                                                                                                                               | p105                                                                                                                                                                                        | <code>\AtBeginShipoutInit</code> .....                | 699, R412                                                              |
| <code>\alpha</code> .....                                                                                                                                                                                                              | x268                                                                                                                                                                                        | <code>\AtBeginShipoutNext</code> .....                | 699, R363, R413                                                        |
| <code>\amalg</code> .....                                                                                                                                                                                                              | x379                                                                                                                                                                                        | <code>\AtBeginShipoutUpperLeft</code> .....           | 699, 699, R375, R418                                                   |
| <code>\AmSfont</code> .....                                                                                                                                                                                                            | 302                                                                                                                                                                                         | <code>\AtBeginShipoutUpperLeftForeground</code> ..    | 699, 699, R376, R418                                                   |
| <code>\and</code> .....                                                                                                                                                                                                                | 587                                                                                                                                                                                         | <code>\AtEndAfterFileList</code> .....                | Q433                                                                   |
| <code>\and</code> .....                                                                                                                                                                                                                | K14, K27                                                                                                                                                                                    | <code>\AtEndDocument</code> 114, 116, D70, P775, Q437 |                                                                        |
| <code>\angle</code> .....                                                                                                                                                                                                              | x337                                                                                                                                                                                        | <code>\AtEndDvi</code> .....                          | 697, 700, R380, R385                                                   |
| <code>\approx</code> .....                                                                                                                                                                                                             | x422                                                                                                                                                                                        | <code>\AtEndEnvironment</code> .....                  | 115, D285                                                              |
| <code>\arabic</code> .....                                                                                                                                                                                                             | 257                                                                                                                                                                                         | <code>\AtEndOfClass</code> .....                      | 678, E427, P775                                                        |
| <code>\arabic</code> .....                                                                                                                                                                                                             | 698, p102, J33, R274                                                                                                                                                                        | <code>\AtEndOfPackage</code> .....                    | 678, P375, P394, P461, P472, P775                                      |
| <code>\arccos</code> .....                                                                                                                                                                                                             | E13                                                                                                                                                                                         | <code>\AtEndPreamble</code> .....                     | 116                                                                    |
| <code>\arcsin</code> .....                                                                                                                                                                                                             | E10                                                                                                                                                                                         | <code>\AtNextShipout</code> .....                     | 699, R439                                                              |
| <code>\arctan</code> .....                                                                                                                                                                                                             | E16                                                                                                                                                                                         | <code>\atopwithdelims</code> .....                    | E57, E58, E59                                                          |
|                                                                                                                                                                                                                                        |                                                                                                                                                                                             | <code>\attribute</code> .....                         | 38, d79                                                                |
|                                                                                                                                                                                                                                        |                                                                                                                                                                                             | <code>\attributedef</code> .....                      | d79, d215                                                              |
|                                                                                                                                                                                                                                        |                                                                                                                                                                                             | <code>\attributezero</code> .....                     | d215                                                                   |
|                                                                                                                                                                                                                                        |                                                                                                                                                                                             | <code>\AtVeryEndDocument</code> .....                 | Q432                                                                   |
|                                                                                                                                                                                                                                        |                                                                                                                                                                                             | <code>\AtVeryVeryEnd</code> .....                     | Q434                                                                   |
|                                                                                                                                                                                                                                        |                                                                                                                                                                                             | <code>\author</code> .....                            | 587                                                                    |
|                                                                                                                                                                                                                                        |                                                                                                                                                                                             | <code>\author</code> .....                            | K8, K24, K32                                                           |

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**B**

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|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <code>\b</code> .....                                                                                                                          | <a href="#">o233</a> , <a href="#">o389</a> , <a href="#">o472</a> , <a href="#">o753</a> , <a href="#">o1214</a>                                              | <code>\bigg</code> .....                                                                                              | <a href="#">x628</a> , <a href="#">x638</a> , <a href="#">E47</a> , <a href="#">E48</a> , <a href="#">E49</a>                        |
| <code>\backslash</code> .....                                                                                                                  | <a href="#">x251</a> , <a href="#">x590</a>                                                                                                                    | <code>\Biggl</code> .....                                                                                             | <a href="#">E50</a>                                                                                                                  |
| <code>\bar</code> .....                                                                                                                        | <a href="#">x520</a>                                                                                                                                           | <code>\biggl</code> .....                                                                                             | <a href="#">E47</a>                                                                                                                  |
| <code>\baselineskip</code> .....                                                                                                               |                                                                                                                                                                | <code>\Biggm</code> .....                                                                                             | <a href="#">E51</a>                                                                                                                  |
| .....                                                                                                                                          | <a href="#">b369</a> , <a href="#">b399</a> , <a href="#">b435</a> , <a href="#">t140</a> , <a href="#">t141</a> ,                                             | <code>\biggm</code> .....                                                                                             | <a href="#">E48</a>                                                                                                                  |
|                                                                                                                                                | <a href="#">t142</a> , <a href="#">t144</a> , <a href="#">t145</a> , <a href="#">x510</a> , <a href="#">E158</a> , <a href="#">E159</a> ,                      | <code>\Biggr</code> .....                                                                                             | <a href="#">E52</a>                                                                                                                  |
|                                                                                                                                                | <a href="#">E178</a> , <a href="#">E184</a> , <a href="#">E188</a> , <a href="#">G280</a> , <a href="#">G299</a> ,                                             | <code>\biggr</code> .....                                                                                             | <a href="#">E49</a>                                                                                                                  |
|                                                                                                                                                | <a href="#">H198</a> , <a href="#">R146</a> , <a href="#">R197</a> , <a href="#">S242</a> , <a href="#">S273</a> ,                                             | <code>\Bigl</code> .....                                                                                              | <a href="#">E44</a>                                                                                                                  |
|                                                                                                                                                | <a href="#">S622</a> , <a href="#">S637</a> , <a href="#">S681</a> , <a href="#">S696</a> , <a href="#">I136</a> , <a href="#">I314</a> , <a href="#">I373</a> | <code>\bigl</code> .....                                                                                              | <a href="#">E41</a>                                                                                                                  |
| <code>\baselinestretch</code> <a href="#">r290</a> , <a href="#">t118</a> , <a href="#">t119</a> , <a href="#">t138</a> , <a href="#">t199</a> |                                                                                                                                                                | <code>\Bigr</code> .....                                                                                              | <a href="#">E45</a>                                                                                                                  |
| <code>\batchmode</code> .....                                                                                                                  | <a href="#">209</a> , <a href="#">e67</a> , <a href="#">e73</a> ,                                                                                              | <code>\bigm</code> .....                                                                                              | <a href="#">E42</a>                                                                                                                  |
|                                                                                                                                                | <a href="#">n552</a> , <a href="#">n583</a> , <a href="#">n584</a> , <a href="#">u106</a> , <a href="#">U502</a> , <a href="#">U523</a>                        | <code>\bigodot</code> .....                                                                                           | <a href="#">x353</a>                                                                                                                 |
| <code>\BeforeBeginEnvironment</code> .....                                                                                                     |                                                                                                                                                                | <code>\bigoplus</code> .....                                                                                          | <a href="#">x352</a>                                                                                                                 |
| .....                                                                                                                                          | <a href="#">115</a> , <a href="#">115</a> , <a href="#">115</a> , <a href="#">115</a> , <a href="#">D285</a>                                                   | <code>\bigotimes</code> .....                                                                                         | <a href="#">x351</a>                                                                                                                 |
| <code>\BeforeClearDocument</code> .....                                                                                                        | <a href="#">Q435</a>                                                                                                                                           | <code>\Bigr</code> .....                                                                                              | <a href="#">E46</a>                                                                                                                  |
| <code>\begin</code> .....                                                                                                                      | <a href="#">81</a> , <a href="#">99</a> , <a href="#">114</a> ,                                                                                                | <code>\bigr</code> .....                                                                                              | <a href="#">E43</a>                                                                                                                  |
|                                                                                                                                                | <a href="#">115</a> , <a href="#">115</a> , <a href="#">116</a> , <a href="#">129</a> , <a href="#">194</a> , <a href="#">468</a> , <a href="#">468</a> ,      | <code>\bigskip</code> .....                                                                                           | <a href="#">b420</a> , <a href="#">l400</a>                                                                                          |
|                                                                                                                                                | <a href="#">j197</a> , <a href="#">j199</a> , <a href="#">t7</a> , <a href="#">x4</a> , <a href="#">x102</a> , <a href="#">y4</a> , <a href="#">D156</a> ,     | <code>\bigskipamount</code> ....                                                                                      | <a href="#">b419</a> , <a href="#">l402</a> , <a href="#">l403</a> , <a href="#">L367</a>                                            |
|                                                                                                                                                | <a href="#">D157</a> , <a href="#">E432</a> , <a href="#">E444</a> , <a href="#">K14</a> , <a href="#">K17</a> , <a href="#">P482</a> ,                        | <code>\bigsqcup</code> .....                                                                                          | <a href="#">x356</a>                                                                                                                 |
|                                                                                                                                                | <a href="#">R309</a> , <a href="#">R451</a> , <a href="#">T3</a> , <a href="#">U387</a> , <a href="#">U391</a> , <a href="#">I461</a>                          | <code>\bigtriangledown</code> .....                                                                                   | <a href="#">x361</a> , <a href="#">x362</a>                                                                                          |
| <code>\begingroup</code> .....                                                                                                                 | <a href="#">194</a> , <a href="#">219</a> , <a href="#">468</a>                                                                                                | <code>\bigtriangleup</code> .....                                                                                     | <a href="#">x360</a> , <a href="#">x363</a>                                                                                          |
| <code>\belowdisplayshortskip</code> .....                                                                                                      | <a href="#">b353</a> , <a href="#">E495</a>                                                                                                                    | <code>\biguplus</code> .....                                                                                          | <a href="#">x344</a>                                                                                                                 |
| <code>\belowdisplayskip</code> .....                                                                                                           | <a href="#">b352</a> , <a href="#">E494</a>                                                                                                                    | <code>\bigvee</code> .....                                                                                            | <a href="#">x342</a>                                                                                                                 |
| <code>\beta</code> .....                                                                                                                       | <a href="#">x269</a>                                                                                                                                           | <code>\bigwedge</code> .....                                                                                          | <a href="#">x343</a>                                                                                                                 |
| <code>\bezier</code> .....                                                                                                                     | <a href="#">551</a>                                                                                                                                            | <code>\binoppenalty</code> .....                                                                                      | <a href="#">b321</a>                                                                                                                 |
| <code>\bezier</code> ..                                                                                                                        | <a href="#">I682</a> , <a href="#">I683</a> , <a href="#">I805</a> , <a href="#">I806</a> , <a href="#">I821</a> , <a href="#">I823</a>                        | <code>\bmod</code> .....                                                                                              | <a href="#">E35</a>                                                                                                                  |
| <code>\bfdefault</code> ...                                                                                                                    | <a href="#">118</a> , <a href="#">304</a> , <a href="#">367</a> , <a href="#">367</a> , <a href="#">368</a> ,                                                  | <code>\boldmath</code> .....                                                                                          | <a href="#">m14</a> , <a href="#">w463</a>                                                                                           |
|                                                                                                                                                | <a href="#">368</a> , <a href="#">369</a> , <a href="#">370</a> , <a href="#">372</a> , <a href="#">373</a> , <a href="#">374</a> , <a href="#">374</a> ,      | bool commands:                                                                                                        |                                                                                                                                      |
|                                                                                                                                                | <a href="#">374</a> , <a href="#">374</a> , <a href="#">374</a> , <a href="#">w15</a> , <a href="#">w194</a> , <a href="#">w201</a> ,                          | <code>\bool_gset_false:N</code> <a href="#">g15</a> , <a href="#">R15</a> , <a href="#">R43</a> , <a href="#">R51</a> |                                                                                                                                      |
|                                                                                                                                                | <a href="#">w202</a> , <a href="#">w203</a> , <a href="#">w204</a> , <a href="#">w213</a> , <a href="#">w274</a> ,                                             | <code>\bool_gset_true:N</code> <a href="#">g10</a> , <a href="#">R10</a> , <a href="#">R85</a> , <a href="#">R268</a> |                                                                                                                                      |
|                                                                                                                                                | <a href="#">w285</a> , <a href="#">w326</a> , <a href="#">x92</a> , <a href="#">x104</a> , <a href="#">x106</a> , <a href="#">x114</a>                         | <code>\bool_if:N</code> .....                                                                                         |                                                                                                                                      |
| <code>\bfseries</code> .....                                                                                                                   | <a href="#">118</a> , <a href="#">367</a> , <a href="#">367</a> ,                                                                                              | .....                                                                                                                 | <a href="#">g21</a> , <a href="#">g664</a> , <a href="#">g673</a> , <a href="#">R21</a> , <a href="#">R49</a> , <a href="#">R289</a> |
|                                                                                                                                                | <a href="#">370</a> , <a href="#">379</a> , <a href="#">w13</a> , <a href="#">w14</a> , <a href="#">w189</a> , <a href="#">w198</a> ,                          | <code>\bool_lazy_and:nnTF</code> <a href="#">g666</a> , <a href="#">g833</a> , <a href="#">R291</a>                   |                                                                                                                                      |
|                                                                                                                                                | <a href="#">w268</a> , <a href="#">w279</a> , <a href="#">w280</a> , <a href="#">w320</a> , <a href="#">w324</a> ,                                             | <code>\bool_lazy_or:nnTF</code> .....                                                                                 | <a href="#">g259</a>                                                                                                                 |
|                                                                                                                                                | <a href="#">w325</a> , <a href="#">z19</a> , <a href="#">C13</a> , <a href="#">J36</a> , <a href="#">J38</a> , <a href="#">N20</a> , <a href="#">R310</a>      | <code>\bool_new:N</code> ..                                                                                           | <a href="#">g6</a> , <a href="#">g24</a> , <a href="#">R6</a> , <a href="#">R112</a> , <a href="#">R127</a>                          |
| <code>bfseries</code> .....                                                                                                                    | <a href="#">w252</a>                                                                                                                                           | <code>\bool_set_false:N</code> .....                                                                                  | <a href="#">g656</a>                                                                                                                 |
| <code>bfseries/defaults</code> .....                                                                                                           | <a href="#">w252</a>                                                                                                                                           | <code>\bool_set_true:N</code> .....                                                                                   | <a href="#">g653</a>                                                                                                                 |
| <code>\bgroup</code> .....                                                                                                                     | <a href="#">b383</a>                                                                                                                                           | <code>\bool_while_do:nn</code> .....                                                                                  | <a href="#">g483</a>                                                                                                                 |
| <code>\bibtex</code> .....                                                                                                                     | <a href="#">N7</a> , <a href="#">N9</a> , <a href="#">N10</a>                                                                                                  | <code>\bordermatrix</code> .....                                                                                      | <a href="#">E172</a>                                                                                                                 |
| <code>\bibdata</code> .....                                                                                                                    | <a href="#">N25</a> , <a href="#">N29</a>                                                                                                                      | <code>\bot</code> .....                                                                                               | <a href="#">x321</a>                                                                                                                 |
| <code>\bibitem</code> .....                                                                                                                    | <a href="#">N3</a>                                                                                                                                             | <code>\botfigrule</code> .....                                                                                        | <a href="#">S742</a> , <a href="#">S2325</a>                                                                                         |
| <code>\bibliography</code> .....                                                                                                               | <a href="#">624</a>                                                                                                                                            | <code>\botmark</code> .....                                                                                           | <a href="#">O50</a> , <a href="#">S647</a> , <a href="#">S706</a>                                                                    |
| <code>\bibliography</code> .....                                                                                                               | <a href="#">N27</a>                                                                                                                                            | <code>\bottomfraction</code> .....                                                                                    | <a href="#">L275</a> , <a href="#">S2294</a>                                                                                         |
| <code>\bibliographystyle</code> .....                                                                                                          | <a href="#">624</a>                                                                                                                                            | <code>\bowtie</code> .....                                                                                            | <a href="#">x482</a>                                                                                                                 |
| <code>\bibliographystyle</code> .....                                                                                                          | <a href="#">N32</a>                                                                                                                                            | <code>\Box</code> .....                                                                                               | <a href="#">w539</a>                                                                                                                 |
| <code>\bibstyle</code> .....                                                                                                                   | <a href="#">N25</a> , <a href="#">N37</a>                                                                                                                      | <code>\box</code> .....                                                                                               | <a href="#">496</a>                                                                                                                  |
| <code>\Big</code> .                                                                                                                            | <a href="#">x623</a> , <a href="#">x626</a> , <a href="#">x635</a> , <a href="#">x637</a> , <a href="#">E44</a> , <a href="#">E45</a> , <a href="#">E46</a>    | box commands:                                                                                                         |                                                                                                                                      |
| <code>\big</code> .....                                                                                                                        | <a href="#">x624</a> , <a href="#">x636</a> , <a href="#">E41</a>                                                                                              | <code>\box_dp:N</code> .....                                                                                          | <a href="#">R118</a>                                                                                                                 |
| <code>\bigbreak</code> .....                                                                                                                   | <a href="#">b415</a> , <a href="#">f764</a> , <a href="#">f785</a>                                                                                             | <code>\box_ht:N</code> .....                                                                                          | <a href="#">701</a> , <a href="#">R117</a> , <a href="#">R226</a>                                                                    |
| <code>\bigcap</code> .....                                                                                                                     | <a href="#">x345</a>                                                                                                                                           | <code>\box_if_empty:N</code> .....                                                                                    | <a href="#">R40</a> , <a href="#">R58</a>                                                                                            |
| <code>\bigcirc</code> .....                                                                                                                    | <a href="#">x392</a>                                                                                                                                           | <code>\box_if_horizontal:N</code> ..                                                                                  | <a href="#">R158</a> , <a href="#">R210</a>                                                                                          |
| <code>\bigcup</code> .....                                                                                                                     | <a href="#">x346</a>                                                                                                                                           | <code>\box_if_vertical:N</code> ..                                                                                    | <a href="#">R132</a> , <a href="#">R183</a>                                                                                          |
| <code>\Bigg</code> .....                                                                                                                       | <a href="#">x630</a> , <a href="#">x639</a> , <a href="#">E50</a> , <a href="#">E51</a> , <a href="#">E52</a>                                                  | <code>\box_move_up:nn</code> .....                                                                                    | <a href="#">R172</a> , <a href="#">R226</a>                                                                                          |
|                                                                                                                                                |                                                                                                                                                                | <code>\box_new:N</code> .....                                                                                         | <a href="#">R23</a> , <a href="#">R128</a>                                                                                           |

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \box\_set\_dp:Nn ..... R145,  
R154, R171, R196, R207, R225, R256
  - \box\_set\_eq\_drop:NN ..... R54
  - \box\_set\_ht:Nn ..... R144,  
R153, R170, R195, R206, R224, R255
  - \box\_set\_wd:Nn R143, R169, R194, R223
  - \box\_use:N .....  
. R88, R149, R174, R202, R227, R257
  - \box\_wd:N ..... R119, R220, R228
  - \l\_shipout\_box .....  
..... 695, 696, 701, 701, 705,  
706, R23, R29, R40, R46, R54, R58,  
R69, R88, R131, R132, R139, R150,  
R153, R154, R158, R165, R175,  
R183, R190, R200, R206, R207,  
R210, R217, R219, R220, R226, R228
  - \boxmaxdepth .....  
... b344, S486, S506, S546, S715,  
S724, S764, I475, I503, I533, I611, I628
  - \brace ..... E59
  - \braceld .... x553, x557, x558, x560, x562
  - \bracelu ..... x555, x559, x561
  - \bracerd ..... x554, x559, x561
  - \braceru ..... x556, x558, x562
  - \bracevert ..... x608
  - \brack ..... E58
  - \break ..... b408, b413, f765, f786, l115
  - \breve ..... x521
  - \brokenpenalty ..... b326, r637
  - \buildrel ..... x469, E149
  - \bullet ..... x381
- C**
- \c ..... o234,  
o335, o337, o339, o341, o343, o345,  
o347, o349, o351, o372, o374, o392,  
o456, o475, o600, o602, o627, o629,  
o642, o668, o695, o698, o699, o700,  
o701, o702, o703, o704, o705, o706,  
o756, o1216, o1230, o1256, o1313,  
o1314, o1333, o1334, o1337, o1338,  
o1343, o1344, o1355, o1356, o1363,  
o1364, o1367, o1368, A183, A200
  - \cal ..... w589
  - call commands:  
  call\_callback ..... d685
  - \call\_callback ..... 42
  - callback commands:  
  callback\_descriptions ..... d815
  - callback.register ..... d565
  - \callback\_descriptions ..... 42
  - \cap ..... x372
  - \capitalacute o833, A180, A197, A600, A852
  - \capitalbreve o840, A181, A198, A601, A859
  - \capitalcaron o839, A182, A199, A602, A858
  - \capitalcedilla .....  
..... o826, A183, A200, A603, A849
  - \capitalcircumflex .....  
..... o834, A184, A201, A604, A853
  - \capitaldieresis .....  
..... o836, A185, A202, A605, A855
  - \capitaldotaccent .....  
..... o842, A186, A203, A606, A861
  - \capitalgrave o832, A187, A204, A607, A851
  - \capitalhungarumlaut .....  
..... o837, A188, A205, A608, A856
  - \capitalmacron .....  
..... o841, A189, A206, A609, A860
  - \capitalnewtie ..... 428,  
o846, A195, A207, A610, A926, A927
  - \capitallogonek .....  
..... o829, A190, A208, A611, A850
  - \capitalring o838, A191, A209, A612, A857
  - \capitaltie .....  
o844, A192, A210, A613, A922, A923
  - \capitaltilde o835, A193, A211, A614, A854
  - \caption ..... L4
  - \cases ..... E153, E154, E164, E166
  - \catcode ..... 464
  - \catcodetable ..... 38, d89, d109
  - \catcodetable@atletter ..... 39
  - \catcodetable@initex ..... 39
  - \catcodetable@latex ..... 39
  - \catcodetable@string ..... 39
  - \cdot ..... x394
  - \cdottp ..... x502, x508
  - \cdots ..... x508
  - center (environment) ..... D337
  - \center ..... D337
  - \centering ..... D337,  
D342, D343, D361, D363, D378, D380
  - \centerline ..... G428
  - \changes ..... 67
  - \char .... f727, f742, o391, o394, o427,  
o430, o441, o448, o474, o478, o483,  
o486, o488, o490, o727, o755, o758,  
o791, o798, o805, o828, o831, o879,  
o989, o1025, o1182, w476, w483,  
A547, A554, A556, A670, D452,  
D567, E235, I232, I282, I296, I304,  
I307, I448, I563, I568, I576, I580,  
I616, I617, I619, I632, I633, I636, I663
  - char commands:  
  \char\_generate:nn ..... e121
  - \chardef .....  
a64, a70, a71, b10, b16, b17, b18,  
b19, b20, b58, b64, b66, b73, b79,  
b82, b84, b94, b96, b97, b98, b99,

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- b108, b114, b115, b128, b130, b194,  
 b253, b257, b259, b283, b298, b429,  
 b430, b431, d22, d26, d38, d47, d48,  
 d89, d157, d216, h2, n54, n123,  
 o18, r14, H4, H9, P885, P1016,  
 P1133, U28, U30, U34, U53, U104,  
 U105, U106, U107, U108, U109, U110  
 \charsubdef ..... U251  
 \charzero ..... d216  
 \check ..... x522  
 \CheckCommand ..... f177  
 \CheckEncodingSubset . 422, A16, A82,  
 A130, A131, A132, A176, A178,  
 A286, A537, A741, A791, A847,  
 A848, A916, A1033, A1036, A1050  
 \chi ..... x288  
 \choose ..... E57  
 \circ ..... x391  
 \circle ..... I450, I605, I807, I824  
 \citation ..... N11, N19, N43  
 \cite ..... 624  
 \cite ..... N12  
 \clap ..... G432  
 class/after ..... 678  
 class/after/... ..... 678  
 class/before ..... 678  
 class/before/... ..... 678  
 \ClassError ..... j84  
 \ClassInfo ..... j84  
 \ClassWarning ..... j84  
 \ClassWarningNoLine ..... j84  
 \cleaders ..... b449, x548, x551  
 \cleardoublepage ..... S138  
 \ClearHookRule ..... 104, g940, g977  
 \clearpage ..... 116,  
 203, 678, 679, 710, 710, n297, n324,  
 n328, n344, n362, D16, D73, D154,  
 S125, S138, S143, S200, S407,  
 S410, S414, S455, S461, S2171, S2188  
 \cline ..... H367  
 clist commands:  
   \clist\_gclear:N ..... g482  
   \clist\_gput\_left:Nn ..... g426  
   \clist\_gput\_right:Nn ..... g428  
   \clist\_if\_empty:NTF ..... g683  
   \clist\_new:N ..... g51  
   \clist\_use:Nn ..... g685  
 \clubpenalty ..... 194, b323,  
 n10, n27, n96, n153, r635, F128,  
 F194, F196, K100, K106, K130, K135  
 \clubsuit ..... x331  
 \colon ..... x503  
 \columnsep ..... n29, n98, n155, S81, S202  
 \columnseprule ..... S82, S2226, S2260  
 \columnwidth ..... n26, n29, n30, n32,  
 n95, n98, n99, n101, n152, n155,  
 n156, n159, G327, G354, L99, L168,  
 L442, S80, S144, S145, S146, S201,  
 S202, S203, S204, S205, S1843,  
 S1845, S2224, S2228, S2256, S2262  
 \cong ..... x457  
 \contentsline 596, K164, K171, K177, K184  
 \coprod ..... x341  
 \copyright ..... o285, o316, w499  
 \cos ..... E12  
 \cosh ..... E14  
 \cot ..... E18  
 \coth ..... E19  
 \countdef ..... a66, b37,  
 b38, b39, b41, b51, b90, d75, d85,  
 d174, d182, d190, d198, d217, B3, U61  
 \counterwithin ..... 257  
 \counterwithin ..... p77, p97  
 \counterwithout ..... 257  
 \counterwithout ..... p67, p94  
 \CountZero ..... d217  
 \cr ..... b379, o497, o503, o513,  
 o519, A122, A126, A839, A843,  
 E175, E179, E361, E407, E505,  
 H192, H203, H210, H219, H224,  
 H230, H377, I141, I143, I148, I154  
 \crrcr ..... b436, o327,  
 o362, o363, o390, o394, o397, o473,  
 o477, o481, o483, o486, o726, o754,  
 o758, o761, o828, o831, o878, o1219,  
 w501, x337, x338, x340, x459, x462,  
 x466, x530, x531, x532, x533, x534,  
 x535, x537, x538, x539, x540, x541,  
 x543, A127, A844, E155, E157,  
 E158, E159, E175, E177, E178,  
 E179, E197, E198, H171, H172, I141  
 create commands:  
   create\_callback ..... d660  
 \create\_callback ..... 42  
 \CS ..... 71  
 cs commands:  
   \cs:w ..... 124, g135,  
   g389, g422, g474, g494, g497, g536,  
   g537, g538, g545, g552, g774, g784,  
   g814, g855, Q147, Q156, Q164, Q165  
   \cs\_argument\_spec:N ..... e118  
   \cs\_end: ..... g135, g392, g422,  
   g474, g494, g497, g527, g537, g538,  
   g545, g552, g722, g774, g780, g793,  
   g814, g855, Q147, Q156, Q164, Q165  
   \cs\_generate\_variant:Nn .....  
   g37, g38, g39, g190, g515, Q330, Q338

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx,  
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 L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx,  
 Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \cs\_gset:Npn ..... Q169, R106
- \cs\_gset:Npx ..... Q149
- \cs\_gset\_eq:NN .. e115, e116, e117,  
e118, e119, e120, e121, g396, g409,  
g410, g768, R31, R105, R245, R302
- \cs\_gset\_protected:Npx .... g20, R20
- \cs\_if\_exist:NTF .... 690, Q307, Q311
- \cs\_if\_exist\_use:NTF .....  
..... g338, R237, R238, R242, R243
- \cs\_new:Npn .. g87, g96, g109, g119,  
g120, g122, g132, g138, g271, g273,  
g275, g323, g371, g387, g439, g440,  
g516, g517, g698, g778, g786, g794,  
g929, g930, Q30, Q38, Q44, Q57,  
Q161, Q167, Q282, Q284, Q286,  
Q289, Q291, Q305, Q321, Q331,  
Q440, R33, R39, R102, R113, R116,  
R130, R181, R234, R247, R261,  
R264, R274, R307, R427, R428, R429
- \cs\_new\_eq:NN ..... g7, g23, g36,  
g352, g358, g394, g591, g592, g593,  
g594, g595, g596, g793, g942, g943,  
g945, g947, g949, Q179, Q180,  
Q374, Q376, Q378, Q380, Q382,  
Q384, Q386, Q388, Q390, R7,  
R94, R271, R273, R326, R328, R329
- \cs\_new\_protected:Npn .....  
. g8, g13, g18, g41, g43, g56, g64,  
g66, g71, g73, g139, g148, g153,  
g161, g171, g173, g191, g204, g209,  
g214, g219, g228, g286, g288, g305,  
g307, g312, g328, g333, g347, g353,  
g359, g364, g366, g368, g369, g395,  
g412, g446, g518, g525, g534, g541,  
g548, g555, g563, g569, g580, g597,  
g604, g616, g621, g626, g628, g630,  
g700, g715, g720, g727, g743, g745,  
g754, g759, g767, g769, g791, g800,  
g809, g817, g827, g908, g914, g931,  
g932, g933, g934, Q49, Q61, Q69,  
Q78, Q144, Q153, Q263, Q268,  
Q405, R8, R13, R18, R267, R327, R390
- \cs\_prefix\_spec:N ..... e117
- \cs\_replacement\_spec:N ..... e119
- \cs\_set:Npx ..... Q147, Q156
- \cs\_set\_eq:NN g425, g426, g427, g428,  
g618, g623, R24, R44, R56, R87,  
R91, R331, R333, R335, R337, R339
- \cs\_set\_protected:Npn g702, g730, R25
- \cs\_to\_str:N ..... 124, e115
- \cs\_undefine:N ..... e125, e126,  
e127, e128, e129, e130, g370, Q158
- cs\check@icr commands:  
  \cs\_gset\_eq:NN ..... 67
- \csc ..... E21
- \csname ..... 102, 371, 468, 686, 689
- \csname\endcsname ..... 686, 687, 688
- \cup ..... x373
- \CurrentFile ..... 202, 653, 677, 677,  
677, 677, 679, 682, 684, 684, 688,  
688, P623, Q3, Q66, Q83, Q105,  
Q112, Q115, Q248, Q252, Q413, Q414
- \CurrentFilePath . 677, 677, 682, 684,  
688, Q3, Q66, Q82, Q104, Q249, Q252
- \CurrentFilePathUsed .....  
677, Q3, Q65, Q80, Q102, Q246, Q249
- \CurrentFileUsed ..... 653,  
677, 679, 684, 688, P623, Q3, Q65,  
Q81, Q103, Q246, Q248, Q412, Q413
- \CurrentOption .....  
. o1496, o1499, o1504, o1516, P13,  
P326, P337, P338, P343, P351,  
P352, P355, P367, P372, P373,  
P386, P391, P392, P400, P402,  
P412, P413, P414, P422, P423,  
P424, P654, P709, P807, P808, P818
- CurrentOption commands:  
  \CurrentOption: P336, P350, P366,  
P371, P385, P390, P411, P421, P817
- \CYRA ..... o1468
- \cyra ..... o1468, o1519
- \CYRABHCH ..... o1468
- \cyrabhch ..... o1468
- \CYRABHCHDSC ..... o1468
- \cyrabhchdsc ..... o1468
- \CYRABHDZE ..... o1469
- \cyrabhdze ..... o1468
- \CYRABHHA ..... o1469
- \cyrabhha ..... o1469
- \CYRAE ..... o1469
- \cyrae ..... o1469
- \CYRB ..... o1469
- \cyrb ..... o1469
- \CYRBYUS ..... o1470
- \cyrbyus ..... o1469
- \CYRC ..... o1470
- \cyrc ..... o1470
- \CYRCH ..... o1470
- \cyrch ..... o1470
- \CYRCHLDSC ..... o1470
- \cyrchldsc ..... o1470
- \CYRCHRDSC ..... o1471
- \cyrchrdsc ..... o1470
- \CYRCHVCRS ..... o1471
- \cyrchvcrs ..... o1471
- \CYRD ..... o1471
- \cyrd ..... o1471
- \CYRDELTA ..... o1471

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspc.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx



|                           |       |                        |       |
|---------------------------|-------|------------------------|-------|
| <code>\cyrdelta</code>    | o1471 | <code>\cyrje</code>    | o1478 |
| <code>\CYRDJE</code>      | o1472 | <code>\CYRK</code>     | o1478 |
| <code>\cyrdje</code>      | o1472 | <code>\cyrk</code>     | o1478 |
| <code>\CYRDZE</code>      | o1472 | <code>\CYRKBEAK</code> | o1479 |
| <code>\cyrdze</code>      | o1472 | <code>\cyrkbeak</code> | o1479 |
| <code>\CYRDZHE</code>     | o1472 | <code>\CYRKDSC</code>  | o1479 |
| <code>\cyrdzhe</code>     | o1472 | <code>\cyrkdsc</code>  | o1479 |
| <code>\CYRE</code>        | o1472 | <code>\CYRKHCRS</code> | o1479 |
| <code>\cyre</code>        | o1472 | <code>\cyrkhcrs</code> | o1479 |
| <code>\CYREPS</code>      | o1473 | <code>\CYRKHK</code>   | o1480 |
| <code>\cyreps</code>      | o1472 | <code>\cyrkhk</code>   | o1479 |
| <code>\CYREREV</code>     | o1473 | <code>\CYRKVCRS</code> | o1480 |
| <code>\cyrerev</code>     | o1473 | <code>\cyrkvcrs</code> | o1480 |
| <code>\CYRERY</code>      | o1473 | <code>\CYRL</code>     | o1480 |
| <code>\cyrery</code>      | o1473 | <code>\cyr1</code>     | o1480 |
| <code>\CYRF</code>        | o1473 | <code>\CYRLDSC</code>  | o1480 |
| <code>\cyrf</code>        | o1473 | <code>\cyrldsc</code>  | o1480 |
| <code>\CYRFITA</code>     | o1474 | <code>\CYRLHK</code>   | o1481 |
| <code>\cyrfita</code>     | o1473 | <code>\cyr1hk</code>   | o1480 |
| <code>\CYRG</code>        | o1474 | <code>\CYRLJE</code>   | o1481 |
| <code>\cyrg</code>        | o1474 | <code>\cyr1je</code>   | o1481 |
| <code>\CYRGDSC</code>     | o1474 | <code>\CYRM</code>     | o1481 |
| <code>\cyrgdsc</code>     | o1474 | <code>\cym</code>      | o1481 |
| <code>\CYRGDSCHCRS</code> | o1474 | <code>\CYRMDSC</code>  | o1481 |
| <code>\cyrgdschcrs</code> | o1474 | <code>\cymdsc</code>   | o1481 |
| <code>\CYRGHCRS</code>    | o1475 | <code>\CYRMHK</code>   | o1481 |
| <code>\cyrghcrs</code>    | o1475 | <code>\cymhk</code>    | o1481 |
| <code>\CYRGHK</code>      | o1475 | <code>\CYRN</code>     | o1482 |
| <code>\cyrghk</code>      | o1475 | <code>\cyrn</code>     | o1482 |
| <code>\CYRGUP</code>      | o1475 | <code>\CYRNDSC</code>  | o1482 |
| <code>\cyrgup</code>      | o1475 | <code>\cyrndsc</code>  | o1482 |
| <code>\CYRH</code>        | o1475 | <code>\CYRNG</code>    | o1482 |
| <code>\cyrh</code>        | o1475 | <code>\cyrng</code>    | o1482 |
| <code>\CYRHDSC</code>     | o1476 | <code>\CYRNHK</code>   | o1482 |
| <code>\cyrhdsc</code>     | o1476 | <code>\cyrnhk</code>   | o1482 |
| <code>\CYRHCRS</code>     | o1476 | <code>\CYRNJE</code>   | o1483 |
| <code>\cyrhcrs</code>     | o1476 | <code>\cyrnje</code>   | o1482 |
| <code>\CYRHHK</code>      | o1476 | <code>\CYRNLHK</code>  | o1483 |
| <code>\cyrhhk</code>      | o1476 | <code>\cyrnlhk</code>  | o1483 |
| <code>\CYRHSDSN</code>    | o1477 | <code>\CYRO</code>     | o1483 |
| <code>\cyhrdsn</code>     | o1476 | <code>\cyro</code>     | o1483 |
| <code>\CYRI</code>        | o1477 | <code>\CYROTLD</code>  | o1483 |
| <code>\cyri</code>        | o1477 | <code>\cyrotld</code>  | o1483 |
| <code>\CYRIE</code>       | o1477 | <code>\CYRP</code>     | o1483 |
| <code>\cyrie</code>       | o1477 | <code>\cyrp</code>     | o1483 |
| <code>\CYRII</code>       | o1477 | <code>\CYRPHK</code>   | o1484 |
| <code>\cyrii</code>       | o1477 | <code>\cyrphk</code>   | o1484 |
| <code>\CYRISHRT</code>    | o1477 | <code>\CYRQ</code>     | o1484 |
| <code>\cyrishrt</code>    | o1477 | <code>\cyrq</code>     | o1484 |
| <code>\CYRISHRTDSC</code> | o1478 | <code>\CYRR</code>     | o1484 |
| <code>\cyrishrtdsc</code> | o1478 | <code>\cyr</code>      | o1484 |
| <code>\CYRIZH</code>      | o1478 | <code>\CYRRDSC</code>  | o1484 |
| <code>\cyrizh</code>      | o1478 | <code>\cyrddsc</code>  | o1484 |
| <code>\CYRJE</code>       | o1478 | <code>\CYRRHK</code>   | o1485 |

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|                                                                             |                                                                                                |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| A333, A334, A335, A336, A337,                                               | o377, o460, o710, o732, o738, o824,                                                            |
| A338, A339, A340, A341, A342,                                               | o1022, <a href="#">r118</a> , x126, x127, x128, x129                                           |
| A343, A344, A345, A346, A347,                                               | <code>\DeclareFontEncodingDefaults</code> . . . . .                                            |
| A348, A349, A350, A351, A352,                                               | <a href="#">r168</a> , u90, u91, x36                                                           |
| A353, A354, A355, A356, A357,                                               | <code>\DeclareFontFamily</code> . . . . . <a href="#">282</a> , <a href="#">r93</a> , u85, u86 |
| A358, A359, A360, A361, A362,                                               | <code>\DeclareFontFamilySubstitution</code> . . . . <a href="#">r408</a>                       |
| A363, A364, A365, A366, A367,                                               | <code>\DeclareFontSeriesChangeRule</code> . . . . .                                            |
| A368, A369, A370, A371, A372,                                               | . . . . . <a href="#">293</a> , <a href="#">293</a> , s5, <a href="#">s6</a> , s8,             |
| A373, A374, A375, A376, A377,                                               | s9, s10, s11, s12, s13, s14, s15, s16,                                                         |
| A378, A379, A380, A381, A382,                                               | s17, s18, s19, s20, s21, s22, s23, s24,                                                        |
| A383, A384, A385, A386, A387,                                               | s25, s26, s27, s28, s29, s30, s31, s32,                                                        |
| A388, A389, A390, A391, A392,                                               | s33, s34, s35, s36, s37, s38, s39, s40,                                                        |
| A393, A394, A395, A396, A397,                                               | s41, s42, s43, s44, s45, s46, s47, s48,                                                        |
| A398, A399, A400, A401, A402,                                               | s49, s50, s51, s52, s53, s54, s55, s56,                                                        |
| A403, A404, A405, A406, A407,                                               | s57, s58, s59, s60, s61, s62, s63, s64,                                                        |
| A408, A409, A410, A411, A412,                                               | s65, s66, s67, s68, s69, s70, s71, s72,                                                        |
| A413, A414, A415, A416, A417,                                               | s73, s74, s75, s76, s77, s78, s79, s80,                                                        |
| A418, A419, A420, A421, A422,                                               | s81, s82, s83, s84, s85, s86, s87, s88,                                                        |
| A423, A424, A425, A426, A427,                                               | s89, s90, s91, s92, s93, s94, s95, s96,                                                        |
| A428, A429, A430, A431, A432,                                               | s97, s98, s99, s100, s101, s102, s103,                                                         |
| A433, A434, A435, A436, A437,                                               | s104, s105, s106, s107, s108, s109,                                                            |
| A438, A439, A440, A441, A442,                                               | s110, s111, s112, s113, s114, s115,                                                            |
| A443, A444, A445, A446, A447,                                               | s116, s117, s118, s119, s120, s121,                                                            |
| A448, A449, A450, A451, A452,                                               | s122, s123, s124, s125, s126, s127,                                                            |
| A453, A454, A455, A456, A457,                                               | s128, s129, s130, s131, s132, s133,                                                            |
| A458, A459, A460, A461, A462,                                               | s134, s135, s136, s137, s138, s139,                                                            |
| A463, A464, A465, A466, A467,                                               | s140, s141, s142, s143, s144, s145,                                                            |
| A468, A469, A470, A471, A472,                                               | s146, s147, s148, s149, s150, s151,                                                            |
| A473, A474, A475, A476, A477,                                               | s152, s153, s154, s155, s156, s157,                                                            |
| A478, A479, A480, A481, A482,                                               | s158, s159, s160, s161, s162, s163,                                                            |
| A483, A484, A485, A486, A487,                                               | s164, s165, s166, s167, s168, s169,                                                            |
| A488, A489, A490, A491, A492,                                               | s170, s171, s172, s173, s174, s175,                                                            |
| A493, A494, A495, A496, A497,                                               | s176, s177, s178, s179, s180, s181,                                                            |
| A498, A499, A500, A501, A534,                                               | s182, s183, s184, s185, s186, s187,                                                            |
| A536, A732, A733, A734, A735,                                               | s188, s189, s190, s191, s192, s193,                                                            |
| <a href="#">A774</a> , A781, A782, A783, A784,                              | s194, s195, s196, s197, s198, s199,                                                            |
| A1060, A1061, A1062, A1063,                                                 | s200, s201, s202, s203, s204, s205,                                                            |
| A1064, A1065, A1066, A1067,                                                 | s206, s207, s208, s209, s210, s211,                                                            |
| A1068, A1069, A1070, A1071,                                                 | s212, s213, s214, s215, s216, s217,                                                            |
| A1072, A1073, A1074, A1075,                                                 | s218, s219, s220, s221, s222, s223,                                                            |
| A1076, A1077, A1078, A1079,                                                 | s224, s225, s226, s227, s228, s229,                                                            |
| A1080, A1081, A1082, A1083,                                                 | s230, s231, s232, s233, s234, s235,                                                            |
| A1084, A1085, A1086, A1087,                                                 | s236, s237, s238, s239, s240, s241,                                                            |
| A1088, A1089, A1090, A1091,                                                 | s242, s243, s244, s245, s246, s247,                                                            |
| A1092, A1093, A1094, A1095,                                                 | s248, s249, s250, s251, s252, s253,                                                            |
| A1096, A1097, A1098, A1099,                                                 | s254, s255, s256, s257, s258, s259,                                                            |
| A1100, A1101, A1102, A1103,                                                 | s260, s261, s262, s263, s264, s265,                                                            |
| A1104, A1105, A1106, A1107,                                                 | s266, s267, s268, s269, s270, s271,                                                            |
| A1108, A1109, A1110, A1111,                                                 | s272, s273, s274, s275, s276, s277,                                                            |
| A1112, A1113, A1114, A1115,                                                 | s278, s279, s280, s281, s282, s283,                                                            |
| A1116, A1117, A1118, A1119, A1120                                           | s284, s285, s286, s287, s288, s289,                                                            |
| <code>\DeclareErrorFont</code> . . . <a href="#">r448</a> , v264, w548, x49 | s290, s291, s292, s293, s294, s295,                                                            |
| <code>\DeclareFixedFont</code> . . . . . <a href="#">r75</a>                | s296, s297, s298, s299, s300, s301,                                                            |
| <code>\DeclareFontEncoding</code> . . . . .                                 | s302, s303, s304, s305, s306, s307,                                                            |

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o1171, o1172, o1173, o1174, o1175,
o1176, o1177, o1179, o1180, o1192,
o1193, o1194, o1195, o1196, o1197,
o1198, o1199, o1200, o1201, o1202,
A295, A296, A297, A298, A299,
A300, A301, A302, A313, A314,
A315, A316, A317, A318, A319,
A320, A321, A322, A515, A516,
A517, A518, A519, A520, A521, A522
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o241, o242, o243, o244, o245, o246,
o247, o248, o249, o250, o251, o252,
o253, o254, o255, o256, o257, o258,
o259, o260, o261, o262, o263, o264,
o265, o266, o267, o268, o269, o270,
o271, o272, o273, o274, o275, o276,
o277, o278, o280, o281, o291, A134,
A136, A138, A140, A141, A142,
A143, A144, A145, A146, A147,
A148, A149, A150, A151, A152,
A153, A154, A155, A156, A157,
A158, A159, A160, A161, A162,
A163, A164, A165, A166, A167,
A168, A169, A170, A171, A172,
A173, A174, A503, A504, A505,
A506, A507, A508, A509, A510,
A523, A524, A525, A526, A527,
A528, A529, A530, A539, A540,
A558, A559, A560, A561, A562,
A563, A564, A566, A862, A863,
A864, A865, A866, A867, A868,
A869, A870, A871, A872, A873,
A874, A875, A876, A877, A878,
A879, A880, A881, A882, A883,
A884, A885, A886, A887, A888,
A889, A890, A891, A892, A893,
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A899, A900, A901, A902, A903,
A904, A905, A906, A907, A908,
A909, A910, A911, A912, A913, A914
o1203, o1204, o1205, o1206, o1207,
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- \defaultshyphenchar . . . . . [b333](#), [f728](#), [f743](#)
  - \defaultscriptratio . . . . . [r595](#), [r602](#)
  - \defaultscriptscriptratio . . . . . [r596](#), [r602](#)
  - \defaultskewchar . . . . . [b334](#)
  - \deg . . . . . [E34](#)
  - \delcode . . . . . [v915](#)
  - \delimiter . . . . . [v828](#), [v898](#), [v909](#)
  - \delimiterfactor . . . . . [b335](#)
  - \delimitershortfall . . . . . [b345](#)
  - \Delta . . . . . [x298](#)
  - \delta . . . . . [x271](#)
  - \depth . . . . . [G32](#), [G35](#)
  - \det . . . . . [E30](#)
  - \detokenize . . . . . [95](#), [201](#),  
[f517](#), [f535](#), [f599](#), [n255](#), [o981](#), [o1024](#),  
[s396](#), [w413](#), [A65](#), [D119](#), [P901](#),  
[P902](#), [P906](#), [P1032](#), [P1033](#), [P1037](#)
  - \DH . . . . . [o525](#), [o1103](#), [U483](#)
  - \dh . . . . . [o535](#), [o1109](#), [U483](#)
  - \Diamond . . . . . [w540](#)
  - \diamond . . . . . [x380](#)
  - \diamondsuit . . . . . [x332](#)
  - \dim . . . . . [E28](#)
  - dim commands:
    - \dim\_new:N . . . . . [R123](#), [R124](#), [R125](#), [R126](#)
    - \dim\_set:Nn . . . . . [R117](#), [R118](#), [R119](#), [R120](#)
    - \dim\_use:N . . . . . [R427](#), [R428](#), [R429](#)
    - \c\_max\_dim . . . . . [R137](#), [R163](#), [R188](#), [R215](#)
    - \c\_zero\_dim . . . . .  
[R143](#), [R144](#), [R145](#), [R151](#), [R169](#),  
[R170](#), [R171](#), [R194](#), [R195](#), [R196](#),  
[R223](#), [R224](#), [R225](#), [R253](#), [R255](#), [R256](#)
    - \dimendef . . . . . [b42](#), [b43](#), [b44](#), [b52](#), [b91](#), [d218](#)
    - \dimenzero . . . . . [d218](#)
    - \dimexpr . . . . . [o500](#), [o516](#), [o1185](#), [o1188](#), [I13](#)
    - \directlua . . . . . [a9](#), [a12](#), [a17](#),  
[a20](#), [a25](#), [b65](#), [b81](#), [b105](#), [b256](#), [d2](#),  
[d14](#), [d29](#), [d205](#), [d223](#), [d248](#), [d253](#),  
[d257](#), [f34](#), [f639](#), [f724](#), [o994](#), [P885](#), [P1016](#)
  - disable commands:
    - disable\_callback . . . . . [d807](#)
  - \disable\_callback . . . . . [42](#)
  - \DiscardShipoutBox . . . . .  
[696](#), [697](#), [699](#), [R326](#), [R353](#), [R417](#)
  - \discretionary . . . . . [f726](#), [f741](#), [f751](#), [E235](#)
  - \displaylines . . . . . [E190](#)
  - displaymath (environment) . . . . . [E329](#)
  - \displaymath . . . . . [E331](#)
  - \displaystyle . . . . . [x532](#), [x535](#),  
[x539](#), [x541](#), [E62](#), [E197](#), [E355](#), [E358](#),  
[E411](#), [E436](#), [E448](#), [E476](#), [E500](#), [E503](#)
  - \displaywidowpenalty . . . . . [b325](#)
  - \displaywidth . . . . . [E197](#), [E354](#), [E423](#), [E479](#)
  - \div . . . . . [x383](#)
  - \DJ . . . . . [o526](#), [o1113](#), [U483](#)
  - \dj . . . . . [o536](#), [o1114](#), [U483](#)
  - \do . . . . . [a74](#), [a75](#), [a126](#),  
[b13](#), [b14](#), [f59](#), [i3](#), [i7](#), [i16](#), [i26](#), [n68](#),  
[n71](#), [n136](#), [n139](#), [n191](#), [n194](#), [n234](#),  
[n305](#), [n352](#), [n427](#), [n465](#), [n608](#), [n614](#),  
[z90](#), [D417](#), [D438](#), [D546](#), [D556](#),  
[D562](#), [D568](#), [G57](#), [G76](#), [H244](#),  
[H269](#), [L65](#), [L134](#), [N16](#), [N41](#), [P178](#),  
[P195](#), [P336](#), [P350](#), [P366](#), [P371](#),  
[P385](#), [P390](#), [P411](#), [P421](#), [P817](#),  
[P854](#), [P934](#), [P985](#), [P1065](#), [P1154](#),  
[P1431](#), [I104](#), [I116](#), [I123](#), [I203](#), [I337](#),  
[I339](#), [I362](#), [I365](#), [I394](#), [I396](#), [I417](#),  
[I422](#), [I478](#), [I506](#), [I535](#), [I731](#), [I787](#)
  - \DocInput . . . . . [t8](#), [x5](#), [y5](#), [T4](#)
  - \document . . . . . [192](#)
  - document (environment) . . . . . [D8](#)
  - \document . . . . . [115](#),  
[116](#), [309](#), [373](#), [466](#), [n11](#), [D172](#), [N40](#)
  - \documentclass . . . . . [103](#),  
[633](#), [d16](#), [t2](#), [x2](#), [y2](#), [P428](#), [P435](#),  
[P478](#), [P481](#), [P604](#), [P726](#), [P837](#), [T2](#)
  - \documentstyle . . . . . [P433](#), [P837](#)
  - \dospecials . . . . . [a74](#), [a126](#), [b13](#), [D417](#),  
[D438](#), [D546](#), [D556](#), [P934](#), [P1065](#), [P1154](#)
  - \dot . . . . . [x525](#)
  - \doteq . . . . . [x469](#)
  - \dotfill . . . . . [b446](#), [f766](#), [f787](#)
  - \dots . . . . . [o320](#), [o322](#)
  - \doublehyphendemerits . . . . . [b328](#)
  - \doublerulesep . . . . . [H311](#), [H338](#), [H362](#)
  - \Downarrow . . . . . [x586](#)
  - \downarrow . . . . . [x580](#)
  - \downbracefill . . . . . [x538](#), [x557](#)
  - \dump . . . . . [U548](#)
- ## E
- \E . . . . . [P941](#), [P944](#), [P971](#), [P1072](#),  
[P1075](#), [P1102](#), [P1161](#), [P1164](#), [P1192](#)
  - \edef . . . . . [304](#), [304](#), [346](#), [373](#)
  - \egroup . . . . . [b383](#)
  - \eject . . . . . [b413](#)
  - \ell . . . . . [x311](#)
  - else commands:
    - \else: [g376](#), [g391](#), [g530](#), [g781](#), [g857](#), [Q168](#)
  - \em . . . . . [382](#), [383](#), [w400](#), [w427](#), [z42](#)
  - \emergencystretch . . . . . [O59](#), [O65](#)
  - \emforce . . . . . [381](#)
  - \emforce . . . . . [381](#),  
[382](#), [383](#), [383](#), [383](#), [w396](#), [w423](#), [w432](#)
  - \eminnershape . . . . . [381](#), [382](#), [w404](#), [w410](#), [w427](#)
  - \emph . . . . . [382](#), [z42](#)
  - \empty . . . . . [b381](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=ltterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx



|                                   |       |                                         |                                                                         |
|-----------------------------------|-------|-----------------------------------------|-------------------------------------------------------------------------|
| <code>\emptyset</code>            | ..... | x318                                    | v654, v696, v709, v716, v904, v912,                                     |
| <code>\emreset</code>             | ..... | 381                                     | w162, w184, w266, w318, w344,                                           |
| <code>\emreset</code>             | ..... | 381, w396, w399, w430                   | w380, w389, w426, w438, w445,                                           |
| <code>\emrest</code>              | ..... | w399                                    | w479, w485, w517, w531, x80,                                            |
| <code>\encodingdefault</code>     | ..... |                                         | x90, x109, x118, x633, x640, z33,                                       |
|                                   |       | 372, d252, d267, d275, o973, o1496,     | z40, A41, A55, A532, A719, C50,                                         |
|                                   |       | o1529, o1530, v269, w508, w522, x50     | C61, C72, D65, D106, D139, D152,                                        |
| <code>\end</code>                 | ..... | 99, 115, 116, 117,                      | D214, D264, D280, D294, D303,                                           |
|                                   |       | 129, 152, 467, 468, 469, 505, a69,      | D313, D320, D330, D335, D359,                                           |
|                                   |       | f23, f661, j200, t9, x6, y6, D179,      | D375, D384, D422, D443, D474,                                           |
|                                   |       | D186, D188, D216, D242, D396,           | D484, D502, D517, D529, D551,                                           |
|                                   |       | D397, E457, E466, F112, K15, K17,       | D559, E86, E95, E117, E124, E143,                                       |
|                                   |       | P949, P953, P959, P1080, P1084,         | E147, E162, E170, E219, E233,                                           |
|                                   |       | P1090, P1169, P1173, P1179, R311, T5    | E263, E271, E300, E327, E390,                                           |
| <code>\end{env}</code>            | ..... | 115                                     | E399, E439, E451, E460, E469,                                           |
| <code>\endarray</code>            | ..... | H171                                    | F132, F137, G13, G22, G69, G86,                                         |
| <code>\endcenter</code>           | ..... | D338                                    | G105, G112, G169, G176, G224,                                           |
| <code>\endcsname</code>           | ..... | 102, 686, 687, 688                      | G232, G283, G301, G369, G374,                                           |
| <code>\enddisplaymath</code>      | ..... | E332                                    | G397, G404, H64, H69, H156,                                             |
| <code>\enddocument</code>         | ..... | 113, 116, 461, 694,                     | H164, H226, H231, K19, K29,                                             |
|                                   |       | 694, 710, 710, 711, D8, D67, D69, R276  | K167, K173, K178, K209, K231,                                           |
| <code>\endenumerate</code>        | ..... | F240                                    | L104, L172, L231, L246, L293,                                           |
| <code>\endeqnarray</code>         | ..... | E363, E410                              | L306, L387, L393, L402, L406,                                           |
| <code>\endequation</code>         | ..... | E335                                    | L415, L421, L425, O39, O46, P34,                                        |
| <code>\endfilecontents</code>     | ..... | P841                                    | P46, P56, P64, P70, P75, P116,                                          |
| <code>\endflushleft</code>        | ..... | D388                                    | P122, P141, P152, P190, P207,                                           |
| <code>\endflushright</code>       | ..... | D390                                    | P238, P251, P264, P293, P302,                                           |
| <code>\endgraf</code>             | ..... | b378                                    | P380, P395, P416, P425, P467,                                           |
| <code>\endgroup</code>            | ..... | 194, 466, 688                           | P474, P552, P580, P701, P758,                                           |
| <code>\EndIncludeInRelease</code> | ..... | a22, a50, a306,                         | P788, P795, P974, P1104, P1194,                                         |
|                                   |       | a316, b87, b101, b118, b123, b133,      | Q14, Q23, Q87, Q120, Q130, Q136,                                        |
|                                   |       | b137, b147, b150, b167, b181, b185,     | Q172, Q183, Q190, Q215, Q228,                                           |
|                                   |       | b219, b224, b232, b240, b288, b300,     | Q232, Q255, Q275, Q298, Q343,                                           |
|                                   |       | b491, b498, b545, b550, c97, c103,      | Q359, Q366, Q394, R343, R383,                                           |
|                                   |       | d226, d249, d272, d276, e90, e111,      | R400, R404, S53, S62, S178, S196,                                       |
|                                   |       | e122, e131, f12, f18, f302, f330, f358, | S365, S370, S418, S464, S650, S708,                                     |
|                                   |       | f363, f382, f396, f437, f447, f477,     | S811, S830, S893, S911, S953, S974,                                     |
|                                   |       | f486, f500, f505, f603, f618, f650,     | S1216, S1385, S1467, S1561, S1683,                                      |
|                                   |       | f659, f709, f716, f738, f749, f752,     | S1810, S1929, S1957, S2177, S2195,                                      |
|                                   |       | f780, f801, g953, g981, l20, l30, l64,  | S2242, S2286, U15, U19, U37, U55,                                       |
|                                   |       | l77, l85, l90, l103, l109, l151, l165,  | U65, U72, U80, U131, U155, U225,                                        |
|                                   |       | l177, l188, l205, l217, l251, l268,     | U229, U338, U385, I15, I19, I38,                                        |
|                                   |       | l306, l328, l365, l398, l431, l435,     | I47, I68, I76, I88, I96, I111, I121,                                    |
|                                   |       | l444, l450, l464, l471, n84, n141,      | I150, I155, I171, I182, I249, I263,                                     |
|                                   |       | n196, n257, n278, n290, n339, n373,     | I368, I425, I463, I469, I500, I530,                                     |
|                                   |       | n437, n475, n488, n492, n510, n521,     | I555, I571, I582, I595, I603, I624,                                     |
|                                   |       | n531, n570, n597, o103, o123, o168,     | I641, I651, I655, I745, I800, I819, I836                                |
|                                   |       | o175, o330, o352, o367, o375, p28,      | <code>\EndIncludeRelease</code> ..... c73                               |
|                                   |       | p33, p89, p100, p142, p148, p168,       | <code>\enditemize</code> ..... F251                                     |
|                                   |       | p171, q10, q14, r52, r73, r231, r248,   | <code>\endline</code> ..... b378, E175                                  |
|                                   |       | r401, r406, r441, r446, r463, r481,     | <code>\endlinechar</code> .....<br>..... 463, a92, a93, a94, a204, f37, |
|                                   |       | r520, r553, r669, r681, s577, s607,     | f39, f44, n545, n579, P272, P273, P274                                  |
|                                   |       | s616, s620, s623, t503, t509, u21,      | <code>\endlist</code> ..... F98, F240, F251                             |
|                                   |       | u143, v77, v105, v168, v198, v230,      |                                                                         |

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lt hooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=ltterror.dtx, k=ltpar.dtx, l=lt space.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=lt pictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- `\endlrbox` ..... [G136](#)
- `\endmath` ..... [E330](#)
- `\endminipage` ..... [G335](#)
- `\endpicture` ..... [I49](#)
- `\endsloppypar` ..... [O63](#)
- `\endtabbing` ..... [H84](#)
- `\endtabular` ..... [H171](#)
- `\endtabular*` ..... [H171](#)
- `\endtrivlist` ..... [D338](#), [D388](#), [D390](#),  
[D446](#), [E481](#), [F100](#), [F101](#), [H85](#), [J39](#)
- `\endverbatim` ..... [D445](#), [D472](#)
- `\enlargethispage` ..... [S1855](#)
- `\enlargethispage*` ..... [S1855](#)
- `\enskip` ..... [I473](#)
- `\enspace` ..... [I461](#), [I469](#)
- `\ensuremath` .....  
. [p144](#), [E412](#), [L385](#), [L392](#), [L413](#), [L420](#)
- `enumerate` (environment) ..... [F231](#)
- `\enumerate` ..... [F231](#)
- environments:
- `array` ..... [H168](#)
- `center` ..... [D337](#)
- `displaymath` ..... [E329](#)
- `document` ..... [D8](#)
- `enumerate` ..... [F231](#)
- `eqnarray` ..... [E341](#), [E482](#)
- `eqnarray*` ..... [E408](#)
- `equation` ..... [E333](#), [E470](#)
- `filecontents` ..... [633](#), [P841](#)
- `flushleft` ..... [D387](#)
- `flushright` ..... [D389](#)
- `itemize` ..... [F242](#)
- `list` ..... [F34](#)
- `lrbox` ..... [511](#)
- `math` ..... [E329](#)
- `minipage` ..... [512](#)
- `picture` ..... [I21](#)
- `sloppypar` ..... [O62](#)
- `tabbing` ..... [H71](#)
- `tabular` ..... [H174](#)
- `thebibliography` ..... [624](#)
- `trivlist` ..... [F89](#)
- `verbatim` ..... [D445](#)
- `verbatim*` ..... [D469](#)
- `\epsilon` ..... [x272](#)
- `eqnarray` (environment) ..... [E341](#), [E482](#)
- `\eqnarray` ..... [E346](#), [E409](#)
- `eqnarray*` (environment) ..... [E408](#)
- `\eqno` ..... [E335](#)
- `equation` (environment) ..... [E333](#), [E470](#)
- `\equation` ..... [E334](#)
- `\equiv` ..... [x448](#)
- `\errhelp` [a217](#), [c31](#), [j39](#), [j66](#), [T12](#), [U239](#), [U538](#)
- `\errmessage` .....  
. [a4](#), [a58](#), [a222](#), [b164](#), [b178](#), [b304](#),  
[c32](#), [d63](#), [e57](#), [e72](#), [j47](#), [j72](#), [r492](#),  
[r527](#), [t379](#), [t479](#), [u65](#), [T16](#), [U49](#), [U241](#)
- `\ERROR` ..... [g516](#), [g517](#)
- `\errorcontextlines` ..... [b338](#),  
[b465](#), [b481](#), [b496](#), [b509](#), [b526](#), [j163](#)
- `\errorstopmode` .... [107](#), [110](#), [b454](#), [U547](#)
- `\escapchar` ..... [204](#)
- `\escapechar` .....  
. [90](#), [d204](#), [f116](#), [f159](#), [f163](#), [f171](#),  
[f265](#), [f266](#), [f290](#), [f427](#), [f515](#), [f533](#),  
[n392](#), [r338](#), [r562](#), [t183](#), [v58](#), [v86](#),  
[v147](#), [v178](#), [v209](#), [v253](#), [Q200](#), [Q220](#)
- `\eta` ..... [x274](#)
- `\etacatcode` ..... [d859](#)
- `\eTeXversion` ..... [a57](#)
- `\evensidemargin` ..... [S73](#), [S613](#), [S672](#)
- `\everycr` ... [b434](#), [E192](#), [E195](#), [E354](#), [E497](#)
- `\everydisplay` ..... [r316](#), [r317](#), [r322](#)
- `\everyjob` .. [c37](#), [c42](#), [c47](#), [d208](#), [d254](#),  
[d255](#), [v273](#), [U314](#), [U508](#), [U509](#), [U511](#)
- `\everymath` ..... [r315](#), [r317](#), [r320](#)
- `\everypar` ..... [170](#)
- `\everypar` ..... [505](#),  
[n45](#), [n114](#), [n172](#), [r615](#), [r628](#), [r675](#),  
[D155](#), [D419](#), [D441](#), [F129](#), [F131](#),  
[F135](#), [F136](#), [F180](#), [F197](#), [G273](#),  
[G294](#), [H81](#), [K48](#), [K96](#), [K107](#), [K127](#),  
[K136](#), [L187](#), [S165](#), [S192](#), [S1151](#), [S1317](#)
- `\EveryShipout` ..... [699](#), [R439](#)
- `\ExecuteOptions` [t57](#), [t70](#), [A752](#), [A789](#), [P404](#)
- `\exhyphenpenalty` ..... [b320](#), [b407](#)
- `\exists` ..... [x324](#)
- `\exp` ..... [E31](#)
- exp commands:
- `\exp_after:wN` .....  
. [g134](#), [g135](#), [g529](#), [Q72](#), [Q163](#), [Q164](#)
- `\exp_args:Nc` ..... [g756](#)
- `\exp_args:Ne` [g223](#), [g224](#), [g804](#), [g805](#), [Q46](#)
- `\exp_args:Nf` ..... [Q32](#), [Q34](#), [Q265](#)
- `\exp_args:Nnnv` ..... [g80](#)
- `\exp_args:NNx` ..... [g319](#), [g433](#)
- `\exp_args:No` ..... [g699](#), [g741](#)
- `\exp_args:NV` ..... [Q53](#)
- `\exp_args:Nv` ..... [g650](#), [g723](#)
- `\exp_last_unbraced:NNNNo` ..... [g137](#)
- `\exp_not:N` ..... [g145](#), [R56](#), [R87](#)
- `\exp_not:n` ..... [g406](#), [Q147](#), [Q156](#)
- `\exp_stop_f:` ..... [g373](#), [g381](#), [g855](#)
- `\expandafter` ..... [468](#), [469](#), [686](#)
- expandafter commands:
- `\expandafter:` ..... [z88](#), [H269](#)
- `\expanded` ..... [124](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=lt pictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \ExplSyntaxOff . e133, g951, Q12, Q85,  
Q170, Q181, Q193, Q273, Q296,  
Q341, Q392, Q442, R341, R391, R430
- \ExplSyntaxOn . . . . . e112, g5,  
Q7, Q29, Q143, Q178, Q261, Q281,  
Q304, Q373, Q435, R5, R389, R426
- \extracolsep . . . . . H167
- \extrafloats . . . . . b152, b189, b274
- F**
- \fam . . . . . b98, d22, d26, d38, r15
- \familydefault . . . . . 372,  
o1530, v270, w276, w509, w523, x120
- \fbox . . . . . 511
- \fbox . . . . . G154, G167, G174
- \fboxrule . . . . . G152, G188,  
G191, G197, G199, G206, G207, U84
- \fboxsep . . . . . G152,  
G158, G187, G192, G202, G204, U83
- fi commands:
  - \fi: . . . . . g377, g385,  
g391, g532, g725, g783, g859, Q168
- \filbreak . . . . . b411
- file commands:
  - \file\_full\_name:n . . . . . 684, Q35
  - \file\_parse\_full\_name:apply:nN . .  
. . . . . Q32, Q47
  - \l\_file\_search\_path\_seq 677, 684, 688
- file/after . . . . . 676
- file/after/... . . . . 676
- file/before . . . . . 676
- file/before/... . . . . 676
- filecontents (environment) . . . . 633, P841
- \filecontents . . . . . P841
- filehook internal commands:
  - \\_\_filehook\_drop\_extension:N . . .  
. . . . . Q44, Q385
  - \\_\_filehook\_drop\_extension\_-  
aux:nnn . . . . . Q54, Q57
  - \\_\_filehook\_file\_name\_compose:nnn  
. . . . . Q277, Q294
  - \\_\_filehook\_file\_parse\_full\_-  
name:nN . . . . 682, 682, 689, Q28,  
Q30, Q53, Q165, Q265, Q283, Q285
  - \\_\_filehook\_file\_pop: . . . Q59, Q389
  - \\_\_filehook\_file\_pop\_assign:nnnn  
. . . . . Q59, Q391
  - \\_\_filehook\_file\_push: . . . Q59, Q387
  - \\_\_filehook\_file\_subst\_begin:nnn  
. . . . . 689, Q283, Q291
  - \\_\_filehook\_file\_subst\_cycle\_-  
error:NN . . . . . 691, Q326, Q331
  - \\_\_filehook\_file\_subst\_loop:NN . .  
. . . . . 690, Q300
  - \\_\_filehook\_file\_subst\_tortoise\_-  
hare:nn . . . . . 689, 690, Q293, Q300
  - \\_\_filehook\_full\_name:nn . . . . . Q30
  - \\_\_filehook\_if\_file\_replaced:TF .  
. . . . . Q288, Q383
  - \\_\_filehook\_if\_no\_extension:nTF .  
. . . . . Q44, Q375
  - \g\_filehook\_input\_file\_seq 682, Q59
  - \l\_filehook\_internal\_tl . . . . . Q59
  - \\_\_filehook\_log\_file\_record:n . Q405
  - \g\_filehook\_nesting\_level\_int . .  
. . . . . Q402, Q407, Q410, Q411, Q417
  - \\_\_filehook\_normalize\_file\_-  
name:w . . . . . Q277, Q381
  - \\_\_filehook\_resolve\_file\_subst:w  
. . . . . Q277, Q379
  - \\_\_filehook\_set\_curr\_file:nNN . . .  
. . . . . Q263, Q377
  - \\_\_filehook\_set\_curr\_file\_-  
assign:nnnNN . . . . Q30, Q266, Q268
  - \\_\_filehook\_subst\_add:nn . . . . .  
. . . . . Q142, Q144, Q179
  - \\_\_filehook\_subst\_empty\_name\_-  
chk:NN . . . . . Q144
  - \\_\_filehook\_subst\_file\_normalize:n  
. . . . . Q144
  - \\_\_filehook\_subst\_remove:n . . . . .  
. . . . . Q144, Q180
  - \\_\_filehook\_substitution\_-  
lthooadd:nn . . . . . 685
  - \filename@parse . . . . . 1, 6
  - \filesize . . . . . e50, e98
  - \fill . . . . . 1454
  - \finalhyphenemerits . . . . .  
. . . . . b329, D346, D350, D356
  - \firstmark . . . . . O51, S647, S706, S2217
  - flag internal commands:
    - \flag\_\\_\_filehook\_file\_replaced . 690
    - \flag\_\\_\_filehook\_file\_replaced . Q288
  - flag commands:
    - \flag\_if\_raised:nTF . . . . Q290, Q309
    - \flag\_new:n . . . . . Q288
    - \flag\_raise:n . . . . . Q310
  - \flat . . . . . x328
  - \floatingpenalty . . . . . L441
  - \floatpagefraction . . . . . L278, S2298
  - \floatsep . . . . .  
S726, S744, S751, S2104, S2154, S2303
  - \flushbottom . . . . . O55
  - flushleft (environment) . . . . . D387
  - \flushleft . . . . . D387
  - flushright (environment) . . . . . D389
  - \flushright . . . . . D389

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- \hbar ..... x335
- \hbox ..... 695, 696, 699
- hbox commands:
  - \hbox:n ..... R297
  - \hbox\_set:Nn . R141, R167, R192, R221
  - \hbox\_set\_to\_wd:Nnn R165, R217, R253
  - \hbox\_unpack:N ..... R175, R219
- \headheight ..... S75, S626, S685
- \headsep ..... S76, S635, S694
- \heartsuit ..... x333
- \height ..... o1188, G31, G34
- \hfil ..... 497
- \hfuzz ..... b339, r626, O60, O61,  
O67, O68, R161, R163, R213, R215
- \hglue ..... b401
- \hideoutput ..... b499
- \hideskip ..... b307, b425
- \hidewidth ..... b425, o327,  
o329, o358, o362, o390, o391, o394,  
o397, o473, o474, o478, o481, o483,  
o486, o498, o503, o519, o754, o755,  
o758, o761, o828, o831, o1219, o1221
- \hline ..... H358, H361
- \hom ..... E29
- hook commands:
  - \hook\_debug\_off: ..... 110, g7, g934
  - \hook\_debug\_on: ..... 110, g7, g933
  - \hook\_gput\_code:nnn .....  
108, 109, 125, 127, g171, g212, g902
  - \hook\_gput\_next\_code:nn .....  
109, 127, g217, g743, g904
  - \hook\_gremove\_code:nn .....  
109, 129, g286, g906
  - \hook\_gset\_rule:nnnn .....  
109, 131, g328, g936, g938, g941
  - \hook\_if\_empty:nTF .... 102, 103,  
109, g829, g943, R70, R73, R79, R103
  - \hook\_if\_empty\_p:n .....  
109, g668, g829, R292
  - \hook\_if\_exist:n ..... 106, 109
  - \hook\_if\_exist:nTF . 102, 103, 109,  
129, g45, g181, g194, g242, g300,  
g418, g634, g691, g749, g841, g942
  - \hook\_if\_exist\_p:n .. 109, g667, g841
  - \hook\_log:n ..... 110, g616, g932
  - \hook\_new:n .....  
108, 121, 147, 148, g41, g72,  
g242, g898, R95, R96, R97, R98, R99
  - \hook\_new\_pair:nn .... 108, g71, g900
  - \hook\_new\_reversed:n .....  
108, g64, g72, g899
  - \hook\_show:n .... 110, 141, g616, g931
  - \hook\_use:n .....  
102, 103, 108, 112, 125, 145, 147,  
g409, g769, g824, g929, R47, R72, R76
  - \hook\_use\_once:n .....  
102, 108, 112, 147, g817, g930
- hook internal commands:
  - \g\_\_hook\_\_\_code\_prop ..... g41
  - \g\_\_hook\_??\_code\_prop ..... g325
  - \g\_\_hook\_??\_reversed\_tl ..... g325
  - \g\_\_hook\_{hook}\_labels\_clist ... 122
  - \g\_\_hook\_{name}\_code\_prop .... 121
  - \g\_\_hook\_{name}\_reversed\_tl ... 121
  - \g\_\_hook\_all\_seq ..... g28, g48, g398
  - \\_\_hook\_apply\_rule\_>:nnn ... g591
  - \\_\_hook\_apply\_rule\_<:nnn ... g591
  - \\_\_hook\_apply\_rule\_<:nnn .... g591
  - \\_\_hook\_apply\_rule\_>:nnn .... g591
  - \\_\_hook\_apply\_rule\_x:nnn .... g591
  - \\_\_hook\_apply\_label\_pair:nnn ...  
137, 138, 144, g464, g465, g518
  - \\_\_hook\_apply\_rule:nnn 139, g528, g534
  - \\_\_hook\_apply\_rule:nnnN ..... 139
  - \\_\_hook\_apply\_rule\_>:nnn .... g569
  - \\_\_hook\_apply\_rule\_<:nnn .... g569
  - \\_\_hook\_apply\_rule\_<:nnn .... g541
  - \\_\_hook\_apply\_rule\_>:nnn .... g541
  - \\_\_hook\_apply\_rule\_xE:nnn .... g555
  - \\_\_hook\_apply\_rule\_xW:nnn .... g555
  - \\_\_hook\_clear\_next:n ..... g743
  - \\_\_hook\_clist\_gput:Nn .....  
g426, g428, g488, g516
  - \l\_\_hook\_cur\_hook\_tl .....  
140, g30, g450, g575, g586
  - \\_\_hook\_curr\_name\_pop: ... g907, g950
  - \\_\_hook\_curr\_name\_push:n .....  
150, g907, g948
  - \\_\_hook\_currname\_or\_default:n ...  
123, 124, g90, g105, g121, g122
  - \\_\_hook\_debug:n ... 119, g7, g193,  
g397, g402, g415, g433, g469, g489,  
g543, g550, g557, g565, g571, g582
  - \g\_\_hook\_debug\_bool . g6, g10, g15, g21
  - \\_\_hook\_debug\_gset: ..... g7
  - \\_\_hook\_debug\_label\_data:N .....  
g469, g510, g604
  - \\_\_hook\_debug\_print\_rules:n .. g727
  - \\_\_hook\_declare:n .....  
148, g50, g56, g206, g335, g748
  - \g\_\_hook\_execute\_immediately\_-  
prop ..... 147, g32, g175, g828

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lthooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

`\__hook_file_hook_normalize:n` ... [129](#), [g224](#), [g271](#), [g805](#)  
`\l__hook_front_tl` [g441](#), [g480](#), [g483](#), [g486](#), [g488](#), [g489](#), [g490](#), [g503](#), [g504](#)  
`\c__hook_generics_file_prop` ... [128](#), [g264](#), [g283](#)  
`\c__hook_generics_prop` ... [g240](#), [g281](#)  
`\c__hook_generics_reversed_ii_prop` ... [g243](#), [g283](#)  
`\c__hook_generics_reversed_iii_prop` ... [g246](#), [g283](#)  
`\__hook_gput_code:nnn` ... [g171](#)  
`\__hook_gput_next_do:nn` ... [127](#), [g217](#), [g743](#)  
`\__hook_gput_next_do:Nnn` ... [g743](#)  
`\__hook_gput_undeclared_hook:nnn` ... [127](#), [g204](#), [g212](#)  
`\__hook_gremove_code:nn` ... [g286](#)  
`\__hook_gremove_code_do:nn` ... [130](#), [g296](#), [g305](#)  
`\__hook_gset_rule:nnnn` ... [g328](#)  
`\g__hook_hook_curr_name_tl` ... [124](#), [150](#), [150](#), [151](#), [g34](#), [g124](#), [g130](#), [g911](#), [g918](#)  
`\__hook_hook_gput_code_do:nnn` ... [g80](#), [g171](#), [g207](#)  
`\__hook_if_exist:nTF` ... [g58](#), [g290](#), [g636](#), [g831](#), [g847](#)  
`\__hook_if_exist_p:n` ... [g847](#)  
`\__hook_if_exist_use:n` ... [146](#), [g794](#)  
`\__hook_if_file_hook:wTF` ... [127](#), [128](#), [146](#), [g221](#), [g254](#), [g802](#)  
`\__hook_if_file_hook_p:w` ... [g254](#)  
`\__hook_if_label_case:nnnnn` ... [g387](#), [g462](#), [g707](#)  
`\__hook_if_marked_removal:nnTF` ... [g178](#), [g317](#)  
`\__hook_if_reversed:nTF` ... [g424](#), [g674](#), [g676](#), [g853](#)  
`\__hook_if_reversed_p:n` ... [g853](#)  
`\__hook_include_legacy_code_chunk:n` ... [g53](#), [g73](#), [g417](#)  
`\__hook_initialize_all:` ... [g395](#), [g946](#)  
`\__hook_initialize_hook_code:n` ... [138](#), [g396](#), [g412](#), [g792](#)  
`\__hook_initialize_single:NNNn` ... [133](#), [135](#), [136](#), [g430](#), [g446](#)  
`\l__hook_label_0_tl` ... [g441](#)  
`\__hook_label_if_exist_apply:nnnTF` ... [138](#), [139](#), [144](#), [g518](#)  
`\__hook_label_ordered:nn` ... [133](#)  
`\__hook_label_ordered:nnTF` ... [132](#), [g350](#), [g356](#), [g362](#), [g379](#)  
`\__hook_label_ordered_p:nn` ... [g379](#)  
`\__hook_label_pair:nn` ... [132](#), [133](#), [g349](#), [g355](#), [g361](#), [g365](#), [g367](#), [g370](#), [g371](#), [g600](#), [g601](#)  
`\l__hook_labels_int` ... [138](#), [g441](#), [g449](#), [g453](#), [g485](#), [g506](#)  
`\l__hook_labels_seq` ... [g441](#), [g448](#), [g454](#), [g472](#), [g606](#)  
`\__hook_list_if_rule_exists:nnnTF` ... [g700](#)  
`\__hook_list_one_rule:nnn` ... [g700](#)  
`\__hook_list_rules:nn` ... [143](#), [g654](#), [g700](#), [g732](#)  
`\__hook_log:nN` ... [g616](#)  
`\__hook_log_cmd:n` ... [g618](#), [g623](#), [g627](#), [g629](#), [g633](#)  
`\__hook_log_line:n` ... [g616](#)  
`\__hook_log_line_indent:n` ... [g616](#)  
`\__hook_log_next_code:n` ... [g650](#), [g698](#)  
`\__hook_make_name:n` ... [121](#), [125](#), [g115](#), [g121](#), [g127](#), [g132](#)  
`\__hook_make_name:w` ... [g132](#)  
`\__hook_mark_removal:nn` ... [130](#), [g297](#), [g303](#), [g307](#)  
`\__hook_msg_pair_found:nnn` [g543](#), [g550](#), [g557](#), [g565](#), [g573](#), [g584](#), [g597](#)  
`\g__hook_name_stack_seq` ... [g34](#), [g907](#), [g910](#), [g916](#), [g917](#), [g926](#)  
`\__hook_new:n` ... [g42](#), [g43](#), [g68](#)  
`\__hook_new_reversed:n` ... [g64](#)  
`\__hook_normalize_hook_args:Nn` ... [g42](#), [g65](#), [g139](#), [g619](#), [g624](#), [g744](#), [g822](#)  
`\__hook_normalize_hook_args:Nnn` ... [g139](#), [g172](#), [g287](#)  
`\__hook_normalize_hook_args_aux:Nn` ... [g139](#)  
`\__hook_normalize_hook_rule_args:Nnnnn` ... [g139](#), [g330](#)  
`\__hook_parse_dot_label:nn` ... [g93](#), [g96](#)  
`\__hook_parse_dot_label:nw` ... [g96](#)  
`\__hook_parse_dot_label_aux:nw` ... [g96](#)  
`\__hook_parse_dot_label_cleanup:w` ... [g96](#)  
`\__hook_parse_label_default:n` ... [g87](#), [g151](#), [g157](#), [g158](#), [g165](#), [g166](#), [g168](#)  
`\__hook_preamble_hook:n` ... [145](#), [146](#), [g410](#), [g632](#), [g769](#), [g813](#)  
`\l__hook_rear_tl` ... [g441](#), [g470](#), [g476](#), [g477](#), [g499](#), [g500](#)  
`\g__hook_removal_list_prop` ... [g29](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lthooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx



- \g\_\_hook\_removal\_list\_tl ..... [131](#), [g29](#), [g309](#), [g314](#), [g319](#)
- \\_\_hook\_removal\_tl:nn ..... [g310](#), [g315](#), [g320](#), [g323](#)
- \l\_\_hook\_return\_tl ..... [g25](#), [g197](#), [g200](#), [g295](#), [g486](#), [g487](#), [g821](#), [g823](#), [g916](#), [g917](#), [g918](#), [g926](#)
- \\_\_hook\_rule\_<\_gset:nnn ..... [g347](#)
- \\_\_hook\_rule\_>\_gset:nnn ..... [g347](#)
- \\_\_hook\_rule\_after\_gset:nnn .. [g347](#)
- \\_\_hook\_rule\_before\_gset:nnn ... [137](#), [g347](#)
- \\_\_hook\_rule\_gclear:nnn ..... [133](#), [g336](#), [g368](#)
- \\_\_hook\_rule\_incompatible-error-gset:nnn ..... [g364](#)
- \\_\_hook\_rule\_incompatible-warning-gset:nnn ..... [g364](#)
- \\_\_hook\_rule\_unrelated\_gset:nnn . [133](#), [g368](#)
- \\_\_hook\_rule\_voids\_gset:nnn .. [g359](#)
- \\_\_hook\_seq\_csname:n ..... [g439](#), [g456](#), [g490](#), [g546](#), [g553](#), [g611](#)
- \\_\_hook\_str\_compare:nn ..... [g23](#), [g373](#), [g381](#), [g390](#)
- \\_\_hook\_strip\_double\_slash:n . [g271](#)
- \\_\_hook\_strip\_double\_slash:w . [g271](#)
- \\_\_hook\_tl\_csname:n ..... [g439](#), [g445](#), [g455](#), [g471](#), [g474](#), [g476](#), [g480](#), [g492](#), [g494](#), [g497](#), [g499](#), [g504](#), [g544](#), [g545](#), [g551](#), [g552](#), [g610](#)
- \\_\_hook\_tl\_gput:Nn ..... [g425](#), [g427](#), [g487](#), [g516](#)
- \\_\_hook\_tmp:w ..... [g36](#), [g702](#), [g723](#), [g730](#), [g741](#)
- \l\_\_hook\_tmpa\_bool ..... [142](#), [g24](#), [g653](#), [g656](#), [g664](#), [g673](#)
- \l\_\_hook\_tmpa\_tl ..... [g25](#)
- \l\_\_hook\_tmpb\_tl ..... [g25](#)
- \\_\_hook\_try\_declaring\_generic-hook:nnn ..... [127](#), [g186](#), [g209](#)
- \\_\_hook\_try\_declaring\_generic-hook:nNNnn [127](#), [127](#), [g211](#), [g216](#), [g219](#)
- \\_\_hook\_try\_declaring\_generic-hook:wnTF ..... [g219](#)
- \\_\_hook\_try\_declaring\_generic-hook\_split:nNNnn ..... [g219](#)
- \\_\_hook\_try\_declaring\_generic-next\_hook:nn ..... [127](#), [g209](#), [g751](#)
- \\_\_hook\_try\_file\_hook:n ... [146](#), [g794](#)
- \\_\_hook\_unmark\_removal:nn ..... [126](#), [130](#), [g179](#), [g312](#)
- \\_\_hook\_update\_hook\_code:n ..... [126](#), [130](#), [134](#), [g184](#), [g301](#), [g341](#), [g394](#), [g396](#), [g400](#), [g762](#)
- \\_\_hook\_use:wn ..... [145](#), [146](#), [g776](#), [g789](#), [g794](#)
- \\_\_hook\_use\_end: ..... [g769](#)
- \\_\_hook\_use\_initialized:n ..... [145](#), [g409](#), [g769](#)
- \\_\_hook\_use\_once\_store:n . [g822](#), [g827](#)
- \\_\_hook\_use\_undefined:w ..... [g769](#)
- \g\_\_hook\_used\_prop ..... [g33](#), [g397](#), [g404](#), [g434](#)
- \l\_\_hook\_work\_prop ..... [137](#), [g31](#), [g429](#), [g451](#), [g458](#), [g460](#), [g469](#), [g486](#), [g510](#), [g578](#), [g589](#)
- \hookleftarrow ..... [x480](#)
- \hookrightarrow ..... [x478](#)
- \hphantom ..... [E75](#)
- \hrule ..... [b402](#), [b446](#), [l350](#), [l358](#), [l384](#), [l392](#), [o289](#), [o294](#), [x340](#), [x618](#), [G144](#), [G149](#), [G197](#), [G207](#), [H359](#), [H376](#), [L371](#), [I590](#), [I600](#)
- \hrulefill ..... [b446](#), [f769](#), [f790](#)
- \hspace ..... [l437](#), [l441](#), [l446](#)
- \hss ..... [708](#)
- \Hwithstroke ..... [231](#), [o491](#), [o1179](#)
- \hwithstroke ..... [231](#), [o507](#), [o1180](#)
- \hyphenation ..... [o205](#)
- \hyphenchar ..... [97](#), [f727](#), [f730](#), [f739](#), [f742](#), [f745](#), [f750](#), [D440](#)
- \hyphenpenalty ..... [b319](#), [r632](#), [r664](#)

## I

- \I ..... [b370](#), [P967](#), [P1098](#), [P1188](#), [P1208](#), [U188](#), [U453](#)
- \i ..... [o247](#), [o402](#), [o449](#), [o450](#), [o451](#), [o452](#), [o453](#), [o454](#), [o544](#), [o581](#), [o582](#), [o674](#), [o676](#), [o678](#), [o680](#), [o772](#), [o1115](#), [o1261](#), [o1263](#), [o1265](#), [o1267](#), [o1318](#), [o1321](#), [o1324](#), [o1327](#), [o1397](#), [U192](#), [U457](#), [U464](#)
- \ialign ..... [b434](#), [b436](#), [x337](#), [x459](#), [x530](#), [x533](#), [x537](#), [x540](#), [E155](#), [E157](#), [E176](#), [H191](#), [I141](#)
- \IeC ..... [U255](#), [U259](#), [U366](#)
- \if ..... [464](#)
- if commands:
  - \if\_case:w ..... [g373](#), [g390](#)
  - \if\_cs\_exist:w ..... [g527](#), [g722](#), [g780](#)
  - \if\_int\_compare:w ..... [g381](#), [g855](#)
  - \if\_meaning:w ..... [Q168](#)
- \IfBold ..... [379](#)
- \IfClassAtLeastTF ..... [P105](#)

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|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\ifcsname</code> . . . . .              | f625, f642, s403,<br>s406, s537, s540, w39, w50, P855, P986                                                                                                                                                                                                                                                                                                                                           | <code>include/before</code> . . . . .     | 679                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\ifdefined</code> . . . . .             | e49,<br>e50, e51, e52, e82, e97, e98, e99, w473                                                                                                                                                                                                                                                                                                                                                       | <code>include/before/...</code> . . . . . | 679                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\iff</code> . . . . .                   | x500                                                                                                                                                                                                                                                                                                                                                                                                  | <code>include/end</code> . . . . .        | 679                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\IfFileExists</code> . . . . .          | 192, 636                                                                                                                                                                                                                                                                                                                                                                                              | <code>include/end/...</code> . . . . .    | 679                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\IfFileExists</code> . . . . .          | 209, a178, e15, e46,<br>e84, e94, n407, n447, n478, n534,<br>n559, P610, Q96, Q126, Q134, U486                                                                                                                                                                                                                                                                                                        | <code>\IncludeInRelease</code> . . . . .  | 67, a18,<br>a23, a290, a307, b49, b88, b103,<br>b119, b125, b134, b139, b148, b154,<br>b168, b182, b186, b220, b228, b233,<br>b244, b289, b457, b492, b499, b546,<br>c66, d3, d227, d250, d273, e36, e92,<br>e113, e123, f5, f13, f262, f304, f332,<br>f360, f367, f384, f400, f438, f450,<br>f478, f489, f501, f508, f604, f621,<br>f651, f692, f711, f722, f739, f750,<br>f761, f781, g3, g954, l5, l21, l54, l65,<br>l81, l86, l98, l104, l132, l152, l166,<br>l178, l191, l206, l235, l252, l271,<br>l307, l333, l366, l426, l432, l440,<br>l445, l459, l465, n12, n85, n143,<br>n221, n258, n279, n294, n341, n402,<br>n438, n484, n489, n497, n511, n522,<br>n538, n571, o77, o104, o148, o169,<br>o324, o332, o353, o369, p24, p30,<br>p46, p90, p127, p143, p151, p169,<br>q5, q11, r24, r53, r210, r232, r391,<br>r402, r410, r442, r450, r464, r485,<br>r521, r608, r670, s4, s578, s611,<br>s617, s621, t495, t504, u2, u22,<br>v49, v78, v138, v169, v200, v607,<br>v655, v701, v710, v894, v905, w33,<br>w163, w188, w267, w319, w348,<br>w381, w393, w427, w440, w471,<br>w480, w505, w518, x63, x81, x100,<br>x110, x622, x634, z27, z34, A2, A42,<br>A59, A533, C38, C51, C62, D10,<br>D66, D113, D140, D159, D215,<br>D265, D287, D295, D308, D314,<br>D326, D331, D341, D360, D377,<br>D401, D423, D450, D475, D488,<br>D503, D519, D542, D552, E79, E87,<br>E109, E118, E139, E144, E152,<br>E163, E203, E220, E256, E264,<br>E274, E301, E382, E391, E428,<br>E440, E452, E461, F125, F133,<br>G4, G14, G50, G70, G98, G106,<br>G162, G170, G216, G225, G262,<br>G284, G364, G370, G390, G398,<br>H60, H65, H137, H157, H222, H227,<br>K5, K20, K161, K168, K174, K187,<br>K210, L35, L105, L206, L232, L280,<br>L294, L382, L388, L396, L403,<br>L410, L416, L422, O20, O40, P23,<br>P36, P48, P59, P66, P72, P107,<br>P117, P129, P142, P172, P191, |
| <code>\iffontchar</code> . . . . .            | o1034, o1182                                                                                                                                                                                                                                                                                                                                                                                          |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\IfFontSeriesContextTF</code> . . . . . | 379, w346, w382, w384                                                                                                                                                                                                                                                                                                                                                                                 |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\IfFormatAtLeastTF</code> . . . . .     | P105                                                                                                                                                                                                                                                                                                                                                                                                  |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\IfHookEmptyTF</code> . . . . .         | 102, 103, 105, 152, g942, g979, D199                                                                                                                                                                                                                                                                                                                                                                  |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\IfHookExistsTF</code> . . . . .        | 102, 103, 106, g942, g978                                                                                                                                                                                                                                                                                                                                                                             |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\ifinner</code> . . . . .               | E261,<br>E269, E289, E316, L57, L126, L315                                                                                                                                                                                                                                                                                                                                                            |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\ifnum</code> . . . . .                 | 698                                                                                                                                                                                                                                                                                                                                                                                                   |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\ifodd</code> . . . . .                 | v973, L68, L137, S21, S138,<br>S610, S668, S982, S985, S1018,<br>S1021, S1132, S1135, S1294, S1297,<br>S1574, S1577, S1695, S1698, S1818,<br>S2039, S2047, I320, I344, I378, I400                                                                                                                                                                                                                     |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\IfPackageAtLeastTF</code> . . . . .    | P105                                                                                                                                                                                                                                                                                                                                                                                                  |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\IfTargetDateBefore</code> . . . . .    | P1416                                                                                                                                                                                                                                                                                                                                                                                                 |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\ifvbox</code> . . . . .                | S319, S376, S423, S502, S518                                                                                                                                                                                                                                                                                                                                                                          |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\ifx</code> . . . . .                   | 95, 369, 370, 371, 383, 686                                                                                                                                                                                                                                                                                                                                                                           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\ignorespaces</code> . . . . .          | 116, 219, l49, l143, l162, l174,<br>l185, l201, l214, l483, n73, n140,<br>n195, o72, r286, D205, D212, D263,<br>D278, D323, D328, D334, E297,<br>E324, F55, F217, G135, G360,<br>H57, H62, H68, H83, H92, H105,<br>H109, H116, H123, H125, H134,<br>H154, H237, H301, H303, H305,<br>H332, J30, J32, K110, L17, L24,<br>L448, N7, N9, R254, I36, I46, I66,<br>I75, I109, I120, I131, I143, I148, I154 |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\ignorespacesafterend</code> . . . . .  | D7                                                                                                                                                                                                                                                                                                                                                                                                    |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\IJ</code> . . . . .                    | o250, o433, o547, o1116                                                                                                                                                                                                                                                                                                                                                                               |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\ij</code> . . . . .                    | o249, o431, o546, o1117                                                                                                                                                                                                                                                                                                                                                                               |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\Im</code> . . . . .                    | x314                                                                                                                                                                                                                                                                                                                                                                                                  |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\imath</code> . . . . .                 | x309                                                                                                                                                                                                                                                                                                                                                                                                  |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\in</code> . . . . .                    | x429, x461                                                                                                                                                                                                                                                                                                                                                                                            |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| in commands:                                  |                                                                                                                                                                                                                                                                                                                                                                                                       |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>in_callback</code> . . . . .            | d791                                                                                                                                                                                                                                                                                                                                                                                                  |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\in_callback</code> . . . . .           | 41                                                                                                                                                                                                                                                                                                                                                                                                    |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\include</code> . . . . .               | 192                                                                                                                                                                                                                                                                                                                                                                                                   |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\include</code> . . . . .               | 118, 203, 676, 678,<br>679, 682, n219, n267, n269, n285, n287                                                                                                                                                                                                                                                                                                                                         |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>include/after</code> . . . . .          | 679                                                                                                                                                                                                                                                                                                                                                                                                   |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>include/after/...</code> . . . . .      | 679                                                                                                                                                                                                                                                                                                                                                                                                   |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lthooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspc.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx



- P221, P239, P252, P281, P295,  
P363, P381, P405, P417, P458,  
P468, P524, P553, P585, P702,  
P782, P789, P843, P975, P1105,  
Q5, Q15, Q27, Q91, Q122, Q131,  
Q141, Q176, Q184, Q196, Q216,  
Q229, Q236, Q259, Q279, Q302,  
Q348, Q360, Q371, R3, R344,  
R387, R401, S24, S54, S151, S179,  
S345, S366, S371, S419, S591, S651,  
S794, S812, S873, S894, S930, S954,  
S1066, S1217, S1386, S1468, S1562,  
S1684, S1903, S1930, S2160, S2178,  
S2197, S2243, U8, U16, U23, U38,  
U57, U66, U73, U99, U132, U221,  
U226, U246, U339, I10, I16, I26,  
I39, I55, I69, I80, I89, I100, I112,  
I146, I151, I160, I172, I235, I250,  
I311, I369, I455, I464, I473, I501,  
I531, I558, I572, I585, I596, I608,  
I625, I645, I652, I686, I746, I804, I820  
\includeonly ..... 192  
\includeonly ..... 200,  
678, 679, n219, n259, n261, n280, n281  
\indent ..... I462, F161, H81  
\index ..... 621  
\index K182, M6, M18, O24, O32, S620, S679  
\indexentry ..... M15  
\inf ..... E25  
\infty ..... x316  
\initcatcodetable ..... d91  
\input ..... 192, 636  
\input ..... 118, 633, 676, 677,  
677, 681, 682, 687, a68, a174, a177,  
a234, d18, e81, e85, e110, f22, n494,  
t16, u106, w564, w574, w584, x10,  
x11, x12, x13, x14, x23, x41, x42,  
x46, x47, x136, x137, x138, x139,  
x654, x655, x656, A1038, P434,  
U97, U111, U136, U214, U303, U491  
\input@path ..... 1, 6  
input@path commands:  
  \input@path: ..... a239  
\inputencodingname ... U280, U302, U384  
\InputIfFileExists ..... 192, 636  
\InputIfFileExists ..... 208, 209,  
653, 654, 682, 683, 683, n477, n500,  
n515, n525, n535, n589, o1506,  
r362, w556, w566, w576, A754,  
A1121, P671, P733, Q90, T8, U208  
\inputlineno ..... a327, j165  
\insert ..... b254, b279, b281,  
b284, b299, L437, S517, S518, S1883  
\int ..... x348
- int commands:  
  \int\_compare:nNnTF ... g474, g496,  
  g506, g865, R34, R78, R277, R283  
  \int\_decr:N ..... g485  
  \int\_eval:n ... g493, g545, g552, R279  
  \int\_gdecr:N ..... Q417  
  \int\_gincr:N ..... Q407, R48, R64  
  \int\_gset:Nn ..... Q403  
  \int\_incr:N ..... g453  
  \int\_new:N ... g442, Q402, R270, R272  
  \int\_set:Nn ..... Q148, Q157  
  \int\_use:N .....  
  .... 698, 698, Q411, R66, R81, R287  
  \int\_value:w ..... R27  
  \int\_zero:N ..... g449  
  \c\_max\_int ... R138, R164, R189, R216  
  \c\_zero\_int ..... R52
- int internal commands:  
  \_\_hook~ ..... 125  
  \_\_hook~... ..... g41  
  \_\_hook~?? ..... 131, g325  
  \_\_hook <hook> ..... 135  
  \_\_hook <name> ..... 121  
\interdisplaylinepenalty .....  
  .... I13, E55, E194, E376  
\interfootlinepenalty ..... b360  
\interfootnotelinepenalty b360, I18, L439  
\interlinepenalty .....  
  .... I11, r634, D412, D415, D433,  
  D436, K67, K118, K194, K217,  
  L439, S338, S1153, S1157, S1319, S1323  
\intextsep ..... S1136,  
  S1140, S1155, S1158, S1165, S1298,  
  S1304, S1321, S1324, S1333, S2303  
\intop ..... x347, x348  
\iota ..... x276
- iow commands:  
  \iow\_char:N ..... g575, g586  
  \iow\_log:n ..... g618  
  \iow\_newline: ..... Q415  
  \iow\_now:Nn ..... R286  
  \iow\_term:n .... g193, g403, g405,  
  g415, g489, g508, g509, g511, g574,  
  g585, g599, g605, g606, g607, g610,  
  g614, g623, g729, g734, Q408, Q441  
\ishortstack ..... I132  
\itdefault ..... s565, w30, x94  
\item .... 497, j230, D337, D387, D389,  
  D403, D425, E435, E447, E474,  
  F141, F219, H78, J36, J38, N4, N8  
\itemindent .....  
  . 496, 497, F9, F42, F95, F187, F208  
  itemize (environment) ..... F242  
  \itemize ..... F242

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx,  
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l=lt space.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx,  
q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx,  
v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx,  
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F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=lt pictur.dtx, J=ltthm.dtx, K=ltsect.dtx,  
L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx,  
Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- `\itemsep` ..... 497, [F1](#), [F176](#)  
`\iterate` ..... [a81](#), [a82](#), [b390](#)  
`\itshape` ..... 308, [381](#), [o444](#),  
[o801](#), [s563](#), [s564](#), [w28](#), [w29](#), [w404](#),  
[w437](#), [w443](#), [z21](#), [A550](#), [J36](#), [J38](#), [L375](#)
- J**
- `\J` ..... [U190](#), [U455](#)  
`\j` ..... [o248](#), [o403](#),  
[o545](#), [o773](#), [o1125](#), [o1331](#), [o1411](#), [U464](#)  
`\jmath` ..... [x310](#)  
`\jobname` ..... 660  
`\Join` ..... [w538](#)  
`\joinrel` . [x471](#), [x478](#), [x480](#), [x482](#), [x484](#),  
[x486](#), [x488](#), [x490](#), [x492](#), [x496](#), [x498](#)  
`\jot` ..... [E53](#), [E191](#), [E387](#), [E397](#)
- K**
- `\k` ..... 237,  
[o482](#), [o584](#), [o589](#), [o611](#), [o616](#), [o692](#),  
[o693](#), [o751](#), [o752](#), [o806](#), [o808](#), [o813](#),  
[o815](#), [o1217](#), [o1285](#), [o1286](#), [o1303](#),  
[o1304](#), [o1326](#), [o1327](#), [o1328](#), [o1381](#),  
[o1382](#), [o1409](#), [o1410](#), [A190](#), [A208](#)  
`\kanjiskip` ..... [e52](#)  
`\kappa` ..... [x277](#)  
`\ker` ..... [E27](#)  
`\kern` ..... 706  
kernel internal commands:  
`\_kernel_msg_expandable_-`  
error:nnnn ..... [Q333](#)  
`\_kernel_msg_new:nnn` ..... [Q339](#)  
`\kill` ..... [H154](#), [H162](#)
- L**
- `\L` ..... [o242](#), [o421](#), [o527](#), [o765](#), [o1118](#),  
[P964](#), [P1095](#), [P1185](#), [P1207](#), [U483](#)  
`\l` ... [o251](#), [o423](#), [o548](#), [o774](#), [o1119](#), [U483](#)  
`\label` .. [C32](#), [K182](#), [O24](#), [O32](#), [S619](#), [S678](#)  
`\labelenumi` ..... 508  
`\labelenumiv` ..... 508  
`\labelformat` ..... 455  
`\labelformat` ... [C46](#), [C52](#), [C58](#), [C63](#), [C69](#)  
`\labelitemi` ..... 508  
`\labelitemii` ..... 508  
`\labelitemiii` ..... 508  
`\labelitemiv` ..... 508  
`\labelsep` 497, 508, [F9](#), [F210](#), [F216](#), [J36](#), [J38](#)  
`\labelwidth` .....  
. 495, 497, [F9](#), [F93](#), [F209](#), [F211](#), [F214](#)  
`\Lambda` ..... [x300](#)  
`\lambda` ..... [x278](#)  
`\land` ..... [x368](#), [x370](#)  
`\langle` ..... [x594](#)
- `\language` ..... [b35](#), [b82](#), [b84](#),  
[b99](#), [n54](#), [n123](#), [D408](#), [D548](#), [S597](#), [T10](#)  
`\lastbox` ..... [r652](#), [E180](#), [E181](#),  
[F130](#), [F136](#), [F185](#), [K99](#), [K132](#), [S305](#)  
`\LastDeclaredEncoding` .. [r137](#), [r140](#), [U380](#)  
`\lastnamedcs` ..... [f643](#)  
`\lastnodetype` ..... [r645](#), [r646](#), [r647](#), [r651](#)  
`\lastpenalty` ..... [r648](#), [z112](#), [z115](#)  
`\lastskip` ..... [b414](#), [b415](#), [b417](#),  
[b419](#), [l44](#), [l128](#), [l140](#), [l159](#), [l220](#),  
[l221](#), [l225](#), [l227](#), [l228](#), [l240](#), [l258](#),  
[l280](#), [l283](#), [l315](#), [l318](#), [l319](#), [z102](#),  
[z105](#), [F115](#), [F116](#), [F150](#), [F151](#), [I123](#)  
`\LaTeX` ..... [f722](#), [m3](#),  
[m15](#), [P927](#), [P1058](#), [P1147](#), [R312](#), [R318](#)  
`\LaTeXe` ..... [m13](#)  
`\latexreleaseversion` ..... [c1](#)  
`\lbrace` ..... [o308](#), [x598](#)  
`\lbrack` ..... [b374](#)  
`\lccode` ..... [j19](#), [j20](#),  
[j21](#), [j22](#), [j23](#), [j24](#), [o140](#), [o1039](#), [D493](#),  
[D508](#), [D523](#), [D566](#), [U157](#), [U174](#),  
[U182](#), [U189](#), [U191](#), [U192](#), [U194](#),  
[U196](#), [U197](#), [U198](#), [U199](#), [U439](#),  
[U447](#), [U454](#), [U456](#), [U457](#), [U459](#), [U461](#)  
`\lceil` ..... [x602](#)  
`\ldotp` ..... [x501](#), [x504](#), [x619](#)  
`\ldots` ..... [o322](#), [x505](#)  
`\le` ..... [x416](#), [x418](#)  
`\leaders` ..... [b446](#),  
[x340](#), [x558](#), [x559](#), [x561](#), [x562](#), [H376](#),  
[K199](#), [K222](#), [I565](#), [I578](#), [I590](#), [I600](#)  
`\leadsto` ..... [w541](#)  
`\leavevmode` ..... [b405](#), [b432](#), [b435](#),  
[b446](#), [b448](#), [l407](#), [l421](#), [o75](#), [o184](#),  
[o289](#), [o290](#), [o393](#), [o422](#), [o426](#), [o429](#),  
[o476](#), [o757](#), [o790](#), [z123](#), [A119](#), [A836](#),  
[D412](#), [D433](#), [D446](#), [D457](#), [D465](#),  
[D544](#), [D554](#), [D567](#), [E435](#), [E447](#),  
[E474](#), [F58](#), [F103](#), [G8](#), [G17](#), [G24](#),  
[G137](#), [G139](#), [G155](#), [G183](#), [G244](#),  
[G320](#), [G377](#), [G394](#), [G401](#), [H178](#),  
[K40](#), [K195](#), [K207](#), [K218](#), [L462](#), [N14](#),  
[S157](#), [S162](#), [S184](#), [S189](#), [I134](#), [I314](#), [I373](#)  
`\left` .... [x625](#), [x627](#), [x629](#), [x631](#), [x636](#),  
[x637](#), [x638](#), [x639](#), [E154](#), [E160](#), [E182](#)  
`\Leftarrow` ..... [x410](#), [x492](#), [x498](#)  
`\leftarrow` .....  
. . [x437](#), [x439](#), [x480](#), [x490](#), [x496](#), [x550](#)  
`\leftarrowfill` ..... [x534](#), [x550](#)  
`\lefteqn` ..... [E411](#)  
`\leftharpoonup` ..... [x453](#), [x467](#)  
`\leftharpoonup` ..... [x452](#)  
`\lefthyphenmin` ..... [T11](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- `\leftline` ..... [G428](#)
- `\leftmargin` ..... [495](#),  
[497](#), [F9](#), [F52](#), [F53](#), [F94](#), [F146](#), [F148](#)
- `\leftmargini` ..... [497](#), [E427](#), [F17](#)
- `\leftmarginii` ..... [F17](#)
- `\leftmarginiii` ..... [F17](#)
- `\leftmarginiv` ..... [F17](#)
- `\leftmarginv` ..... [F17](#)
- `\leftmarginvi` ..... [497](#), [F17](#)
- `\leftmark` ..... [O48](#)
- `\Leftrightarrow` ..... [x409](#)
- `\leftrightharpoonrightarrow` ..... [x436](#)
- `\leftskip` ..... [b427](#),  
[r629](#), [D345](#), [D351](#), [D355](#), [D365](#),  
[D369](#), [D373](#), [D405](#), [D427](#), [F74](#),  
[G276](#), [G297](#), [K192](#), [K197](#), [K215](#), [K220](#)
- `\legacyoldstylenums` ..... [A1](#), [A52](#)
- `\leq` ..... [x414](#), [x416](#)
- `\let` ..... [82](#), [85](#), [152](#), [268](#), [402](#), [402](#), [406](#)
- `\LetLtxMacro` ..... [89](#)
- `\lfloor` ..... [x606](#)
- `\lg` ..... [E4](#)
- `\lggroup` ..... [x608](#)
- `\lhd` ..... [w544](#)
- `\lhook` ..... [x477](#), [x478](#)
- `\lim` ..... [E6](#)
- `\liminf` ..... [E8](#)
- `\limits` ..... [x539](#), [x543](#), [E149](#), [E337](#)
- `\limsup` ..... [E7](#)
- `\line` ..... [j219](#), [I158](#), [I450](#), [I809](#), [I826](#)
- `\linebreak` ..... [172](#)
- `\linebreak` ..... [19](#), [126](#)
- `\linepenalty` ..... [b318](#)
- `\lineskip` [b368](#), [b400](#), [b435](#), [x458](#), [E187](#),  
[G278](#), [G298](#), [H71](#), [H198](#), [R147](#),  
[R198](#), [S622](#), [S681](#), [I136](#), [I315](#), [I374](#)
- `\lineskiplimit` [b369](#), [b400](#), [b437](#), [b438](#),  
[x458](#), [x510](#), [E189](#), [E193](#), [G264](#),  
[G279](#), [G286](#), [R148](#), [R199](#), [S622](#), [S681](#)
- `\linespread` ..... [r287](#)
- `\linethickness` ..... [I130](#), [I810](#), [I827](#)
- `\linewidth` ..... [496](#), [n32](#), [n101](#), [n159](#),  
[E282](#), [E308](#), [E436](#), [E448](#), [E475](#),  
[E479](#), [E497](#), [F15](#), [F51](#), [F52](#), [F54](#),  
[G274](#), [G295](#), [H36](#), [L266](#), [S146](#), [S205](#)
- `list` (environment) ..... [F34](#)
- `\list` ..... [F34](#), [F236](#), [F247](#)
- `\listfiles` ..... [636](#)
- `\listfiles` ..... [117](#), [n604](#)
- `\listparindent` ..... [497](#), [F9](#), [F41](#), [F50](#)
- `\ll` ..... [x434](#)
- `\llap` ..... [F238](#), [F249](#), [G432](#)
- `\lmoustache` ..... [x563](#)
- `\ln` ..... [E5](#)
- `\lnot` ..... [x326](#), [x327](#)
- `\LoadClass` ..... [634](#)
- `\LoadClass` ..... [P440](#),  
[P454](#), [P643](#), [P750](#), [P824](#), [P832](#), [P833](#)
- `\LoadClassWithOptions` ..... [634](#)
- `\LoadClassWithOptions` ..... [P453](#)
- `\LoadFontDefinitionFile` ..... [r389](#),  
[r415](#), [r416](#), [x21](#), [x27](#), [x28](#), [x29](#), [x33](#)
- `\LoadPackageWithOptions` ..... [677](#)
- `\loccount` ..... [d17](#)
- `\log` ..... [E3](#)
- `\loggingall` ..... [b457](#)
- `\loggingoutput` ... [b453](#), [b466](#), [b482](#), [b496](#)
- `\LogHook` ..... [107](#), [g931](#)
- `\long` ..... [81](#)
- `\Longleftarrow` ..... [x492](#)
- `\longleftarrow` ..... [x489](#)
- `\Longleftrightarrow` ..... [x498](#), [x500](#)
- `\longleftarrow` ..... [x496](#)
- `\longmapsto` ..... [x494](#)
- `\Longrightarrow` ..... [x486](#)
- `\longrightarrow` ..... [x487](#), [x494](#)
- `\loop` ..... [a81](#), [b390](#), [d150](#),  
[d159](#), [r643](#), [H382](#), [P873](#), [P936](#),  
[P1004](#), [P1067](#), [P1118](#), [P1156](#), [U263](#),  
[U274](#), [U284](#), [U295](#), [U325](#), [U351](#), [U361](#)
- `\lor` ..... [x369](#), [x371](#)
- `\lower` ..... [m2](#), [x458](#), [G195](#), [I35](#), [I45](#),  
[I196](#), [I305](#), [I306](#), [I353](#), [I354](#), [I409](#), [I410](#)
- `\lowercase` [j26](#), [o141](#), [o1040](#), [o1504](#), [r303](#),  
[r361](#), [D497](#), [D512](#), [D527](#), [D567](#), [U479](#)
- `\lq` ..... [b372](#)
- `lrbox` (environment) ..... [511](#)
- `\lrbox` ..... [G125](#)
- `\ltfilehookdate` ..... [Q400](#)
- `\ltfilehookversion` ..... [Q400](#)
- `\luabytecode` ..... [d194](#)
- `\luachunk` ..... [d202](#)
- `\luafunction` ..... [38](#), [d178](#)
- `luatexbase` ..... [d280](#)
- `\luatexluafunction` ..... [a18](#), [a23](#)
- `\luatexversion` ... [a11](#), [d5](#), [e51](#), [e99](#), [o977](#)

## M

- `\M` ..... [b370](#)
- `\magstep` ..... [b361](#)
- `\magstephalf` ..... [b361](#)
- `\makeatletter` .....  
... [f718](#), [n34](#), [n103](#), [n161](#), [r367](#),  
[D25](#), [D80](#), [K151](#), [P434](#), [P608](#), [P711](#), [S2](#)
- `\makeatother` ..... [f718](#), [P434](#), [U546](#)
- `\makebox` ..... [511](#)
- `\makebox` ..... [E282](#), [E308](#), [G3](#)
- `\makeglossary` ..... [621](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=ltterror.dtx, k=ltpar.dtx, l=ltspc.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

|                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\makeglossary</code> .....                                           | n206, <a href="#">M20</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <code>\mathchardef</code> .....                                                                                                           | .. b21, b22, b23, b24, b107, b110,<br>b111, d219, h3, h4, h5, h6, o70, v768                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <code>\makeindex</code> .....                                              | 621                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <code>\mathcharzero</code> .....                                                                                                          | d219                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\makeindex</code> .....                                              | n205, <a href="#">M3</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <code>\mathchoice</code> .....                                                                                                            | E61                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\makelabel</code> .....                                              | 496, F45, F97, F205, <a href="#">F218</a> , F238, F249                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <code>\mathclose</code> .....                                                                                                             | v979, x231, x240, x242, x245, x250,<br>x256, x258, x260, x566, x593, x597,<br>x601, x605, x611, E43, E46, E49, E52                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <code>\MakeLowercase</code> .....                                          | U473, U485                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <code>\mathcode</code> .....                                                                                                              | v765, x252, x253, x254                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>\MakeRobust</code> .....                                             | 361,<br><a href="#">f261</a> , f763, f764, f765, f766, f767,<br>f768, f769, f770, f771, f772, f773,<br>f774, f775, f776, f777, f778, v705,<br>v900, I806, I807, I808, I809, I810,<br>I811, I812, I813, I814, I815, I816, I817                                                                                                                                                                                                                                                                                                                                                           | <code>\mathdollar</code> .....                                                                                                            | o307, <a href="#">x614</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <code>\maketitle</code> .....                                              | 587                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <code>\mathellipsis</code> .....                                                                                                          | o321, <a href="#">x619</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <code>\MakeUppercase</code> .....                                          | C48, C60, <a href="#">U463</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <code>\mathgroup</code> .                                                                                                                 | b79, <a href="#">r14</a> , t257, t263, t269,<br>t270, t281, x643, A8, A14, A49, A1048                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <code>\mapsto</code> .....                                                 | x444                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\mathhexbox</code> .....                                                                                                            | <a href="#">b433</a> , w502                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <code>\mapstochar</code> .....                                             | x443, x444, x494                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <code>\mathindent</code> <a href="#">E425</a> , <a href="#">E437</a> , <a href="#">E449</a> , <a href="#">E477</a> , <a href="#">E487</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>\marginpar</code> .....                                              | <a href="#">L308</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\mathinner</code> .....                                                                                                             | x504, x508, x513, x619                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>\marginparpush</code> .....                                          | S85, S1834                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <code>\mathit</code> .....                                                                                                                | s564, w29, x153, x156, x617                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <code>\marginparsep</code> .....                                           | S84, S1845, S1847                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <code>\mathnormal</code> .....                                                                                                            | x149                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <code>\marginparwidth</code> .....                                         | L337, S83, S1847                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <code>\mathop</code> .....                                                                                                                | v975, x341, x342, x343,<br>x344, x345, x346, x347, x349, x350,<br>x351, x352, x353, x354, x356, x357,<br>x537, x540, E3, E4, E5, E6, E7, E8,<br>E9, E10, E11, E12, E13, E14, E15,<br>E16, E17, E18, E19, E20, E21, E22,<br>E23, E24, E25, E26, E27, E28, E29,<br>E30, E31, E32, E33, E34, E149, E337                                                                                                                                                                                                                                                          |
| <code>\mark</code> .....                                                   | O27, O35, <a href="#">O53</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <code>\mathopen</code> .....                                                                                                              | v978, x241, x244, x249,<br>x255, x257, x259, x564, x595, x599,<br>x603, x607, x609, E41, E44, E47, E50                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>\markboth</code> .....                                               | O21, <a href="#">O22</a> , O41, O43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <code>\mathord</code> .....                                                                                                               | v792, v974, x236, x243, x246, x251,<br>x263, x264, x265, x267, x268, x269,<br>x270, x271, x272, x273, x274, x275,<br>x276, x277, x278, x279, x280, x281,<br>x282, x283, x284, x285, x286, x287,<br>x288, x289, x290, x291, x292, x293,<br>x294, x295, x296, x308, x309, x310,<br>x311, x312, x313, x314, x315, x316,<br>x317, x318, x319, x320, x321, x322,<br>x323, x324, x325, x327, x328, x329,<br>x330, x331, x332, x333, x334, x524,<br>x526, x527, x549, x550, x553, x554,<br>x555, x556, x568, x570, x572, x575,<br>x577, x591, x613, x614, x615, x616 |
| <code>\markright</code> .....                                              | <a href="#">O22</a> , O44                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <code>\mathpalette</code> .....                                                                                                           | x457, x461, x464, <a href="#">E60</a> , E69, E99, E129                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>\marks</code> .....                                                  | d37, U10, U12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <code>\mathparagraph</code> . . .                                                                                                         | o310, p134, p146, <a href="#">x614</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>math</code> (environment) .....                                      | <a href="#">E329</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\mathpunct</code> .....                                                                                                             | .. v980, x234, x238, x501, x502, x503                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <code>\math</code> .....                                                   | <a href="#">E329</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\mathrel</code> .....                                                                                                               | v977,<br>x237, x239, x247, x248, x261, x262,<br>x338, x398, x399, x400, x401, x402,<br>x403, x404, x405, x406, x407, x408,                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <code>\mathaccent</code> .....                                             | v622, v670, v704, v714                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>\mathalpha</code> .....                                              | v792,<br><a href="#">v971</a> , x169, x170, x171, x172, x173,<br>x174, x175, x176, x177, x178, x179,<br>x180, x181, x182, x183, x184, x185,<br>x186, x187, x188, x189, x190, x191,<br>x192, x193, x194, x195, x196, x197,<br>x198, x199, x200, x201, x202, x203,<br>x204, x205, x206, x207, x208, x209,<br>x210, x211, x212, x213, x214, x215,<br>x216, x217, x218, x219, x220, x221,<br>x222, x223, x224, x225, x226, x227,<br>x228, x229, x230, x297, x298, x299,<br>x300, x301, x302, x303, x304, x305,<br>x306, x307, x516, x517, x518, x519,<br>x520, x521, x522, x523, x525, x528 |                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>\mathbf</code> . . . .                                               | w14, w199, w280, w325, x151                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>\mathbin</code> .....                                                | v976, x232, x233, x235,<br>x358, x359, x360, x361, x364, x365,<br>x366, x367, x370, x371, x372, x373,<br>x374, x375, x376, x377, x378, x379,<br>x380, x381, x382, x383, x384, x385,<br>x386, x387, x388, x389, x390, x391,<br>x392, x393, x394, x395, x396, x397, <a href="#">E37</a>                                                                                                                                                                                                                                                                                                   |                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>\mathcal</code> .....                                                | x150                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>\mathchar</code> <a href="#">b433</a> , v733, v777, x335, x336, x617 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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- [x409](#), [x410](#), [x411](#), [x414](#), [x415](#), [x418](#),  
[x419](#), [x420](#), [x421](#), [x422](#), [x423](#), [x424](#),  
[x425](#), [x426](#), [x427](#), [x428](#), [x429](#), [x430](#),  
[x432](#), [x433](#), [x434](#), [x435](#), [x436](#), [x437](#),  
[x438](#), [x441](#), [x442](#), [x443](#), [x445](#), [x446](#),  
[x447](#), [x448](#), [x449](#), [x450](#), [x451](#), [x452](#),  
[x453](#), [x454](#), [x455](#), [x457](#), [x461](#), [x464](#),  
[x471](#), [x473](#), [x476](#), [x477](#), [x479](#), [x482](#),  
[x484](#), [x579](#), [x581](#), [x583](#), [x585](#), [x587](#),  
[x589](#), [E42](#), [E45](#), [E48](#), [E51](#), [E149](#), [E337](#)  
`\mathring` ..... [x528](#)  
`\mathrm` ..... [w5](#), [w238](#), [w302](#), [w331](#), [x148](#)  
`\mathsection` ..... [o311](#), [p133](#), [p145](#), [x614](#)  
`\mathsf` . [w8](#), [w243](#), [w307](#), [w334](#), [x152](#), [x155](#)  
`\mathsterling` ..... [o319](#), [x614](#)  
`\mathstrut` ..... [E84](#), [E93](#), [E158](#), [E159](#)  
`\mathsurround` ..... [b421](#)  
`\mathsymbol` ..... [v770](#)  
`\mathtt` .... [w11](#), [w248](#), [w312](#), [w337](#), [x154](#)  
`\mathunderscore` ..... [x614](#)  
`\mathversion` ..... [r307](#), [w464](#), [w466](#)  
`\matrix` ..... [E156](#), [E160](#), [E167](#)  
`\max` ..... [E22](#)  
`\maxdeadcycles` ..... [S7](#)  
`\maxdepth` ..... [b342](#), [l287](#), [n62](#), [n130](#),  
[n185](#), [S92](#), [S169](#), [S170](#), [S506](#), [S514](#),  
[S546](#), [S715](#), [S724](#), [S764](#), [S991](#), [U85](#)  
`\maxdimen` ..... [711](#), [b307](#), [b343](#),  
[b344](#), [b400](#), [b438](#), [b454](#), [b465](#), [b481](#),  
[b496](#), [r616](#), [r626](#), [r661](#), [r676](#), [t338](#),  
[t391](#), [x458](#), [P1228](#), [P1269](#), [P1278](#),  
[R275](#), [R277](#), [R324](#), [S291](#), [S1853](#),  
[S1873](#), [S1878](#), [S2165](#), [S2205](#), [S2206](#),  
[S2208](#), [U89](#), [I475](#), [I503](#), [I533](#), [I611](#), [I628](#)  
`\mbox` ..... [511](#)  
`\mbox` [b433](#), [m13](#), [o293](#), [w498](#), [x506](#), [G11](#),  
[G20](#), [G24](#), [L385](#), [L392](#), [L413](#), [L420](#), [I52](#)  
`\mddefault` .....  
[367](#), [367](#), [368](#), [370](#), [372](#), [w18](#), [w195](#),  
[w221](#), [w222](#), [w223](#), [w232](#), [w275](#),  
[w296](#), [w329](#), [x92](#), [x105](#), [x107](#), [x121](#)  
`\mdseries` ..... [118](#),  
[372](#), [379](#), [w16](#), [w17](#), [w156](#), [w218](#),  
[w290](#), [w291](#), [w327](#), [w328](#), [w501](#), [z20](#)  
`mdseries` ..... [w252](#)  
`mdseries/defaults` ..... [w252](#)  
`\meaning` .....  
[a219](#), [a228](#), [a323](#), [f218](#), [f280](#), [f318](#),  
[f346](#), [f429](#), [f689](#), [v444](#), [v457](#), [v558](#),  
[v623](#), [v670](#), [v734](#), [v828](#), [v924](#), [v1028](#)  
`\medbreak` ..... [b415](#), [f770](#), [f791](#)  
`\mediumseries` ..... [372](#)  
`\medmuskip` [x645](#), [E36](#), [E38](#), [E211](#), [E214](#), [E228](#)  
`\medskip` ..... [b418](#), [l400](#)  
`\medskipamount` ..... [b417](#), [l401](#), [l403](#)  
`\medspace` ..... [E201](#)  
`\MessageBreak` ..... [e56](#),  
[e59](#), [e60](#), [e61](#), [e62](#), [e63](#), [e64](#), [f194](#),  
[f269](#), [f308](#), [f336](#), [j3](#), [j6](#), [j13](#), [j33](#),  
[j46](#), [j60](#), [j73](#), [j171](#), [j173](#), [j179](#), [j186](#),  
[o161](#), [o971](#), [o1509](#), [o1512](#), [r34](#), [r35](#),  
[r507](#), [r541](#), [s419](#), [t20](#), [t21](#), [t67](#), [t88](#),  
[t281](#), [t432](#), [t452](#), [t484](#), [t500](#), [t515](#),  
[t528](#), [u31](#), [u33](#), [v399](#), [v408](#), [v546](#),  
[w58](#), [z144](#), [A23](#), [A100](#), [A102](#), [A121](#),  
[A760](#), [A762](#), [A763](#), [A764](#), [A766](#),  
[A768](#), [A769](#), [A770](#), [A771](#), [A772](#),  
[A822](#), [A824](#), [A831](#), [A838](#), [A1053](#),  
[D44](#), [D84](#), [P214](#), [P480](#), [P491](#),  
[P493](#), [P495](#), [P506](#), [P596](#), [P597](#),  
[P599](#), [P600](#), [P601](#), [P603](#), [P605](#),  
[P638](#), [P639](#), [P640](#), [P641](#), [P718](#),  
[P719](#), [P721](#), [P722](#), [P723](#), [P725](#),  
[P727](#), [P745](#), [P746](#), [P747](#), [P748](#),  
[P809](#), [P826](#), [P827](#), [P895](#), [P914](#),  
[P953](#), [P1026](#), [P1045](#), [P1084](#), [P1139](#),  
[P1173](#), [P1282](#), [P1284](#), [P1366](#),  
[P1369](#), [P1382](#), [P1384](#), [R60](#), [R108](#),  
[R394](#), [R395](#), [R396](#), [R397](#), [S578](#),  
[S1960](#), [S1997](#), [U232](#), [U233](#), [U234](#), [U236](#)  
`\mho` ..... [w537](#)  
`\mid` ..... [x402](#)  
`\min` ..... [E23](#)  
`minipage` (environment) ..... [512](#)  
`\minipage` ..... [G307](#)  
`\mit` ..... [w589](#)  
`\mkern` ..... [x335](#), [x338](#), [x340](#), [x462](#),  
[x471](#), [x513](#), [x514](#), [x515](#), [x545](#), [x546](#),  
[x547](#), [x548](#), [x549](#), [x550](#), [x551](#), [x552](#),  
[E36](#), [E37](#), [E40](#), [E73](#), [E74](#), [K200](#), [K223](#)  
`mlist` commands:  
`mlist_to_hlist` ..... [d840](#)  
`\models` ..... [x484](#)  
`module` commands:  
`module_error` ..... [d336](#)  
`module_info` ..... [d336](#)  
`module_warning` ..... [d336](#)  
`\module_error` ..... [41](#)  
`\module_info` ..... [41](#)  
`\module_warning` ..... [41](#)  
`modules` ..... [d289](#)  
`\month` .... [a185](#), [c17](#), [P931](#), [P1062](#), [P1151](#)  
`\moveright` ..... [S625](#), [S684](#)  
`\mp` ..... [x389](#)  
`\mscount` ..... [H379](#)  
`msg` commands:  
`\msg_error:nnn` ..... [g46](#), [g920](#), [Q74](#)  
`\msg_error:nnnnnn` ..... [g343](#), [g558](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx,  
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q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx,  
v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx,  
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F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx,  
L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx,  
Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \msg\_expandable\_error:nnn .... g100
- \msg\_line\_context: ..... g877
- \msg\_new:nnn ..... g876, g893
- \msg\_new:nnnn ..... g861, g871, g878
- \msg\_warning:nnnnnn ..... g566
- \mskip ..... E36,  
E38, E206, E225, E228, E230, E231
- \mu ..... x279
- \mubyte ..... U250
- \multicolumn ..... 468, H233
- \multirow ..... 178, I811, I828
- \multispan ..... H233, H379
- \muskip .... b29, b55, b93, d34, x545, x546
- \muskipdef ..... b55, b93, d220
- \muskipzero ..... d220
- N**
- \n ..... d323,  
d325, d332, d334, d461, d567, d593,  
d619, d665, d687, d706, d714, d715,  
d735, d748, d755, d756, d763, d775
- \nabla ..... x319
- \NAME ..... 70
- \narrower ..... b426
- \natural ..... x329
- \ncallback ..... d670
- \ndefault ..... d675, d679
- \ne ..... 402, x413
- \nearrow ..... x405
- \NeedsTeXFormat .. t12, A731, P485, P1428
- \neg ..... x325, x326
- \negmedspace ..... E201
- \negthickspace ..... E201
- \negthinspace ..... 1468, E201
- \neq ..... 402, x412
- new commands:
- new\_attribute ..... d402
- new\_bytecode ..... d436
- new\_chunkname ..... d449
- new\_luafunction ..... d465
- new\_whatshit ..... d424
- \new\_attribute ..... 39
- \new\_bytecode ..... 39
- \new\_chunkname ..... 39
- \new\_luafunction ..... 39
- \new\_whatshit ..... 39
- \newattribute ..... 38
- \newattribute ..... d74, d230
- \newbox b47, b312, b423, h13, D468, E66,  
F27, G96, H16, H17, H18, H343,  
S86, S120, S121, S122, I6, I670, I675
- \newcatcodetable ..... 38
- \newcatcodetable .....  
.... d84, d93, d94, d120, d121, d234
- \newcommand ..... 70
- \newcommand .....  
82, 85, 89, 91, f67, o4, s453, s458,  
s463, w36, x51, x52, x53, x54, x56,  
x57, x59, x60, x92, x93, x94, x95,  
x96, x97, x120, x121, x122, D289,  
D290, D291, D292, Q431, Q432,  
Q433, Q434, Q436, S2291, S2294,  
S2297, S2298, S2301, S2302, I682
- \NewCommandCopy .... 86, 87, 88, f451, f453
- \newcount .... b47, b360, h7, h8, I124,  
n9, p36, t25, v27, v286, E55, E341,  
E342, F23, F24, F25, F26, F56,  
F226, F241, G348, H11, H12, H13,  
H14, H15, H335, H336, H337, K36,  
K140, K141, L3, L267, L268, L269,  
L270, P1225, S103, S105, S107,  
S109, S111, S119, S1986, S2289,  
S2292, S2295, S2299, U3, U4, U5,  
U77, I664, I665, I666, I667, I676
- \newcounter ..... 257
- \newcounter ..... p10
- \newdimen b47, b307, b309, b310, b359,  
h10, h11, h12, I123, t352, t353, E53,  
F9, F10, F11, F12, F13, F14, F15,  
F16, F17, F18, F19, F20, F21, F22,  
G152, G153, H3, H5, H6, H7, H8,  
H166, H338, H339, H340, H341,  
L427, S71, S72, S73, S75, S76, S77,  
S78, S79, S80, S81, S82, S83, S84,  
S85, S91, S93, S94, S106, S108,  
S110, S112, S113, S114, S115, S116,  
S117, S118, S1987, S1988, I3, I4,  
I5, I7, I431, I432, I433, I434, I435,  
I436, I668, I669, I671, I672, I673, I674
- \NewDocumentCommand .....  
.. 85, e82, g898, g899, g900, g901,  
g903, g905, g924, g935, g937, g940
- \newenvironment ..... 71
- \newenvironment .....  
.. 114, 115, f136, P929, P1060, P1149
- \newfam ..... b47, d38, r16
- \newfont ..... w468
- \newgroup ..... v47
- \newhelp ..... b306
- \NewHook ..... 99, 100, 100, 105,  
106, 109, 111, 115, g4, g898, g955,  
g957, n74, n75, n76, w252, w253,  
w254, w255, w256, w257, w258,  
w259, w260, D32, D33, D34, D35, D36
- \newif ..... c68,  
f158, f757, h9, n7, n8, r204, s385,  
v15, w378, z82, A780, C3, E75,  
E76, E190, E343, F28, F29, F30,

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- F31, F32, F33, F138, G362, H19,  
H251, K38, K124, P2, S95, S96,  
S97, S98, S99, S100, S101, S102,  
I157, I427, I428, I429, I430, I459, I460
- \newinsert .....  
    . b193, b242, G349, L366, S27, S1852
- \newlabel ..... C22, C34
- \newlanguage ..... b47, U217
- \newlength ..... 265
- \newlength ..... q3
- \newline ..... 192, 199, I105
- \newlinechar ..... a72, f20
- \newluabytecode ..... 38
- \newluabytecode ..... d189, d244
- \newluachunkname ..... 39
- \newluachunkname ..... d197, d246
- \newluafunction ..... 38
- \newluafunction d4, d173, d228, d240, o993
- \newmarks ..... U6
- \newmathalphabet ..... u13, u109
- \NewMirroredHookPair .....  
    . 100, 106, 109, g898, g959
- \newmuskip ..... b47
- \newpage ..... S133, S139, S150
- \newread ..... b47, n3
- \NewReversedHook .....  
    . 100, 100, 106, 109, 111, g898, g958
- \newrobustcmd ..... 85
- \newsavebox ..... 511
- \newsavebox ..... G96
- \newskip ..... b47, b308, b311, b357,  
    b358, h14, h15, h17, I403, I404,  
    I405, I454, q3, D386, E344, E426,  
    F2, F3, F4, F5, F6, F7, F8, S2303,  
    S2304, S2305, S2309, S2310, S2313,  
    S2314, S2315, S2319, S2320, S2321
- \newtheorem ..... J1
- \newtie ..... 428,  
    o845, A194, A212, A615, A924, A925
- \newtoks .....  
    b47, b306, h16, r317, r318, s442, t201
- \newwhatsit ..... 38
- \newwhatsit ..... d181, d242
- \newwrite b47, n4, n5, n6, K154, M4, M21
- \newXeTeXintercharclass ..... U21
- next ... internal commands:  
    \\_hook\_next~... ..... g41
- next <name> internal commands:  
    \\_hook\_next <name> ..... 121
- \NG ..... o528, o1120, U483
- \ng ..... o549, o1121, U483
- \ni ..... x430, x431
- \noalign ..... 468, x339, x531, x534,  
    x537, x538, x542, x543, E158, E159,  
    E175, E178, E192, E387, E397,  
    H224, H230, H359, H378, I148, I154
- \nobreak b403, b406, b408, f771, f792, I59,  
    I71, I115, I141, I147, I160, I173, I199,  
    I351, I359, I385, I393, I414, I421,  
    I452, n204, n216, o432, o434, D311,  
    D318, G427, K90, K197, K198,  
    K202, K220, K221, K225, L463,  
    O29, O37, S336, S1149, S1315,  
    U141, U143, U147, U148, U149, U153
- \nobreakdashes ..... 1406
- \nobreakspace ..... 1420
- \nobreakspace\_ ..... 188
- \nocite ..... 624
- \nocite ..... N39
- \nocorr ..... z43, z58, z62, z65
- \nocorrlist ..... z89, z121
- \nofiles ..... 192
- \nofiles ..... 462, 463, 710, n200
- \noindent ..... 505, r639, r665, K139
- \nointerlineskip ..... b398, x339,  
    x531, x534, x538, x542, E281, E307,  
    S1842, S1850, I563, I566, I576, I578
- \nolimits ..... x348, x355,  
    E3, E4, E5, E9, E10, E11, E12, E13,  
    E14, E15, E16, E17, E18, E19, E20,  
    E21, E26, E27, E28, E29, E31, E34
- \nolinebreak ..... 172
- \nolinebreak ..... 19, 127
- \nonfrenchspacing .....  
    b364, b552, f772, f793, n50, n119, n177
- \nonscript ..... E36, E38
- \nonumber ..... E370, E409, E410
- \nopagebreak ..... 172
- \nopagebreak ..... 17, 125
- \noprotusion ..... K207, K230
- \normalbaselines ..... b368, E154, E156
- \normalbaselineskip .....  
    . b357, b369, t142, G280, G299
- \normalcolor .....  
    . 785, E336, E422, G89, G340,  
    K203, K226, L97, L166, S216, S492,  
    S629, S639, S688, S698, S2226, S2259
- \normalfont ..... 118, 219, 372, r617,  
    r677, w503, w519, w521, w527, z18,  
    D447, E336, E422, K203, K226, L377
- normalfont ..... w252
- \normallineskip . b357, b368, G278, G298
- \normallineskiplimit .....  
    b357, b369, E193, G263, G279, G285
- \normalmarginpar ..... L363
- \normalsfcodes .....  
    . n46, n48, n50, n115, n117, n119,  
    n173, n175, n177, n199, S618, S677

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|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\normalshape</code> . . .            | 305, 308, <a href="#">s550</a> , <a href="#">s597</a> , <a href="#">s604</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <code>\oplus</code> . . . . .                                                                                                                                                                                                                                          | <a href="#">x388</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <code>\normalsize</code> . . . . .         | <a href="#">101</a> , <a href="#">n44</a> , <a href="#">n113</a> , <a href="#">n171</a> ,<br><a href="#">z142</a> , <a href="#">L23</a> , <a href="#">L176</a> , <a href="#">L348</a> , <a href="#">P5</a> , <a href="#">S617</a> , <a href="#">S676</a>                                                                                                                                                                                                                                                                                           | <code>\OptionNotUsed</code> . . . . .                                                                                                                                                                                                                                  | <a href="#">P322</a> , <a href="#">P329</a> , <a href="#">P764</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>\not</code> . . . . .                | <a href="#">x338</a> , <a href="#">x412</a> , <a href="#">x413</a> , <a href="#">x435</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                          | or commands:                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\notin</code> . . . . .              | <a href="#">x461</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <code>\or:</code> . . . . .                                                                                                                                                                                                                                            | <a href="#">g375</a> , <a href="#">g391</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>\nu</code> . . . . .                 | <a href="#">x280</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <code>\oslash</code> . . . . .                                                                                                                                                                                                                                         | <a href="#">x385</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <code>\null</code> . . . . .               | <a href="#">b382</a> , <a href="#">o327</a> , <a href="#">o363</a> ,<br><a href="#">o483</a> , <a href="#">o486</a> , <a href="#">o828</a> , <a href="#">o831</a> , <a href="#">o1219</a> , <a href="#">C17</a> ,<br><a href="#">D412</a> , <a href="#">D433</a> , <a href="#">D544</a> , <a href="#">D554</a> , <a href="#">E112</a> ,<br><a href="#">E121</a> , <a href="#">E156</a> , <a href="#">E185</a> , <a href="#">K197</a> , <a href="#">K220</a> , <a href="#">R300</a>                                                                 | <code>\OT</code> . . . . .                                                                                                                                                                                                                                             | <a href="#">o372</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <code>\nulldelimiterspace</code> . . . . . | <a href="#">b346</a> , <a href="#">x642</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <code>\otimes</code> . . . . .                                                                                                                                                                                                                                         | <a href="#">x386</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <code>\nullfont</code> . . . . .           | <a href="#">D156</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <code>\outer</code> . . . . .                                                                                                                                                                                                                                          | <a href="#">d21</a> , <a href="#">d38</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <code>\number</code> . . . . .             | <a href="#">a86</a> , <a href="#">c48</a> , <a href="#">c56</a> , <a href="#">d105</a> ,<br><a href="#">f2</a> , <a href="#">f104</a> , <a href="#">p108</a> , <a href="#">r567</a> , <a href="#">r570</a> , <a href="#">t393</a> , <a href="#">v64</a> ,<br><a href="#">v93</a> , <a href="#">v113</a> , <a href="#">v128</a> , <a href="#">v153</a> , <a href="#">v184</a> , <a href="#">v216</a> ,<br><a href="#">w495</a> , <a href="#">P840</a> , <a href="#">P931</a> , <a href="#">P1062</a> , <a href="#">P1151</a> , <a href="#">R275</a> | <code>\outerparskip</code> . . . . .                                                                                                                                                                                                                                   | <a href="#">F1</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>\numberline</code> . . . . .         | <a href="#">K72</a> , <a href="#">K82</a> , <a href="#">K233</a> , <a href="#">L17</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <code>\output</code> . . . . .                                                                                                                                                                                                                                         | <a href="#">S256</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <code>\numexpr</code> . . . . .            | <a href="#">b189</a> , <a href="#">b205</a> , <a href="#">b215</a> ,<br><a href="#">b246</a> , <a href="#">d82</a> , <a href="#">d105</a> , <a href="#">d157</a> , <a href="#">f632</a> , <a href="#">o1018</a> , <a href="#">S36</a>                                                                                                                                                                                                                                                                                                              | <code>\outputpenalty</code> <a href="#">S258</a> , <a href="#">S272</a> , <a href="#">S295</a> , <a href="#">S298</a> ,<br><a href="#">S299</a> , <a href="#">S334</a> , <a href="#">S1159</a> , <a href="#">S1160</a> , <a href="#">S1325</a> , <a href="#">S1328</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>\nunknown</code> . . . . .           | <a href="#">d692</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <code>\oval</code> . . . . .                                                                                                                                                                                                                                           | <a href="#">I450</a> , <a href="#">I453</a> , <a href="#">I812</a> , <a href="#">I829</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <code>\nwarrow</code> . . . . .            | <a href="#">x407</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <code>\over</code> . . . . .                                                                                                                                                                                                                                           | <a href="#">x469</a> , <a href="#">E149</a> , <a href="#">E338</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\overbrace</code> . . . . .                                                                                                                                                                                                                                      | <a href="#">x536</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\overfullrule</code> . . . . .                                                                                                                                                                                                                                   | <a href="#">b341</a> , <a href="#">O69</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\overleftarrow</code> . . . . .                                                                                                                                                                                                                                  | <a href="#">x533</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\overrightarrow</code> . . . . .                                                                                                                                                                                                                                 | <a href="#">x530</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\owns</code> . . . . .                                                                                                                                                                                                                                           | <a href="#">x431</a> , <a href="#">x432</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>P</b>                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\P</code> . . . . .                                                                                                                                                                                                                                              | <a href="#">o310</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>package/after</code> . . . . .                                                                                                                                                                                                                                   | <a href="#">678</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>package/after/...</code> . . . . .                                                                                                                                                                                                                               | <a href="#">678</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>package/before</code> . . . . .                                                                                                                                                                                                                                  | <a href="#">678</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>package/before/...</code> . . . . .                                                                                                                                                                                                                              | <a href="#">678</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\PackageError</code> . . . . .                                                                                                                                                                                                                                   | <a href="#">c72</a> , <a href="#">c101</a> ,<br><a href="#">c110</a> , <a href="#">j84</a> , <a href="#">o1507</a> , <a href="#">A736</a> , <a href="#">A786</a> , <a href="#">A830</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\PackageInfo</code> . . . . .                                                                                                                                                                                                                                    | <a href="#">j84</a> , <a href="#">A738</a> , <a href="#">A755</a> ,<br><a href="#">A760</a> , <a href="#">A776</a> , <a href="#">A777</a> , <a href="#">A837</a> , <a href="#">A1122</a> , <a href="#">R50</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\PackageWarning</code> . . . . .                                                                                                                                                                                                                                 | <a href="#">j84</a> ,<br><a href="#">A737</a> , <a href="#">A787</a> , <a href="#">A1051</a> , <a href="#">R41</a> , <a href="#">R59</a> , <a href="#">R393</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\PackageWarningNoLine</code> . . . . .                                                                                                                                                                                                                           | <a href="#">j84</a> , <a href="#">o969</a> , <a href="#">S1959</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\pagebreak</code> . . . . .                                                                                                                                                                                                                                      | <a href="#">172</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\pagebreak</code> . . . . .                                                                                                                                                                                                                                      | <a href="#">l6</a> , <a href="#">l7</a> , <a href="#">l22</a> , <a href="#">l24</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\pagegoal</code> . . . . .                                                                                                                                                                                                                                       | <a href="#">S1880</a> , <a href="#">S1887</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\pagenumbering</code> . . . . .                                                                                                                                                                                                                                  | <a href="#">453</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\pagenumbering</code> . . . . .                                                                                                                                                                                                                                  | <a href="#">B5</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\pageref</code> . . . . .                                                                                                                                                                                                                                        | <a href="#">C10</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\pageshrink</code> . . . . .                                                                                                                                                                                                                                     | <a href="#">S538</a> , <a href="#">S542</a> , <a href="#">S558</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\pagestyle</code> . . . . .                                                                                                                                                                                                                                      | <a href="#">O2</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\pagetotal</code> . . . . .                                                                                                                                                                                                                                      | <a href="#">S128</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\paperheight</code> . . . . .                                                                                                                                                                                                                                    | <a href="#">S93</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\paperwidth</code> . . . . .                                                                                                                                                                                                                                     | <a href="#">S93</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\par</code> . . . . .                                                                                                                                                                                                                                            | <a href="#">505</a> , <a href="#">a120</a> , <a href="#">b11</a> , <a href="#">b378</a> , <a href="#">b386</a> ,<br><a href="#">b387</a> , <a href="#">b402</a> , <a href="#">b411</a> , <a href="#">b412</a> , <a href="#">b413</a> , <a href="#">b415</a> ,<br><a href="#">b417</a> , <a href="#">b419</a> , <a href="#">d156</a> , <a href="#">f9</a> , <a href="#">f21</a> , <a href="#">k3</a> , <a href="#">k4</a> ,<br><a href="#">k5</a> , <a href="#">r642</a> , <a href="#">D154</a> , <a href="#">D311</a> , <a href="#">D318</a> , <a href="#">D410</a> ,<br><a href="#">D431</a> , <a href="#">F63</a> , <a href="#">F110</a> , <a href="#">F127</a> , <a href="#">F129</a> ,<br><a href="#">F135</a> , <a href="#">F161</a> , <a href="#">F164</a> , <a href="#">G269</a> , <a href="#">G290</a> ,<br><a href="#">G336</a> , <a href="#">H195</a> , <a href="#">H385</a> , <a href="#">K41</a> , <a href="#">K90</a> ,<br><a href="#">K205</a> , <a href="#">K227</a> , <a href="#">L15</a> , <a href="#">L24</a> , <a href="#">L249</a> , <a href="#">O62</a> ,<br><a href="#">O63</a> , <a href="#">R316</a> , <a href="#">S166</a> , <a href="#">S193</a> , <a href="#">S257</a> , <a href="#">S1886</a> |
|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>\paragraphmark</code> . . . . .                                                                                                                                                                                                                                  | <a href="#">K143</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lthooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspc.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx



- `\parallel` ..... x401
- `\parbox` ..... 511
- `\parbox` ..... [G215](#)
- `\parboxrestore` ..... [G303](#)
- `\parfillskip` ... b356, r616, r631, r676,  
D347, D357, D366, D374, D406,  
D428, F76, G277, G298, K192, K215
- `\parindent` b348, b427, b428, D347, D352,  
D357, D366, D370, D374, D406,  
D428, F50, G272, G293, K193, K216
- `\parsep` ..... 497, [F1](#), F49, F90
- `\parseunicodedataI` ..... d123, d162
- `\parseunicodedataII` ..... d124, d126
- `\parseunicodedataIII` ..... d128, d134
- `\parseunicodedataIV` ..... d130, d142
- `\parseunicodedataV` ..... d146, d149
- `\parshape` ..... F54
- `\parskip` ..... 497, b349, D322, D404,  
D406, D426, D428, E493, F49,  
F73, F88, F90, F117, F153, F172,  
F223, G272, G293, H79, S1159, S1327
- `\partial` ..... x315
- `\partopsep` ..... 497, [E491](#), [F1](#), F61
- `\PassOptionsToClass` ..... 634
- `\PassOptionsToClass` ..... [P280](#)
- `\PassOptionsToPackage` ..... 634
- `\PassOptionsToPackage` ..... [P280](#)
- `\patterns` ..... [o205](#)
- `\pdffilesize` ..... e49, e97
- `\pdfhorigin` ..... R238
- `\pdfvariable` ..... R237, R242
- `\pdfvorigin` ..... R243
- `\penalty` ..... b407,  
b408, b409, b410, b411, b412,  
b416, b418, b420, l34, l37, l46,  
l281, l291, l316, l320, z118, D412,  
D415, D433, D436, E37, E194,  
E387, E397, F190, H56, L195,  
L199, L201, L217, L221, L223, N17,  
S136, S176, S195, S198, S1157, S1323
- `\perp` ..... x447
- `\phantom` ..... [E75](#)
- `\Phi` ..... x305
- `\phi` ..... x287
- `\Pi` ..... x302
- `\pi` ..... x282
- `picture` (environment) ..... [I21](#)
- `\picture` ..... [I21](#)
- `\pkg` ..... R441, R445
- `\pm` ..... x390
- `\pmatrix` ..... [E160](#), [E168](#)
- `\pmod` ..... [E39](#)
- `\poptabs` ..... j206, [H142](#), H161
- `\poptracing` ..... t130, t294
- `\postdisplaypenalty` l12, [E434](#), [E446](#), [E472](#)
- `\pounds` ..... o318
- `\Pr` ..... [E32](#)
- `\prec` ..... x421
- `\preceq` ..... x424
- `\predisplaypenalty` b327, [E433](#), [E445](#), [E471](#)
- `\pretolerance` ..... b314, r618, r633, r678
- `\prevdepth` .....  
184, b398, b402, b403, l287, l288,  
l349, l354, l383, l388, E192, L196,  
L198, L218, L220, S167, S169, S172
- `\PreviousTotalPages` . 698, 711, 711, [R322](#)
- prg commands:
  - `\prg_do_nothing:` ..... R105, R245
  - `\prg_new_conditional:Npnn` .....  
.. g254, g379, g829, g841, g847, g853
  - `\prg_new_protected_conditional:Npnn`  
..... g234, g317
  - `\prg_replicate:nn` ..... Q410
  - `\prg_return_false:` .....  
... g238, g251, g262, g266, g269,  
g321, g384, g837, g845, g851, g858
  - `\prg_return_true:` g249, g265, g321,  
g382, g836, g839, g844, g850, g856
- `\prime` ..... x253, x317, [E240](#)
- `\ProcessOptions` ..... o1528,  
t71, A753, A790, [P330](#), P397, P828
- `\ProcessOptions*` ..... [P330](#)
- `\prod` ..... x349
- prop commands:
  - `\prop_const_from_keyval:Nn` .....  
..... g281, g283, g284, g285
  - `\prop_gclear:N` ..... g293, g397
  - `\prop_get:NnN` ..... g486
  - `\prop_get:NnNTF` ..... g197, g295
  - `\prop_gput:Nnn` g199, g202, g433, g828
  - `\prop_gremove:Nn` ..... g306
  - `\prop_if_empty:NTF` ..... g420, g639
  - `\prop_if_empty_p:N` ..... g834
  - `\prop_if_exist:NTF` ..... g849
  - `\prop_if_in:NnTF` .....  
..... g175, g240, g243, g246, g264
  - `\prop_map_break:` ..... g463, g708
  - `\prop_map_inline:Nn` .. g404, g451,  
g458, g460, g608, g642, g703, g705
  - `\prop_new:N` .....  
..... g31, g32, g33, g60, g325, g326
  - `\prop_put:Nnn` ..... g578, g589
  - `\prop_set_eq:NN` ..... g429
  - `\prop_show:N` ..... 144
- `\propto` ..... x398
- `\protect` ..... 468, 701,  
702, 703, 703, 703, f92, f210, f224,  
f233, f238, f241, f242, f244, f245,

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- f250, f251, f256, f259, f260, f285,  
f323, f351, f523, f543, j197, j199,  
j200, j206, j212, j219, j227, j230,  
j236, n212, o26, o32, o51, o55, o209,  
o217, v507, v1055, w488, z143, C12,  
D182, D192, D227, D230, D245,  
D255, H264, K12, K72, K82, K164,  
K171, K177, L17, N5, R44, R56,  
R87, R91, R94, S596, S655, U256
- \protected ..... 85, 227, 308,  
361, f7, f433, l56, l462, o308, o309,  
p160, s550, s554, s557, s560, s563,  
s566, s569, s572, v897, w423, D115,  
D310, R413, R414, R415, R439, R440
- \providecommand ..... f168, g964,  
g967, o6, o964, A723, A724, S1970
- \ProvidesCommandCopy ..... 87
- provides commands:
- provides\_module ..... d290
- \provides\_module ..... 41
- \ProvidesClass ..... 634
- \ProvidesClass ..... P267
- \ProvidesExplPackage ..... Q399
- \ProvidesFile .....  
... a89, x665, x667, x668, x669, P269
- \ProvidesPackage ..... 634
- \ProvidesPackage 642, t13, A729, A758,  
P210, P267, P1429, Q428, R408, R436
- \ProvideTextCommand ..... o3, o60
- \ProvideTextCommandDefault ..... o57
- \Psi ..... x306
- \psi ..... x289
- \pushtabs .. j206, H138, H139, H158, H160
- \pushtracing ..... t115, t275
- \put ..... 696, 699, 708,  
I56, I58, I70, I72, I325, I326, I327,  
I328, I336, I338, I351, I352, I353,  
I354, I361, I364, I384, I385, I386,  
I387, I393, I395, I407, I408, I409,  
I410, I415, I420, I729, I785, I813, I830
- ## Q
- \qbezier ..... 551
- \qbezier ..... I682, I814, I831
- \qbeziermax ..... I681, I707, I708, I768
- \qqquad ..... l473
- \quad ..... l473, E155, E157, E177, K111
- quark internal commands:
- \s\_\_hook\_mark g40, g106, g109, g112,  
g116, g119, g120, g221, g255, g274,  
g275, g279, g776, g789, g794, g802
- \quotedblbase ..... o552, o777, o1142
- \quotesinglbase ..... o553, o1139
- ## R
- \r ..... b376, b377, o236,  
o388, o428, o467, o604, o631, o641,  
o667, o750, o789, o1211, o1229,  
o1255, o1377, o1378, A191, A209
- \radical ..... v921, v924, v954
- \raggedbottom ..... O53
- \raggedleft ..... D353, D371, D382, D389
- \raggedright ..... D348, D367, D381, D387
- \raise o327, o359, o427, o430, o726, o791,  
o878, o1219, w501, x465, x513,  
x515, E73, G412, G421, I61, I73,  
I105, I117, I195, I305, I452, I495,  
I526, I551, I619, I636, I637, I740, I796
- \raisebox ..... 512
- \raisebox ..... o1188, G389
- \rangle ..... x592
- \rbrace ..... o309, x596
- \rbrack ..... b374
- \rceil ..... x600
- \Re ..... x313
- \read ..... 209
- \ReadOnlyShipoutCounter ..... 698
- \ReadonlyShipoutCounter .....  
698, 698, R270, R349
- \Ref ..... 455
- \Ref ..... C47, C52, C59, C63, C70
- \ref ..... 508, C10, C47, C59
- \refstepcounter ..... 257
- \refstepcounter .....  
.. 490, C39, C40, C52, C54, C63,  
C65, E334, E473, F202, J27, K59, L9
- \registernumber ..... 40
- registernumber ..... d381
- \relax . 80, 92, 125, 145, 302, 468, 655, 687
- \Relbar ..... x476, x484, x486, x492
- \relbar ..... x473, x488, x490
- \relpenalty ..... b322
- remove commands:
- remove\_from\_callback ..... d746
- \remove\_from\_callback ..... 41
- \RemoveFromHook .... 101, 101, g905, g966
- \removelastskip .. b414, b416, b418, b420
- \renewcommand ..... 70
- \renewcommand . 87, 368, 374, 394, f114,  
x66, x68, x70, x71, x73, x75, x77,  
x78, x84, x86, x88, x89, x103, x104,  
x105, x113, x114, E421, E441, E462
- \RenewCommandCopy ..... 87, f451, f453
- \renewenvironment ..... 71
- \renewenvironment .... f142, E470, E482
- \repeat ..... a81, a83, b390, d154,  
d164, r659, H382, P877, P940,

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx,  
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L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx,  
Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- [P1008](#), [P1071](#), [P1122](#), [P1160](#), [U267](#),  
[U278](#), [U288](#), [U299](#), [U329](#), [U355](#), [U365](#)  
`\requestedLaTeXdate` .....  
        ..... [P1223](#), [P1256](#), [P1276](#), [P1362](#)  
`\requestedpatchdate` ..... [P1286](#), [P1363](#)  
`\RequirePackage` ..... [634](#)  
`\RequirePackage` ..... [677](#), [698](#), [d24](#),  
        [P430](#), [P437](#), [P464](#), [P473](#), [P824](#), [S1967](#)  
`\RequirePackageWithOptions` ..... [634](#)  
`\RequirePackageWithOptions` ..... [P456](#)  
reserved@a commands:  
    `\reserved@a:` .....  
        ..... [n234](#), [n305](#), [n352](#), [P854](#), [P985](#)  
reserved@b commands:  
    `\reserved@b:` ..... [P178](#), [P195](#)  
reserved@c commands:  
    `\reserved@c:` ..... [n608](#)  
`\reservedb` ..... [268](#)  
`\restorecr` ..... [1480](#)  
`\reversemarginpar` ..... [L363](#)  
`\rfloor` ..... [x604](#)  
`\rgroup` ..... [x608](#)  
`\rhd` ..... [w546](#)  
`\rho` ..... [x283](#)  
`\rho` ..... [x479](#), [x480](#)  
`\right` ... [x625](#), [x627](#), [x629](#), [x631](#), [x636](#),  
        [x637](#), [x638](#), [x639](#), [E155](#), [E160](#), [E184](#)  
`\Rightarrow` ..... [x411](#), [x486](#), [x498](#)  
`\rightarrow` ..... [x438](#),  
        [x440](#), [x444](#), [x478](#), [x488](#), [x496](#), [x549](#)  
`\rightarrowfill` ..... [x531](#), [x547](#)  
`\rightharpoonup` ..... [x455](#)  
`\rightharpoonup` ..... [x454](#), [x466](#)  
`\righthyphenmin` ..... [T11](#)  
`\rightleftharpoons` ..... [x464](#)  
`\rightline` ..... [G428](#)  
`\rightmargin` ..... [497](#), [F9](#), [F40](#), [F51](#)  
`\rightmark` ..... [O48](#)  
`\rightskip` .. [b428](#), [r630](#), [D345](#), [D349](#),  
        [D355](#), [D365](#), [D368](#), [D373](#), [D405](#),  
        [D427](#), [F75](#), [G276](#), [G297](#), [K192](#), [K215](#)  
`\rlap` ..... [o427](#),  
        [o430](#), [o791](#), [E411](#), [E422](#), [G432](#), [H81](#)  
`\rmdefault` ..... [255](#), [372](#), [372](#),  
        [376](#), [377](#), [w6](#), [w143](#), [w191](#), [w239](#),  
        [w271](#), [w303](#), [w332](#), [x50](#), [x120](#), [A7](#), [A48](#)  
`\rmfamily` .... [118](#), [367](#), [371](#), [380](#), [w4](#),  
        [w5](#), [w237](#), [w301](#), [w302](#), [w330](#), [w331](#), [z15](#)  
`rmfamily` ..... [w252](#)  
`\rmoustache` ..... [x565](#)  
`\rmsubstdefault` [x18](#), [x30](#), [A28](#), [A39](#), [A106](#)  
`\Roman` ..... [257](#)  
`\Roman` ..... [698](#), [p104](#)  
`\roman` ..... [257](#)  
`\roman` ..... [p103](#)  
`\romannumeral` ..... [469](#), [p109](#), [p110](#),  
        [D181](#), [D198](#), [D244](#), [F43](#), [F234](#), [F245](#)  
`\root` ..... [E66](#), [E340](#)  
`\rootbox` ..... [E66](#)  
`\rq` ..... [b372](#)  
`\rule` ..... [512](#)  
`\rule` ..... [G360](#), [G363](#), [L448](#)
- ## S
- `\S` ..... [o311](#)  
`\samepage` ..... [172](#)  
`\samepage` ..... [111](#), [128](#)  
`\savebox` ..... [511](#)  
`\savebox` ..... [G97](#)  
`\savecatcodetable` .... [d117](#), [d168](#), [d170](#)  
`\sb` ..... [E199](#)  
`\sbox` ..... [511](#)  
`\sbox` ..... [b422](#), [m4](#), [o495](#), [o511](#),  
        [F205](#), [G103](#), [G110](#), [G114](#), [G119](#), [G124](#)  
scan commands:  
    `\scan_new:N` ..... [g40](#)  
    `\scan_stop:` .....  
        ..... [g230](#), [g235](#), [R249](#), [R251](#), [R252](#)  
`\scdefault` ..... [s562](#), [w27](#), [x94](#)  
`\scriptfont` ..... [t292](#)  
`\scriptscriptfont` ..... [t293](#)  
`\scriptscriptstyle` ..... [E65](#), [E68](#)  
`\scriptspace` ..... [b347](#)  
`\scriptstyle` ..... [x337](#), [E64](#)  
`\scshape` .. [o300](#), [s560](#), [s561](#), [w25](#), [w26](#), [z23](#)  
`\searrow` ..... [x406](#)  
`\sec` ..... [E20](#)  
`\secdef` ..... [K142](#)  
`\sectionmark` ..... [K143](#)  
`\selectfont` ..... [118](#),  
        [376](#), [377](#), [377](#), [386](#), [m7](#), [o302](#), [o329](#),  
        [o360](#), [o446](#), [o803](#), [o1187](#), [o1221](#),  
        [o1529](#), [r285](#), [s451](#), [s456](#), [s461](#), [s552](#),  
        [s556](#), [s559](#), [s562](#), [s565](#), [s568](#), [s571](#),  
        [s574](#), [t112](#), [w6](#), [w9](#), [w12](#), [w15](#),  
        [w18](#), [w21](#), [w24](#), [w27](#), [w30](#), [w216](#),  
        [w235](#), [w241](#), [w246](#), [w251](#), [w287](#),  
        [w298](#), [w305](#), [w310](#), [w315](#), [w326](#),  
        [w329](#), [w332](#), [w335](#), [w338](#), [w414](#),  
        [w491](#), [w514](#), [A36](#), [A115](#), [A125](#),  
        [A552](#), [A584](#), [A825](#), [A842](#), [L379](#), [L400](#)  
seq commands:  
    `\seq_clear:N` ..... [g448](#)  
    `\seq_clear_new:N` ..... [g456](#)  
    `\seq_get:NNTF` ..... [g917](#)  
    `\seq_gpop:NN` ..... [g916](#), [g926](#)  
    `\seq_gpop:NNTF` ..... [Q71](#)  
    `\seq_gpush:Nn` ..... [g907](#), [g910](#), [Q63](#)

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Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \seq\_gput\_right:Nn ..... g48
- \seq\_map\_inline:Nn .. g398, g472, g490
- \seq\_new:N ..... g28, g35, g441, Q60
- \seq\_put\_right:Nn ... g454, g546, g553
- \seq\_use:Nnnn ..... g606, g611
- \seriesdefault . 372, 388, o1530, v271,  
w155, w157, w510, w524, w586, x120
- \setattribute ..... 39
- \setattribute ..... d82, d231
- \setcounter ..... 257
- \setcounter ..... n383, p2,  
p37, F225, S2290, S2293, S2296, S2300
- \setlength ..... 265
- \setlength .. 177, 186, l83, l243, l442,  
q4, E489, E494, E495, E496, G43,  
G185, G246, G249, G322, G379,  
G380, G381, G410, G411, G418,  
G419, G420, H176, H384, S2306,  
S2307, S2308, S2311, S2312, S2316,  
S2317, S2318, S2322, S2323, S2324
- \SetMathAlphabet .....  
... r11, u140, u141, v512, x155, x156
- \setminus ..... x393
- \setrangecatcode .. d96, d104, d113, d114
- \SetSymbolFont ... v367, x145, x146, x147
- \settodepth ..... 265
- \settodepth ..... q17
- \settoheight ..... 265
- \settoheight ..... q17
- \settowidth ..... 265
- \settowidth ..... q17
- \sfcode . b364, b365, b366, b367, b451,  
l416, n47, n116, n174, U183, U448
- \sfdefault ..... w9, w147,  
w192, w244, w272, w308, w335, x50
- \sffamily .... 118, 367, 377, 380, w7,  
w8, w242, w306, w307, w333, w334, z16
- sffamily ..... w252
- \sfsubstdefault .... x19, x31, A30, A108
- \shapedefault .... 305, 372, 382, 395,  
o1530, s552, v272, w511, w525, x120
- \sharp ..... x330
- \shipout ..... 117,  
695, 695, 697, 701, 701, 701, 702,  
703, R4, R31, R345, R346, S602, S660
- shipout commands:
  - \l\_shipout\_box\_dp\_dim ..... 695,  
R118, R121, R123, R154, R207, R428
  - \l\_shipout\_box\_ht\_dim 695, R117,  
R120, R123, R153, R173, R206, R427
  - \l\_shipout\_box\_ht\_plus\_dp\_dim ...  
..... 695,  
R120, R123, R139, R190, R201, R203
  - \l\_shipout\_box\_wd\_dim .....  
... 695, R119, R123, R165, R217, R429
  - \shipout\_debug\_off: .. 698, R7, R329
  - \shipout\_debug\_on: ... 698, R7, R328
  - \shipout\_discard: ..... R267, R326
  - \shipout\_discard\_box: ..... 697
  - \g\_shipout\_readonly\_int .....  
..... 698, R64, R66,  
R78, R81, R270, R279, R283, R287
  - \g\_shipout\_totalpage\_int ..... 698
  - \g\_shipout\_totalpages\_int .....  
..... 698, 702, R48, R272
- shipout internal commands:
  - \\_\_shipout\_add\_background\_box:n .  
..... R104, R130, R262, R334
  - \\_\_shipout\_add\_background\_-  
picture:n ..... R74, R261, R338
  - \\_\_shipout\_add\_firstpage\_-  
material:Nn R106, R113, R327, R332
  - \\_\_shipout\_add\_foreground\_box:n .  
..... R82, R181, R265, R336
  - \\_\_shipout\_add\_foreground\_-  
picture:n ..... R71, R264, R340
  - \\_\_shipout\_debug:n 700, R7, R65, R80
  - \g\_\_shipout\_debug\_bool .....  
..... R6, R10, R15, R21
  - \\_\_shipout\_debug\_gset: ..... R7
  - \g\_\_shipout\_discard\_bool .....  
..... R43, R49, R51, R127, R268
  - \\_\_shipout\_excuse\_extra\_page: ...  
..... R299, R307
  - \\_\_shipout\_execute: .. 701, R25, R31
  - \\_\_shipout\_execute\_cont: .. R37, R39
  - \\_\_shipout\_execute\_firstpage\_-  
hook: ..... 703, R77, R102
  - \\_\_shipout\_execute\_test\_level: ..  
..... R28, R33
  - \\_\_shipout\_get\_box\_size:N .....  
..... 705, R46, R69, R116, R131
  - \l\_\_shipout\_group\_level\_tl .....  
..... R26, R32, R35
  - \c\_\_shipout\_horigin\_tl .. R234, R249
  - \\_\_shipout\_init\_page\_origins: ...  
..... R234, R248
  - \g\_\_shipout\_lastpage\_handled\_-  
bool ..... R85, R112, R289
  - \\_\_shipout\_picture\_overlay:n ...  
..... R247, R262, R265
  - \l\_\_shipout\_saved\_badness\_tl ...  
..... R128, R134,  
R142, R155, R160, R168, R177,  
R185, R193, R205, R212, R222, R230
  - \\_\_shipout\_saved\_protect: .....  
..... R44, R91, R94

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- `\l_shipout_tmp_box` ..... [R128](#), [R141](#), [R143](#), [R144](#),  
[R145](#), [R149](#), [R167](#), [R169](#), [R170](#),  
[R171](#), [R174](#), [R192](#), [R194](#), [R195](#),  
[R196](#), [R202](#), [R221](#), [R223](#), [R224](#),  
[R225](#), [R227](#), [R253](#), [R255](#), [R256](#), [R257](#)
- `\c_shipout_vorigin_tl` .. [R234](#), [R251](#)
- `shipout/background` ..... [696](#), [R95](#)
- `shipout/before` ..... [696](#), [R95](#)
- `shipout/firstpage` ..... [696](#), [R95](#)
- `shipout/foreground` ..... [696](#), [R95](#)
- `shipout/lastpage` ..... [696](#), [R95](#)
- `\ShipoutBox` .....  
[695](#), [696](#), [697](#), [R23](#), [R348](#), [R411](#), [R460](#)
- `\ShipoutBoxDepth` ..... [R368](#), [R428](#)
- `\ShipoutBoxHeight` ..... [715](#), [R367](#), [R426](#)
- `\ShipoutBoxWidth` ..... [R369](#), [R426](#)
- `\ShipoutoBoxDepth` ..... [R426](#)
- `\shortstack` ... [I132](#), [I147](#), [I152](#), [I815](#), [I832](#)
- `\show` ..... [88](#), [90](#), [91](#), [f495](#), [f565](#), [f566](#)
- show commands:
- `\show_hook:n` ..... [141](#)
- `\showboxbreadth` .....  
[b336](#), [b454](#), [b507](#), [b524](#), [b540](#)
- `\showboxdepth` ..... [b337](#), [b454](#),  
[b506](#), [b523](#), [b541](#), [r618](#), [r662](#), [r679](#)
- `\ShowCommand` ..... [88](#), [90](#), [f488](#)
- `\ShowCommmand` ..... [85](#)
- `\ShowHook` ..... [107](#), [110](#), [112](#), [g931](#), [g971](#)
- `\showhyphens` ..... [r607](#)
- `\showoutput` ..... [b453](#)
- `\showoverfull` ... [b452](#), [b455](#), [b489](#), [b497](#)
- `\showtokens` ..... [92](#), [f601](#)
- `\Sigma` ..... [x303](#)
- `\sigma` ..... [x284](#)
- `\sim` ..... [x445](#), [x457](#)
- `\simeq` ..... [x446](#)
- `\sin` ..... [E9](#)
- `\sinh` ..... [E11](#)
- `\skew` ..... [x544](#)
- `\skip` ..... [b28](#), [b53](#), [b92](#), [b208](#), [b250](#),  
[b295](#), [d33](#), [G339](#), [L367](#), [S316](#), [S490](#)
- skip commands:
- `\skip_zero:N` .....  
[R146](#), [R147](#), [R148](#), [R197](#), [R198](#), [R199](#)
- `\skipdef` ..... [b45](#), [b53](#), [b92](#), [d221](#)
- `\skipzero` ..... [d221](#)
- `\slash` ..... [b407](#), [f775](#), [f796](#)
- `\sldefault` ..... [s559](#), [w24](#), [x94](#)
- `\sloppy` ..... [G281](#), [G300](#), [O57](#), [O62](#)
- `sloppypar (environment)` ..... [O62](#)
- `\sloppypar` ..... [O62](#)
- `\slshape` ..... [o437](#),  
[o794](#), [s557](#), [s558](#), [w22](#), [w23](#), [z22](#), [A543](#)
- `\small` ..... [101](#)
- `\smallbreak` ..... [b415](#), [f776](#), [f797](#)
- `\smallint` ..... [x357](#)
- `\smallskip` ..... [b416](#), [l400](#)
- `\smallskipamount` ..... [b415](#), [l400](#), [l403](#)
- `\smash` . [x473](#), [x547](#), [x548](#), [x551](#), [x552](#), [E126](#)
- `\smile` ..... [x450](#)
- `\sp` ..... [E199](#)
- `\space` ..... [b380](#)
- `\spacefactor` ..... [b405](#), [b406](#), [I129](#),  
[I138](#), [I157](#), [I171](#), [I183](#), [I197](#), [I211](#),  
[I416](#), [I429](#), [I434](#), [o70](#), [o73](#), [L463](#), [L465](#)
- `\spaceskip` ..... [A6](#), [A47](#)
- `\spadesuit` ..... [x334](#)
- `\span` ..... [H383](#)
- `\special` ..... [117](#), [696](#)
- `\splitfirstmark` ..... [S2211](#)
- `\splitmaxdepth` ..... [b343](#), [L441](#), [S2205](#)
- `\splittopskip` ..... [b355](#), [L440](#)
- `\sqcap` ..... [x376](#)
- `\sqcup` ..... [x377](#)
- `\sqrt` ..... [E339](#)
- `\sqrtsign` ..... [x529](#), [E71](#), [E339](#)
- `\sqsubset` ..... [w542](#)
- `\sqsubseteq` ..... [x399](#)
- `\sqsupset` ..... [w543](#)
- `\sqsupseteq` ..... [x400](#)
- `\SS` ..... [o304](#), [o531](#), [o1132](#), [U483](#)
- `\ss` .. [o254](#), [o406](#), [o554](#), [o778](#), [o1107](#), [U483](#)
- `\sscdefault` ..... [s459](#), [s574](#), [s603](#)
- `\sscshape` ..... [s459](#), [s572](#), [s573](#), [s602](#), [z31](#)
- `\stackrel` ..... [E337](#)
- `\star` ..... [x397](#)
- `\stepcounter` ..... [257](#)
- `\stepcounter` ..... [p17](#), [p27](#),  
[r572](#), [v48](#), [C41](#), [C54](#), [C65](#), [E347](#),  
[E406](#), [E483](#), [L428](#), [L452](#), [S646](#), [S705](#)
- `\stop` ..... [D154](#)
- `\storedpar` ..... [d156](#), [d161](#)
- str commands:
- `\str_if_eq:nn` ..... [133](#)
- `\str_if_eq:NNTF` ..... [Q413](#)
- `\str_if_eq:nnTF` .....  
[e116](#), [g104](#), [g257](#), [g292](#), [g599](#), [g660](#),  
[g737](#), [g796](#), [g864](#), [g881](#), [Q407](#), [Q417](#)
- `\str_if_eq_p:nn` ..... [g261](#), [g483](#)
- `\str_map_function:NN` ..... [e120](#)
- `\str_set:Nn` ..... [Q270](#), [Q271](#)
- str internal commands:
- `__str_if_eq:nn` ..... [119](#), [g23](#)
- `\stretch` ..... [l456](#)
- `\string` ..... [686](#)
- `\strut` .. [b423](#), [f777](#), [f798](#), [E178](#), [E179](#), [H29](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- `\strutbox` ..... [b423](#),  
[t143](#), [G360](#), [H186](#), [H187](#), [L441](#), [L448](#)
  - `\subsectionmark` ..... [K143](#)
  - `\subsubsectionmark` ..... [K143](#)
  - `\subset` ..... [x426](#)
  - `\subseteq` ..... [x428](#)
  - `\subsubsectionmark` ..... [K143](#)
  - `\succ` ..... [x420](#)
  - `\succeq` ..... [x423](#)
  - `\sum` ..... [x350](#)
  - `\sup` ..... [E24](#)
  - `\suppressfloats` ..... [S1972](#)
  - `\supset` ..... [x425](#)
  - `\supseteq` ..... [x427](#)
  - `\surd` ..... [x336](#)
  - `\swarrow` ..... [x408](#)
  - `\swdefault` ..... [s454](#), [s571](#), [s601](#)
  - `\swshape` ..... [s454](#), [s569](#), [s570](#), [s600](#), [z30](#)
  - `\symbol` ..... [o162](#), [w469](#)
  - `\symletters` ..... [A8](#), [A14](#), [A49](#), [A1048](#)
  - `\symoperators` ..... [x643](#)
- T**
- `\T` ..... [j23](#), [o335](#),  
[o337](#), [o339](#), [o341](#), [o343](#), [o345](#), [o347](#),  
[o349](#), [o351](#), [o374](#), [P1203](#), [P1207](#), [P1208](#)
  - `\t` ..... [o282](#), [o735](#), [o843](#), [A177](#), [A178](#),  
[A192](#), [A194](#), [A195](#), [A207](#), [A210](#),  
[A212](#), [A598](#), [A768](#), [A1035](#), [A1037](#)
  - `tabbing (environment)` ..... [H71](#)
  - `\tabbing` ..... [H71](#)
  - `\tabbingsep` ..... [H130](#), [H132](#), [H166](#)
  - `\tabcolsep` ..... [H259](#), [H338](#)
  - `\tableofcontents` ..... [463](#)
  - `\tabskip` ..... [b434](#), [E195](#),  
[E196](#), [E352](#), [E355](#), [E358](#), [E360](#),  
[E487](#), [E500](#), [E503](#), [E505](#), [H167](#), [H192](#)
  - `tabular (environment)` ..... [H174](#)
  - `\tabular` ..... [H174](#)
  - `\tabular*` ..... [H175](#)
  - `\tabularnewline` ..... [H194](#), [H207](#)
  - `\tan` ..... [E15](#)
  - `\tanh` ..... [E17](#)
  - `\tau` ..... [x285](#)
  - `\tencirc` ..... [y10](#), [I125](#), [I678](#)
  - `\tencircw` ..... [y10](#), [I128](#)
  - `\tenln` ..... [y9](#), [I124](#), [I126](#), [I677](#), [I679](#)
  - `\tenlnw` ..... [y9](#), [I127](#), [I129](#)
  - `\TeX` ..... [m1](#), [m12](#)
  - `TeX and LATEX 2ε commands:`
    - `\...-h@ok` ..... [654](#)
    - `\@` ..... [a65](#), [d20](#), [d859](#), [f718](#), [f719](#), [j19](#),  
[l425](#), [m2](#), [P31](#), [P43](#), [P54](#), [P82](#), [U415](#)
    - `\@...hook` ..... [122](#), [123](#)
  - `\@@` ..... [a331](#), [a332](#), [i15](#),  
[i19](#), [i20](#), [i21](#), [i22](#), [i24](#), [i27](#), [i28](#), [i30](#),  
[i31](#), [n606](#), [n622](#), [t464](#), [t466](#), [t467](#),  
[H238](#), [H239](#), [H240](#), [H250](#), [S10](#), [S11](#)
  - `\@@defaultsubs` ..... [r556](#)
  - `\@@enc@update` ..... [o183](#), [r259](#), [r263](#)
  - `\@@end` [209](#), [a69](#), [a222](#), [f23](#), [n583](#), [n584](#),  
[D31](#), [D100](#), [D154](#), [T18](#), [U502](#), [U523](#)
  - `\@@endpbox` ..... [H193](#), [H236](#), [H386](#)
  - `\@@eqncr` [E364](#), [E386](#), [E396](#), [E401](#), [E506](#)
  - `\@@fileswith@pti@ns` [P374](#), [P393](#), [P760](#)
  - `\@@hyph` ..... [f24](#), [f735](#)
  - `\@@hyphenation` ..... [o205](#)
  - `\@@if@newlist` . [S599](#), [S644](#), [S657](#), [S703](#)
  - `\@@if@definable` ..... [f122](#), [o17](#)
  - `\@@input` [a68](#), [f22](#), [n481](#), [n494](#), [n534](#),  
[D25](#), [D80](#), [P1350](#), [Q113](#), [Q129](#), [Q135](#)
  - `\@@italiccorr` ..... [f25](#), [z113](#), [z117](#)
  - `\@@line` ..... [G428](#)
  - `\@@math@bgroup` ..... [z131](#), [z138](#)
  - `\@@math@egroup` ..... [z128](#)
  - `\@@par` .....  
[f21](#), [k4](#), [D154](#), [D407](#), [D412](#), [D415](#),  
[D429](#), [D433](#), [D436](#), [F82](#), [F85](#), [G247](#),  
[G269](#), [G290](#), [H199](#), [K67](#), [K118](#), [S257](#)
  - `\@@patterns` ..... [o205](#)
  - `\@@protect` ..... [f244](#), [f250](#), [f259](#)
  - `\@@startpbox` ..... [H193](#), [H236](#), [H386](#)
  - `\@@sverb` ..... [477](#), [D486](#)
  - `\@@underline` ..... [G384](#), [G387](#), [G388](#)
  - `\@@unprocessedoptions` .....  
[P676](#), [P737](#), [P814](#)
  - `\@@warning` ..... [j166](#)
  - `\@Alph` ..... [95](#), [p106](#), [p122](#)
  - `\@DeclareEncodingSubset` .....  
[A66](#), [A68](#), [A69](#), [A70](#), [A71](#), [A74](#), [A81](#)
  - `\@DeclareMathDelimiter` ... [v784](#), [v803](#)
  - `\@DeclareMathSizes` .. [r206](#), [r207](#), [r209](#)
  - `\@Esphack` ..... [L190](#), [L201](#), [L223](#), [L241](#)
  - `\@IncludeInRelease` ..... [c79](#), [c80](#)
  - `\@IncludeInRelease` ..... [c77](#), [c78](#), [c79](#)
  - `\@M` ..... [b21](#), [b408](#), [b409](#), [f37](#), [f39](#),  
[I11](#), [I12](#), [I13](#), [I14](#), [I15](#), [I16](#), [I17](#), [I18](#),  
[I119](#), [r625](#), [r632](#), [t393](#), [t406](#), [E374](#),  
[F194](#), [H56](#), [K67](#), [K100](#), [K118](#), [K130](#),  
[K194](#), [K217](#), [S176](#), [S195](#), [S198](#), [S258](#)
  - `\@MM` ..... [154](#), [b21](#), [L441](#), [S299](#)
  - `\@Mi` ..... [h3](#), [L53](#), [L122](#), [L194](#),  
[L216](#), [L241](#), [L311](#), [S295](#), [S1159](#), [S1326](#)
  - `\@Miii` ..... [h3](#), [L55](#), [L124](#), [L313](#), [S298](#)
  - `\@Miv` [h3](#), [L195](#), [L201](#), [L217](#), [L223](#), [S272](#)
  - `\@Roman` ..... [p104](#), [p110](#)
  - `\@TeXversion` ..... [2](#), [a326](#), [j28](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspac.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx



- \@abspage@last .....  
... 709, 710, 710, 711, R67, R78,  
R275, R277, R279, R287, R324, R325
- \@acci ..... w588, G271, G292
- \@accii ..... w588, G271, G292
- \@acciii ..... w588, G271, G292
- \@acol .....  
... H168, H178, H260, H261, H273,  
H274, H277, H294, H309, H317, H327
- \@acolampacol ..... H258,  
H275, H277, H284, H292, H326, H329
- \@activechar@info ..... S575
- \@addamp ..... H251,  
H260, H261, H276, H290, H327, H328
- \@addfield ..... H43,  
H53, H86, H93, H125, H140, H142
- \@addmarginpar ..... S331, S1811
- \@addtobot ..... S975,  
S1062, S1129, S1181, S1290, S1349
- \@addtocurcol .... S328, S1066, S1965
- \@addtodblcol ..... S854, S1562
- \@addtofilelist ..... a101, a103,  
n66, n134, n189, n481, n603, w562,  
w565, w572, w575, w582, w585,  
Q110, Q129, Q135, U212, U215, U543
- \@addtonextcol ... S853, S1386, S1966
- \@addtopreamble ..... H311,  
H324, H330, H331, H332, H334, H346
- \@addtoreset .. p16, p39, p44, p79, p82
- \@addtotoporbot .....  
... S1012, S1175, S1343, S1435, S1524
- \@afterheading ..... K92, K125
- \@afterindentfalse ..... K45
- \@afterindenttrue .....  
..... K43, K124, K193, K216
- \@alph ..... 95, p105, p118, L375
- \@ampacol .... H258, H275, H286, H329
- \@arabic p43, p76, p87, p102, p108, L373
- \@argarraycr ..... H203, H204
- \@argdef ..... f70
- \@argsbox ..... G408
- \@argtabularcr ..... H210, H211
- \@array ..... H181, H182
- \@arrayacol ..... H168, H258
- \@arrayclassiv ..... H169, H331
- \@arrayclassz ..... H168, H275
- \@arraycr ..... H170, H201, H203
- \@arrayparboxrestore G261, G303, H384
- \@arrayrule .....  
H309, H311, H315, H317, H319, H346
- \@arstrut ..... H192, H237, H343
- \@arstrutbox . H185, H218, H343, H385
- \@author ..... K8, K32
- \@auxout .. n218, n224, n268, n286,  
n309, n338, n356, n371, C33, K181,  
N7, N8, N19, N29, N37, N43, R286
- \@backslashchar ..... f209,  
f459, f572, f584, f588, f589, f594,  
j185, j187, x266, P941, P1072, P1161
- \@badcrerr ..... j227
- \@badend ..... j198, D283
- \@badlinearg j217, I165, I177, I188,  
I189, I193, I242, I247, I257, I262, I275
- \@badmath .. j201, E259, E261, E266,  
E269, E278, E290, E295, E304,  
E317, E322, E430, E442, E458, E467
- \@badoptabs ..... j205, H85, H151
- \@badrequireerror ..... P310, P822
- \@badtab ..... j208,  
H22, H87, H108, H114, H121, H148
- \@begin@tempboxa .....  
... G27, G42, G184, G247, G409, G417
- \@begindocumenthook .....  
..... 114, 122, 123, n63, n128,  
n131, n183, n186, N33, P771, P792
- \@beginndvi ..... 700, S623, S682, S710
- \@beginndvibox .....  
..... 696, R358, R359, S86, S711
- \@beginparpenalty .....  
497, I14, E433, E445, E471, F23, F170
- \@begintheorem ..... J30, J35
- \@bezier ..... I683, I684
- \@bibitem ..... N3, N8
- \@biblabel ..... N4, N54
- \@bitor .... S15, S881, S901, S937,  
S960, S1027, S1111, S1121, S1269,  
S1280, S1422, S1509, S1627, S1752
- \@botlist .....  
.... S65, S384, S386, S431, S433,  
S717, S738, S747, S748, S989, S992,  
S1027, S1121, S1280, S1922, S1949
- \@botnum ..... L274, S109, S986,  
S987, S992, S996, S1458, S1463,  
S1551, S1558, S1914, S1941, S1983
- \@botroom .....  
L275, S110, S989, S992, S1915, S1942
- \@boxfpsbit ..... S2031, S2033, S2038
- \@break@tfor .... i31, n433, n471, z98
- \@bsphack ..... I36, I125, I340,  
I356, I374, I390, C32, L52, L121,  
L310, M6, M18, M23, M35, N39, S1882
- \@caption ..... L12, L14
- \@capttype ..... L5,  
L9, L12, L40, L88, L109, L157, S1995
- \@car ..... f53, m14, o89, o110
- \@carcube ..... f55, f125, f575

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspc.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \@cclv ..... [b16](#),  
[S300](#), [S304](#), [S382](#), [S383](#), [S412](#), [S429](#),  
[S430](#), [S459](#), [S483](#), [S487](#), [S488](#), [U53](#)
- \@cclvi .....  
[b21](#), [b57](#), [b82](#), [b93](#), [b95](#), [b99](#), [b159](#),  
[b173](#), [d30](#), [d58](#), [P939](#), [P1070](#), [P1159](#)
- \@cdr ..... [f53](#), [f661](#), [f662](#), [n252](#)
- \@centercr ..... [D306](#),  
[D344](#), [D349](#), [D354](#), [D364](#), [D368](#), [D372](#)
- \@centering ..... [E344](#),  
[E345](#), [E352](#), [E355](#), [E358](#), [E499](#), [E503](#)
- \@cflb ..... [S714](#)
- \@cflt ..... [S714](#)
- \@changed@cmd .....  
..... [o3](#), [o63](#), [o223](#), [r131](#), [r267](#), [U374](#)
- \@changed@x ..... [o3](#), [o211](#), [o219](#)
- \@changed@x@mouth ..... [o211](#), [o219](#)
- \@charlb ..... [n377](#), [n385](#)
- \@charrb ..... [n379](#), [n385](#)
- \@chclass [H271](#), [H272](#), [H335](#), [H348](#), [H353](#)
- \@check@IncludeInRelease .....  
..... [c105](#), [c107](#), [c109](#)
- \@check@c ..... [f179](#), [f181](#)
- \@check@eq ..... [f185](#), [f186](#), [f190](#)
- \@checkend ..... [D15](#),  
[D72](#), [D202](#), [D209](#), [D261](#), [D276](#), [D282](#)
- \@chnum .....  
[H279](#), [H298](#), [H335](#), [H350](#), [H351](#), [H352](#)
- \@circ .... [I622](#), [I640](#), [I649](#), [I654](#), [I657](#)
- \@circle ..... [I605](#), [I606](#)
- \@circlefnt ..... [I125](#), [I128](#), [I447](#),  
[I491](#), [I520](#), [I545](#), [I615](#), [I631](#), [I663](#), [I678](#)
- \@cite ..... [N16](#), [N52](#)
- \@cite@ofmt ..... [N24](#), [N53](#)
- \@citea ..... [N15](#), [N17](#)
- \@citeb ..... [N18](#), [N19](#),  
[N20](#), [N23](#), [N24](#), [N42](#), [N43](#), [N44](#), [N45](#)
- \@citex ..... [N13](#), [N14](#)
- \@classi ..... [H271](#), [H307](#)
- \@classii ..... [H271](#), [H321](#)
- \@classiii ..... [H271](#), [H326](#)
- \@classiv ..... [H169](#), [H180](#), [H272](#)
- \@classoptionslist .... [P9](#), [P339](#),  
[P350](#), [P529](#), [P530](#), [P557](#), [P558](#), [P1431](#)
- \@classv ..... [H272](#), [H332](#)
- \@classz ..... [H168](#), [H179](#), [H271](#)
- \@cline ..... [H367](#)
- \@clnht ..... [I195](#), [I196](#),  
[I204](#), [I206](#), [I208](#), [I218](#), [I225](#), [I273](#), [I672](#)
- \@clnwd [I197](#), [I203](#), [I207](#), [I209](#), [I210](#), [I672](#)
- \@cls@pkg .....  
..... [P214](#), [P215](#), [P594](#), [P639](#), [P673](#),  
[P716](#), [P746](#), [P798](#), [P807](#), [P809](#),  
[P826](#), [P1284](#), [P1359](#), [P1381](#), [P1411](#)
- \@clsextension ..... [654](#),  
[P16](#), [P91](#), [P102](#), [P165](#), [P229](#), [P245](#),  
[P257](#), [P306](#), [P323](#), [P339](#), [P349](#),  
[P431](#), [P446](#), [P454](#), [P528](#), [P556](#),  
[P643](#), [P666](#), [P693](#), [P750](#), [P763](#), [P799](#)
- \@clubpenalty ..... [n9](#), [n27](#),  
[n96](#), [n153](#), [F128](#), [F196](#), [K106](#), [K135](#)
- \@colht .... [n24](#), [n93](#), [n150](#), [L273](#),  
[L275](#), [L278](#), [L284](#), [L285](#), [L298](#),  
[L299](#), [S114](#), [S231](#), [S242](#), [S251](#), [S252](#),  
[S387](#), [S399](#), [S434](#), [S447](#), [S474](#), [S505](#),  
[S535](#), [S541](#), [S545](#), [S555](#), [S560](#), [S645](#),  
[S704](#), [S777](#), [S815](#), [S859](#), [S884](#), [S903](#),  
[S943](#), [S965](#), [S1642](#), [S1768](#), [S2096](#), [U88](#)
- \@colnum . [L276](#), [S111](#), [S995](#), [S1040](#),  
[S1109](#), [S1110](#), [S1138](#), [S1146](#), [S1267](#),  
[S1268](#), [S1300](#), [S1312](#), [S1420](#), [S1421](#),  
[S1458](#), [S1463](#), [S1507](#), [S1508](#), [S1550](#),  
[S1557](#), [S1910](#), [S1937](#), [S1976](#), [S2151](#)
- \@colroom ... [n25](#), [n94](#), [n151](#), [S115](#),  
[S252](#), [S273](#), [S274](#), [S285](#), [S288](#), [S387](#),  
[S434](#), [S777](#), [S994](#), [S1039](#), [S1105](#),  
[S1108](#), [S1137](#), [S1262](#), [S1266](#), [S1299](#),  
[S1416](#), [S1419](#), [S1502](#), [S1506](#), [S1911](#),  
[S1938](#), [S2106](#), [S2111](#), [S2156](#), [U87](#)
- \@combinedblfloats [S750](#), [S2230](#), [S2269](#)
- \@combinefloats ..... [S501](#), [S714](#)
- \@comdblfilelt ..... [S750](#)
- \@comfilelt ..... [S720](#), [S736](#), [S750](#)
- \@cons ..... [b196](#), [b213](#),  
[f52](#), [p44](#), [L193](#), [L215](#), [L239](#), [L355](#),  
[S237](#), [S888](#), [S907](#), [S923](#), [S947](#), [S949](#),  
[S969](#), [S971](#), [S1141](#), [S1209](#), [S1305](#),  
[S1378](#), [S1451](#), [S1541](#), [S1644](#), [S1667](#),  
[S1770](#), [S1795](#), [S1812](#), [S1813](#), [S2157](#)
- \@contfield ..... [H50](#), [H141](#), [H153](#)
- \@copy@... ..... [89](#)
- \@copy@DeclareRobustCommand ....  
..... [f473](#), [f510](#), [f531](#), [f606](#), [f609](#)
- \@copy@newcommand ..... [82](#), [90](#),  
[f296](#), [f474](#), [f510](#), [f552](#), [f581](#), [f606](#), [f612](#)
- \@ctrerr . [j194](#), [p121](#), [p125](#), [p139](#), [p147](#)
- \@curfield ..... [H16](#),  
[H41](#), [H47](#), [H51](#), [H52](#), [H54](#), [H130](#), [H131](#)
- \@curline [H16](#), [H27](#), [H39](#), [H44](#), [H53](#),  
[H54](#), [H55](#), [H90](#), [H91](#), [H103](#), [H128](#), [H129](#)
- \@curr@enc ..... [o154](#), [o156](#)
- \@curr@file ... [653](#), [653](#), [686](#), [687](#),  
[688](#), [n228](#), [n229](#), [n238](#), [n240](#), [n264](#),  
[n272](#), [n390](#), [n409](#), [n501](#), [n516](#), [P625](#),  
[P884](#), [P889](#), [P895](#), [P918](#), [P927](#),  
[P953](#), [P1015](#), [P1020](#), [P1026](#), [P1049](#),  
[P1058](#), [P1084](#), [Q194](#), [Q245](#), [Q247](#)

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`\@curr@file@reqd` ..... [687](#), [688](#), [Q194](#), [Q247](#), [Q251](#)  
`\@currbox` ..... [b275](#), [b276](#), [b277](#),  
[L60](#), [L91](#), [L95](#), [L129](#), [L160](#), [L164](#),  
[L193](#), [L214](#), [L215](#), [L239](#), [L257](#),  
[L259](#), [L261](#), [L319](#), [L322](#), [L327](#),  
[L331](#), [S213](#), [S214](#), [S225](#), [S226](#), [S228](#),  
[S229](#), [S237](#), [S311](#), [S312](#), [S853](#), [S854](#),  
[S1102](#), [S1104](#), [S1112](#), [S1135](#), [S1139](#),  
[S1141](#), [S1156](#), [S1197](#), [S1209](#), [S1257](#),  
[S1260](#), [S1297](#), [S1302](#), [S1305](#), [S1322](#),  
[S1367](#), [S1378](#), [S1410](#), [S1426](#), [S1440](#),  
[S1451](#), [S1493](#), [S1530](#), [S1541](#), [S1581](#),  
[S1585](#), [S1596](#), [S1602](#), [S1604](#), [S1608](#),  
[S1613](#), [S1622](#), [S1631](#), [S1637](#), [S1644](#),  
[S1667](#), [S1702](#), [S1706](#), [S1718](#), [S1725](#),  
[S1727](#), [S1731](#), [S1737](#), [S1747](#), [S1762](#),  
[S1770](#), [S1795](#), [S1813](#), [S1822](#), [S2001](#),  
[S2002](#), [S2031](#), [S2061](#), [S2066](#), [S2112](#),  
[S2115](#), [S2127](#), [S2135](#), [S2152](#), [S2157](#)  
`\@currdir` [9](#), [a108](#), [a130](#), [a132](#), [a138](#),  
[a140](#), [a146](#), [a148](#), [a153](#), [a155](#), [a165](#),  
[a178](#), [a243](#), [a256](#), [a269](#), [P867](#), [P889](#),  
[P918](#), [P998](#), [P1020](#), [P1049](#), [P1132](#)  
`\@current@cmd` ..... [o25](#), [r271](#)  
`\@currentcounter` . [C39](#), [C40](#), [C42](#), [C53](#)  
`\@currentlabel` [490](#), [C34](#), [C43](#), [C55](#),  
[C66](#), [C74](#), [E348](#), [E484](#), [G356](#), [L443](#)  
`\@currenvir` .....  
..... [j199](#), [D3](#), [D165](#), [D220](#), [D237](#),  
[D270](#), [D283](#), [F112](#), [G130](#), [P929](#),  
[P941](#), [P949](#), [P953](#), [P959](#), [P1060](#),  
[P1072](#), [P1080](#), [P1084](#), [P1090](#),  
[P1149](#), [P1161](#), [P1169](#), [P1173](#), [P1179](#)  
`\@currenvline` ..... [j199](#),  
[D166](#), [D221](#), [D238](#), [D271](#), [D284](#), [G131](#)  
`\@currentext` ..... [653](#), [P15](#),  
[P30](#), [P42](#), [P53](#), [P81](#), [P225](#), [P228](#),  
[P229](#), [P244](#), [P245](#), [P256](#), [P257](#),  
[P323](#), [P332](#), [P339](#), [P349](#), [P376](#),  
[P441](#), [P450](#), [P462](#), [P590](#), [P591](#),  
[P592](#), [P597](#), [P603](#), [P610](#), [P615](#),  
[P617](#), [P622](#), [P627](#), [P635](#), [P641](#),  
[P643](#), [P650](#), [P652](#), [P657](#), [P659](#),  
[P660](#), [P662](#), [P666](#), [P675](#), [P677](#),  
[P678](#), [P683](#), [P686](#), [P689](#), [P693](#),  
[P699](#), [P708](#), [P713](#), [P714](#), [P719](#),  
[P725](#), [P729](#), [P731](#), [P732](#), [P734](#),  
[P736](#), [P738](#), [P739](#), [P742](#), [P748](#),  
[P750](#), [P763](#), [P776](#), [P799](#), [P815](#), [P816](#)  
`\@currlist` . [L193](#), [L215](#), [L355](#), [S67](#),  
[S311](#), [S388](#), [S391](#), [S435](#), [S438](#), [S1812](#)  
`\@currname` ..... [103](#),  
[103](#), [123](#), [124](#), [150](#), [653](#), [653](#), [653](#),  
[c66](#), [c82](#), [c90](#), [g126](#), [g128](#), [n615](#),  
[P14](#), [P29](#), [P41](#), [P52](#), [P80](#), [P212](#),  
[P214](#), [P225](#), [P228](#), [P244](#), [P256](#),  
[P332](#), [P376](#), [P450](#), [P462](#), [P589](#),  
[P591](#), [P592](#), [P594](#), [P595](#), [P597](#),  
[P603](#), [P610](#), [P612](#), [P615](#), [P617](#),  
[P622](#), [P626](#), [P635](#), [P639](#), [P641](#),  
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[P738](#), [P739](#), [P776](#), [P807](#), [P809](#),  
[P816](#), [P826](#), [P1359](#), [P1381](#), [P1411](#)  
`\@currnamestack` ..... [693](#), [P20](#), [Q404](#)  
`\@curoptions` .....  
..... [P332](#), [P340](#), [P366](#), [P385](#), [P816](#), [P817](#)  
`\@currpkg@reqd` ..... [653](#), [P227](#),  
[P620](#), [P622](#), [P630](#), [P646](#), [P671](#), [P673](#)  
`\@currsize` ..... [w489](#)  
`\@currtype` ..... [S119](#),  
[S878](#), [S879](#), [S880](#), [S881](#), [S898](#), [S899](#),  
[S900](#), [S901](#), [S1027](#), [S1111](#), [S1121](#),  
[S1269](#), [S1280](#), [S1422](#), [S1509](#), [S1627](#),  
[S1752](#), [S2001](#), [S2003](#), [S2004](#), [S2007](#)  
`\@curtab` ..... [H11](#),  
[H26](#), [H86](#), [H87](#), [H88](#), [H94](#), [H95](#),  
[H98](#), [H102](#), [H103](#), [H107](#), [H146](#), [H147](#)  
`\@curtabmar` ..... [H11](#), [H25](#),  
[H26](#), [H38](#), [H44](#), [H89](#), [H102](#), [H106](#), [H107](#)  
`\@d@r` ..... [a161](#), [a162](#)  
`\@dashbox` ..... [I324](#), [I325](#),  
[I326](#), [I327](#), [I328](#), [I331](#), [I337](#), [I339](#),  
[I349](#), [I351](#), [I352](#), [I353](#), [I354](#), [I358](#),  
[I362](#), [I365](#), [I382](#), [I384](#), [I385](#), [I386](#),  
[I387](#), [I390](#), [I394](#), [I396](#), [I405](#), [I407](#),  
[I408](#), [I409](#), [I410](#), [I413](#), [I417](#), [I422](#), [I674](#)  
`\@dashcnt` ..... [I317](#), [I319](#),  
[I320](#), [I321](#), [I322](#), [I323](#), [I336](#), [I338](#),  
[I341](#), [I343](#), [I344](#), [I345](#), [I347](#), [I348](#),  
[I361](#), [I364](#), [I376](#), [I377](#), [I378](#), [I379](#),  
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[I400](#), [I401](#), [I403](#), [I404](#), [I416](#), [I421](#), [I674](#)  
`\@dashdim` ... [I316](#), [I317](#), [I318](#), [I319](#),  
[I320](#), [I322](#), [I325](#), [I327](#), [I328](#), [I329](#),  
[I336](#), [I338](#), [I340](#), [I341](#), [I342](#), [I343](#),  
[I344](#), [I347](#), [I351](#), [I353](#), [I354](#), [I355](#),  
[I363](#), [I366](#), [I375](#), [I376](#), [I377](#), [I378](#),  
[I380](#), [I384](#), [I386](#), [I387](#), [I388](#), [I393](#),  
[I395](#), [I397](#), [I398](#), [I399](#), [I400](#), [I403](#),  
[I407](#), [I409](#), [I410](#), [I411](#), [I419](#), [I424](#), [I674](#)  
`\@date` ..... [K9](#), [K33](#)  
`\@dbflt` ..... [L32](#), [L264](#)  
`\@dblarg` ..... [f683](#), [K54](#), [K142](#), [L12](#)

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- \@dbldeferlist ..... L239, S70, S445, S450, S452, S816, S823, S824, S1752, S1795, S1926, S1954
- \@dblfloat ..... L31
- \@dblfloatplacement ..... n33, n102, n160, L280, S401, S449, S1907, S1934, S2235, S2275
- \@dblflset ..... L26
- \@dblfpbot ..... L290, L304, S2319
- \@dblfpsep ..... L289, L303, S2319
- \@dblfpstop ..... L288, L302, S2319
- \@dbltoplist ..... S69, S232, S235, S237, S397, S398, S445, S446, S755, S759, S761, S762, S1639, S1644, S1764, S1770, S1925, S1952
- \@dbltopnum ..... L283, L297, S107, S127, S238, S240, S766, S1578, S1579, S1643, S1646, S1674, S1679, S1699, S1700, S1769, S1773, S1802, S1807, S1918, S1945
- \@dbltoproom ..... L284, L286, L298, L300, S108, S1581, S1584, S1585, S1594, S1595, S1598, S1601, S1604, S1608, S1612, S1616, S1621, S1641, S1702, S1705, S1706, S1715, S1716, S1717, S1720, S1724, S1727, S1731, S1736, S1740, S1745, S1746, S1767, S1919, S1946
- \@dec@text@cmd ..... o3
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- \@declaredoptions ..... P8, P313, P336, P352, P371, P390, P769
- \@declareoption ..... P311, P312, P320
- \@defaultfamilyhook w261, w513, w529
- \@defaultsubs r510, r544, r556, D47, D87
- \@defaultunits ..... r214, r218, r219, r220, r235, r299, t133, t135, I13
- \@defaultunitsset ..... G53, G64, I8, I29, I30, I32, I34, I60, I63, I84, I85, I107, I108, I164, I241, I316, I318, I332, I340, I342, I357, I480, I481, I612, I648, I690, I691, I693, I694, I697, I698, I700, I701, I712, I713, I715, I716, I718, I719, I721, I722
- \@defdefault@ds ..... P311, P316, P321
- \@deferlist ..... S68, S384, S393, S394, S397, S402, S404, S410, S431, S440, S442, S778, S786, S787, S798, S803, S804, S1111, S1209, S1269, S1378, S1422, S1451, S1509, S1541, S1627, S1667, S1924, S1951
- \@definecounter ..... p12, p36, E333, F227, F228, F229, F230, J8, J16, L372, L374
- \@depth ..... f26, t145, x558, x559, x561, x562, G383, G427, H187, H219, S1851, I227, I300, I303, I324, I333, I383, I391, I727, I783
- \@dir ..... a160, a163, a165, a167, a168
- \@disable@packageload@do P615, Q346
- \@dischyp ..... f720, f754, G270, G291
- \@docclearpage ..... S296, S371
- \@documentclasshook . P3, P533, P561
- \@doendpe D203, D210, D262, D277, F123
- \@dofilelist ... n612, n628, D37, D82
- \@donoparitem ..... F144, F158
- \@dot ..... I605, I643
- \@dotsep ..... K200, K223
- \@dottedtocline .. K185, K211, K212
- \@downline ..... I297, I301, I306
- \@downvector ..... I268, I306
- \@eha ..... f270, f309, f337, j170, j188, j190, j192, j200, j202, j232, n225, n269, n287, o52, o84, r28, r58, r102, r144, r187, r253, r310, t106, v25, v70, v99, v161, v192, v224, v325, v346, v378, v419, v464, v469, v524, v642, v646, v650, v685, v689, v693, v750, v760, v845, v850, v853, v885, v888, v961, v964, v967, v1034, v1040, z146, A24, A102, A824, A833, D164, D219, D236, D269, N47, S1876, S1892
- \@ehb ..... j170, j195, j220, j222, j224, S234, S390, S437
- \@ehc ..... f118, f145, f459, j170, j227, j230, j236, j238, D495, D510, D525, D538, E405, F220, K31, P1411
- \@ehd ..... e66, e76, j170, j197, j204, j207, j209, j215, v118, H100, H109, L6, P495, P673
- \@elt ..... 370, 371, 380, f52, n378, o1532, o1534, p20, p35, p53, p56, w76, w87, w89, w90, w115, w355, w357, w358, w368, w555, x17, x25, S8, S11, S15, S27, S30, S31, S32, S33, S38, S39, S40, S41, S42, S43, S44, S45, S47, S51, S57, S58, S59, S60, S498, S720, S731, S736, S746, S758, S760, S788, S805, S825, S844, S857, S864, S915, S918, S927, S1898
- \@empty ..... 80, 268, 304, 368, 374, 388, 394, i14
- \@emptycol S198, S245, S248, S277, S281
- \@end@check@IncludeInRelease ..... c106, c108

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     . [G36](#), [G45](#), [G189](#), [G260](#), [G415](#), [G425](#)  
`\@enddocument@kernel@warnings` ...  
     ..... [D38](#), [D42](#), [D104](#)  
`\@enddocumenthook` [123](#), [D71](#), [P771](#), [P793](#)  
`\@endfloatbox` . [L190](#), [L211](#), [L236](#), [L248](#)  
`\@endpary` ..... [505](#), [F120](#), [F123](#)  
`\@endparpenalty` .....  
     [497](#), [115](#), [E434](#), [E446](#), [E472](#), [F23](#), [F124](#)  
`\@endpbox` .....  
     [H193](#), [H236](#), [H266](#), [H333](#), [H384](#), [H387](#)  
`\@endpfalse` .....  
     ..... [D170](#), [D224](#), [D241](#), [D274](#),  
         [F129](#), [F131](#), [F135](#), [F136](#), [F138](#), [G133](#)  
`\@endpeltrue` ..... [F138](#)  
`\@endpetrue` ..... [F124](#), [F126](#), [F134](#)  
`\@endpreamblehook` ..... [196](#)  
`\@endtheorem` ..... [J13](#), [J19](#), [J25](#), [J35](#)  
`\@enlargepage` ... [S1861](#), [S1866](#), [S1868](#)  
`\@ensuredmath` ..... [E416](#), [E418](#)  
`\@enumctr` ..... [F234](#), [F237](#), [F238](#)  
`\@enumdepth` [508](#), [F226](#), [F232](#), [F233](#), [F234](#)  
`\@enumspacing` ..... [508](#)  
`\@eqcnt` ..... [E341](#),  
     [E402](#), [E407](#), [E486](#), [E501](#), [E502](#), [E504](#)  
`\@eqncr` [E353](#), [E371](#), [E408](#), [E409](#), [E488](#)  
`\@eqnnum` [E335](#), [E336](#), [E406](#), [E420](#), [E479](#)  
`\@eqnset` ..... [E341](#), [E500](#)  
`\@eqnswfalse` ..... [E370](#)  
`\@eqnswtrue` .. [E343](#), [E349](#), [E407](#), [E485](#)  
`\@eqpen` [E341](#), [E374](#), [E376](#), [E387](#), [E397](#)  
`\@err@` [j37](#), [j41](#), [j44](#), [j52](#), [j64](#), [j68](#), [j71](#), [j79](#)  
`\@esphack` ..... [138](#),  
     [1131](#), [1345](#), [1362](#), [1379](#), [1396](#), [C35](#),  
     [L361](#), [M17](#), [M19](#), [M34](#), [N50](#), [S1884](#)  
`\@evenfoot` ..... [O12](#), [O15](#), [S613](#), [S672](#)  
`\@evenhead` ..... [O12](#), [O15](#), [S612](#), [S671](#)  
`\@execute@begin@hook` .....  
     ..... [466](#), [D167](#), [D171](#), [D174](#)  
`\@expandtwoargs` .....  
     ..... [f207](#), [P169](#), [P338](#), [P352](#), [P400](#)  
`\@expast` ..... [H239](#), [H267](#)  
`\@expl@@@filehook@drop@extension@@N`  
     ..... [687](#), [Q210](#), [Q211](#), [Q384](#)  
`\@expl@@@filehook@file@pop@@` ...  
     ..... [P632](#), [Q117](#), [Q388](#)  
`\@expl@@@filehook@file@pop@assign@@nnnn`  
     ..... [Q101](#), [Q390](#)  
`\@expl@@@filehook@file@push@@` ...  
     ..... [P616](#), [Q98](#), [Q386](#)  
`\@expl@@@filehook@if@file@replaced@@TF`  
     ..... [687](#), [688](#), [Q207](#), [Q382](#)  
`\@expl@@@filehook@if@no@extension@@nTF`  
     ..... [Q203](#), [Q372](#), [Q374](#)  
`\@expl@@@filehook@normalize@file@name@@w`  
     ..... [Q209](#), [Q380](#)  
`\@expl@@@filehook@resolve@file@subst@@w`  
     ..... [P286](#), [Q206](#), [Q378](#)  
`\@expl@@@filehook@set@curr@file@@nNN`  
     .. [686](#), [688](#), [P285](#), [Q245](#), [Q251](#), [Q376](#)  
`\@expl@@@hook@curr@name@pop@@` ...  
     ..... [g945](#), [P61](#)  
`\@expl@@@hook@curr@name@push@@n` .  
     ..... [g945](#), [P26](#)  
`\@expl@@@initialize@call@@` [g945](#), [D175](#)  
`\@expl@@@shipout@add@background@box@@n`  
     ..... [R331](#), [R419](#)  
`\@expl@@@shipout@add@background@picture@@n`  
     ..... [R331](#), [R423](#)  
`\@expl@@@shipout@add@firstpage@material@@Nn`  
     ..... [R331](#), [R416](#)  
`\@expl@@@shipout@add@foreground@box@@n`  
     ..... [R331](#), [R421](#)  
`\@expl@@@shipout@add@foreground@picture@@n`  
     ..... [R331](#), [R425](#)  
`\@expl@char@generate@@nn` . [e121](#), [f699](#)  
`\@expl@cs@argument@spec@@N` .....  
     ..... [e118](#), [e128](#), [f600](#)  
`\@expl@cs@prefix@spec@@N` .....  
     ..... [e117](#), [e127](#), [f597](#)  
`\@expl@cs@replacement@spec@@N` ...  
     ..... [e119](#), [e129](#), [f558](#), [f592](#), [f600](#)  
`\@expl@cs@to@str@@N` .....  
     . [e115](#), [e125](#), [f467](#), [f524](#), [f544](#), [f546](#),  
     [f547](#), [f560](#), [f572](#), [f584](#), [f588](#), [f589](#), [f594](#)  
`\@expl@finalise@setup@@` .....  
     ..... [e8](#), [U201](#), [U202](#)  
`\@expl@pop@filename@@` .....  
     ..... [e5](#), [P60](#), [P63](#), [P69](#)  
`\@expl@push@filename@@` ..... [637](#),  
     [e3](#), [P24](#), [P27](#), [P37](#), [P39](#), [P49](#), [P67](#), [P73](#)  
`\@expl@push@filename@aux@@` .....  
     ..... [e4](#), [P24](#), [P33](#), [P45](#), [P49](#), [P73](#)  
`\@expl@str@if@eq@@nnTF` .....  
     ..... [e116](#), [e126](#), [f431](#), [f433](#)  
`\@expl@str@map@function@@NN` ...  
     ..... [95](#), [e120](#), [e130](#), [f696](#)  
`\@expl@sys@load@backend@@` ... [e2](#), [n19](#)  
`\@extra@page@added` ..... [D58](#), [R302](#)  
`\@failedlist` ... [S842](#), [S865](#), [S881](#),  
     [S888](#), [S901](#), [S907](#), [S923](#), [S937](#), [S960](#)  
`\@fcolmadefalse` ..... [S833](#)  
`\@fcolmadetrue` ..... [S921](#)  
`\@file-subst@{file}` ..... [685](#)  
`\@file@und` ... [n420](#), [n430](#), [n457](#),  
     [n468](#), [n481](#), [n534](#), [Q100](#), [Q129](#), [Q135](#)  
`\@filehook@file@push` ..... [653](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx,  
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 Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \@filehook@set@CurrentFile ..... n315, P618, Q99, [Q234](#)
- \@filelist ..... n65, n133, n188, [n602](#), n603, n614, w562, w572, w582, U212, U527, [U543](#)
- \@fileswfalse ..... n201, P863, P864, P994, P995
- \@fileswith@pti@ns ..... P310, P374, P393, P520, P521, P525, P527, P554, P555, P582, P760
- \@fileswith@ptions ..... P515, P516, P518, P522
- \@fileswith@ptions ..... P431, P438, P446, [P513](#)
- \@fileswtrue .... n7, P846, P849, P904, P908, P977, P980, P1035, P1039
- \@finalstrut . G360, [G426](#), H385, L448
- \@firstampfalse .. H254, H277, H294
- \@firstamptrue ..... H262
- \@firstcolfirstmark ..... S2212, S2213, S2217
- \@firstcoltopmark ..... S2210, S2218
- \@firstcolumnfalse .... S2202, S2247
- \@firstcolumntrue ..... n30, n99, n157, S98, S207, S2221, S2253
- \@firstofone ..... 87, 100, d12, d100, d108, d166, e12, e39, e54, [f202](#), f455, f460, f461, f464, f465, n127, n182, n397, o68, o153, t300, v53, v81, v142, v173, v204, v795, D70, E414, H372, L10, N18, N42, P607, P633, Q225, Q240, U257
- \@firstoftwo ... 207, a87, e13, e21, [f202](#), f432, f434, f456, f527, f577, f635, f645, f655, f682, f706, n431, n469, o133, p157, p162, v799, w360, A90, A745, A796, A812, C19, O16, P98, P137, P149, P176, P194, P1420
- \@firsttab ..... H2, H74, H75, H76, H106, H118
- \@flcheckspace ... S989, S1025, [S2102](#)
- \@flfail ..... S865, S916, S937, S947, S960, S969
- \@float ..... [L26](#), L32
- \@floatboxreset ... L101, L170, [L174](#)
- \@floatpenalty ..... L3, L53, L55, L58, L122, L124, L127, L191, L194, L199, L201, L212, L216, L221, L223, L237, L241, L311, L313, L317, L321, L355
- \@floatplacement ..... n33, n102, n160, [L271](#), S149, S209, S253, S477, S1908, S1935
- \@flsetnum ..... S986, S1022, S1109, S1267, S1420, S1507, S1578, S1699, [S2070](#)
- \@flsettextmin ..... S1085, S1237, S1406, S1489, [S2086](#)
- \@flstop ..... [S1972](#)
- \@flsucceed S858, S866, S915, S949, S971
- \@fltovf ..... [j223](#), L93, L162, L322
- \@flupdates ..... S992, S1037, [S2148](#)
- \@flushglue ..... h17, D345, D349, D355, D365, D368, D373, D406, D428, F76, G277, G298
- \@fnsymbol ..... p107, [p126](#)
- \@font@aliasinfo ..... [t493](#)
- \@font@info ..... r133, r171, r177, r337, r354, r592, t30, t38, t46, t74, t87, t126, t154, t168, t179, t193, t209, t215, t228, t235, t242, t247, t257, t269, t281, t445, t457, t462, t469, t499, t512, t520, v234, v249, v283, v329, v398, v404, v448, v461, v544, v633, v676, v741, v835, v1002, v1031, A76, A77, A120, U376
- \@font@series@contextfalse ..... w352, w388
- \@font@series@contexttrue ..... w371, w375, w387
- \@font@shape@subst@warning ..... s408, s411, s416, s542, s545, s589
- \@font@warning ..... r3, r506, r511, r538, r545, s419, t19, t33, t41, t49, t61, t77, t430, t444, t456, t461, t468, t511, t519, u30, D44, D84, U232
- \@fontenc@load@list ..... o1533, w555, x17, x25
- \@fontswitch ..... [z126](#), [z128](#)
- \@footnotemark ..... L430, L436, L454, L460, [L461](#)
- \@footnotetext ..... G330, L430, L436, [L437](#), L470, L476
- \@for ..... i16, n234, n305, n352, n614, N16, N41, P178, P195, P336, P350, P366, P371, P385, P390, P411, P421, P817, P854, P985
- \@forced@seriesfalse ..... s387
- \@forced@seriestrue ..... s386
- \@forloop ..... i19, [i20](#)
- \@fornoop ..... i15, i23, i29
- \@fortmp ..... i17, i18, i26, P409, P411, P853, P854, P984, P985
- \@fpbot ..... L290, L304, S863, [S2313](#)
- \@fpmin ..... L278, L287, L301, S113, S920, S1916, S1943, S2165, S2182

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- \@fps ..... L41,  
L42, L44, L47, L64, L110, L111,  
L113, L116, L133, S1993, S1995, S1998
- \@fpsaddddefault .....  
..... L45, L48, L114, L117, S1990
- \@fpsep ..... L289,  
L303, S861, S870, S942, S964, S2313
- \@fpstype .....  
S983, S1004, S1005, S1019, S1050,  
S1051, S1075, S1077, S1080, S1082,  
S1133, S1189, S1190, S1225, S1228,  
S1231, S1234, S1295, S1357, S1358,  
S1396, S1398, S1401, S1403, S1477,  
S1480, S1483, S1486, S1575, S1590,  
S1592, S1610, S1619, S1655, S1656,  
S1696, S1711, S1713, S1733, S1743,  
S1782, S1783, S1986, S2002, S2004,  
S2006, S2009, S2010, S2011, S2013,  
S2014, S2018, S2019, S2021, S2022,  
S2056, S2058, S2060, S2072, S2074,  
S2088, S2090, S2120, S2123, S2134
- \@fptop ..... L288, L302, S860, S2313
- \@frameb@x ..... G160, G188, G190
- \@framebox ..... G167, G174, G178
- \@framepicbox ..... G167, G174, G211
- \@freelist ..... b196,  
b213, b275, L60, L129, L319, L320,  
S29, S34, S48, S56, S213, S499,  
S732, S747, S761, S866, S1812, S1813
- \@getcirc .....  
..... I437, I485, I514, I541, I613, I629
- \@getfpsbit .....  
... S980, S1016, S1572, S1693, S2029
- \@getlarrow ..... I266, I274, I276
- \@getlinechar ..... I190, I229
- \@getpen ..... I34, I37, I46, I117
- \@getrarrow ..... I267, I274, I283
- \@glossaryfile ..... M21, M22, M31
- \@gnewline ..... I95, I101, I108, I111
- \@gobble ..... 380, 652, d11,  
d98, e11, e43, e66, e77, f101, f123,  
f198, f209, f226, f230, f267, f273,  
f276, f286, f306, f312, f315, f324,  
f334, f340, f343, f352, f370, f374,  
f376, f377, f379, f387, f391, f393, i6,  
i9, j101, j127, j153, j162, l75, l483,  
n66, n134, n189, n404, n406, n602,  
o29, r507, r540, t299, u26, v28, v30,  
v287, v298, v362, v409, v410, v439,  
v445, v453, v458, v476, v490, v500,  
v509, v522, v539, v548, v622, v624,  
v628, v636, v670, v679, v731, v733,  
v744, v828, v838, v919, v924, v993,  
v1024, w74, w115, w368, w565,  
w575, w585, A773, D228, K143,  
K144, K145, K146, K147, K182,  
L7, N11, N25, N26, P483, P613,  
P838, P898, P927, P1029, P1058,  
P1142, P1147, P1221, P1365,  
P1377, S619, S620, S621, S678,  
S679, S680, S927, S1900, S2166,  
S2183, U215, U309, U466, U475, U543
- \@gobble@AddToHook@args .. g963, g964
- \@gobble@IncludeInRelease .....  
..... c86, c94, c103
- \@gobble@RemoveFromHook@arg ....  
..... g966, g967
- \@gobblecr ..... l481, l482
- \@gobblefour ..... f198, v24,  
v284, v400, v402, v406, v408, v418,  
v422, v546, v598, P929, P1060, P1149
- \@gobblethree ..... f198, f586, f599
- \@gobbletwo . e103, e108, f165, f166,  
f198, i12, n34, n103, n161, r512,  
r546, v132, D22, D45, D77, D85,  
O11, O13, P897, P1028, P1141, U238
- \@gtempa ... f116, f117, f171, f173,  
f518, f526, n546, n547, n553, n554,  
n555, n580, n581, n583, n584, n585,  
H3, H5, H6, H7, H8, P211, P212,  
P230, P232, P246, P248, P258, P260
- \@halfwidth ..... I2,  
I126, I129, I131, I227, I299, I302,  
I324, I333, I349, I361, I364, I383,  
I391, I405, I416, I421, I680, I706,  
I725, I726, I727, I766, I781, I782, I783
- \@halignto ... H170, H174, H177, H191
- \@changfrom ..... K66, K117, K138
- \@height .....  
.. b402, f26, l350, l358, l384, l392,  
o293, o295, t144, x340, x558, x559,  
x561, x562, G144, G149, G197,  
G207, G383, G427, H186, H219,  
H359, H376, S1851, I227, I300,  
I303, I324, I333, I351, I359, I383,  
I391, I407, I414, I590, I600, I726, I782
- \@highpenalty ..... I118, U3
- \@hightab ..... H11, H21, H23,  
H74, H86, H95, H96, H111, H146, H147
- \@hline ..... I167, I179, I226, I265
- \@holdpg ..... S122,  
S300, S302, S303, S308, S309, S310
- \@hspace ..... I437, I438, I453
- \@hspacer ..... I437, I452
- \@hvector ..... I244, I259, I265
- \@icentercr ..... D323, D324
- \@iden ..... f205
- \@if ..... f161, f162, f164

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- \@if@DeclareRobustCommand ..... 89, 90, f473, f497, f508, f509, [f513](#), f604, f605, f608
- \@if@newcommand ..... 82, 90, 91, f294, f474, f498, f509, f551, f563, [f568](#)
- \@if@pti@ns ..... P169, P173, P175, P192, P193, P209
- \@if@ptions ..... P164, P165, P168, P170, P592, P714
- \@ifatmargin ..... [H55](#), H106
- \@ifbothcounters ..... p61, p69, p71, p79, p81, p93
- \@ifclasslater .... [P101](#), P111, P121
- \@ifclassloaded ..... [P90](#)
- \@ifclasswith ..... [P164](#)
- \@ifdefinable ..... f74, f76, f120, [f122](#), f228, o14, o17, p11, q3, w468, G96, J7, J15, J22
- \@iffileonpath n416, [n424](#), n453, n462
- \@ifl@aded ..... 652, P90, P91, P94, P100, P591, P699, P713
- \@ifl@t@r o1498, P109, P119, P125, P130, P132, P143, P144, P154, P504
- \@ifl@ter ..... o1537, o1538, P101, P102, [P124](#), P635, P742
- \@ifl@ter@@ ..... o1537, o1538
- \@ifnch ..... e27, e28, f667, [f669](#), f681
- \@ifnextchar .. a98, e23, [f663](#), f668, f682, l93, l482, n494, p13, t365, D322, E339, F143, G9, G11, G18, G20, G26, G47, G102, G103, G109, G110, G117, G121, G166, G167, G173, G174, G179, G212, G220, G228, G235, G239, G308, G312, G316, G367, G372, G395, G402, G407, H57, H181, H203, H210, J3, J5, J28, L27, L264, L324, L428, L451, L468, N3, N13, P217, P499, P514, P519, P847, P850, P978, P981, S209, S1974, I23, I132, I143, I453
- \@iforloop ..... i21, [i22](#)
- \@ifpackagelater ... [P101](#), P110, P120
- \@ifpackageloaded ..... [P90](#), S1958
- \@ifpackagewith ..... [P164](#)
- \@ifframebox ..... G180, G181, [G182](#)
- \@ifframepicbox ..... G212, [G213](#)
- \@ifstar ..... f63, [f682](#), l59, l71, l330, l437, p67, p77, r206, u121, D311, D318, D549, D558, E373, H56, H202, H209, K52, K142, P311, P333, S1856, I142, I605
- \@ifundefin@d@i . f625, f626, f643, f646
- \@ifundefin@d@ii ..... f625, f628, f631
- \@ifundefined f117, f124, f144, f151, f173, f184, f267, f273, f306, f312, f334, f340, f370, f387, f468, [f620](#), p3, p7, p16, p50, p62, p64, r100, r186, t378, v319, A75, A775, C23, D130, D147, D163, D218, D235, D268, J21, N20, N44, O3, O7, P88, P289, P299, P367, P386, Q353
- \@ignorefalse [D4](#), D169, D205, D212, D223, D240, D263, D273, D278, L360
- \@ignoretrue ..... l200, l213, [D4](#), D7, E332, E335, E367, E509
- \@iiiminipage ..... G310, G314, G317, G318, [G319](#)
- \@iiiparbox ..... G222, G230, G237, G240, G241, [G242](#), G347
- \@iiminipage ..... G313, [G315](#)
- \@iininput ..... 207, n494, [n495](#)
- \@iiparbox ..... G236, [G238](#)
- \@iirsbox ..... G407, [G416](#)
- \@imakebox ..... G26, [G41](#), G119
- \@imakepicbox . G47, [G48](#), G124, G214
- \@iminipage ..... G309, [G311](#)
- \@include . 200, n229, n272, n288, [n292](#)
- \@includeinreleasefalse ..... c69, c74, c99, c104, f758
- \@includeinreleasetrue ..... c89
- \@index ..... M18, [M19](#), M35
- \@indexfile ..... M4, M5, M14
- \@inlabel ..... 496
- \@inlabelfalse ..... F28, F104, F184, S163, S190
- \@inlabeltrue ..... [F28](#), F178
- \@inmatherr ... j233, F112, F142, I605
- \@inmathwarn ..... o3
- \@inpenc@test ..... U254, U321
- \@input ..... 676, n36, n105, n163, n299, n346, [n533](#), K152, U545
- \@input@ . n319, n361, [n535](#), r364, N31
- \@inputcheck . 661, a70, a191, a192, a195, a203, e16, e17, e20, f38, f45, [n3](#), n411, n412, n419, n428, n429, n432, n448, n449, n456, n466, n467, n470, P886, P887, P923, P1017, P1018, P1054, P1129, P1130, P1137
- \@insertfalse ..... S1073, S1223, S1394, S1475, S1570, S1691
- \@inserttrue ..... S999, S1044, S1161, S1329, S1649, S1776
- \@invalidchar ..... j238
- \@iparbox ..... G221, G229, [G234](#)
- \@irsbox ... G395, G402, G407, [G408](#)
- \@isavebox ..... G117, [G118](#)
- \@isavepicbox ..... G122, [G123](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lt hooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=lt space.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=lt pictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx



- `\@ishortstack` ..... [I133](#), [I141](#)
- `\@istackcr` ..... [I143](#), [I144](#)
- `\@itabcr` ..... [H57](#), [H58](#)
- `\@item` ..... [F143](#), [F156](#)
- `\@itemdepth` [508](#), [F241](#), [F243](#), [F244](#), [F245](#)
- `\@itemfudge` ..... [H38](#), [H44](#), [H82](#)
- `\@itemitem` ..... [F245](#), [F248](#)
- `\@itemlabel` ..... [F44](#), [F96](#), [F143](#)
- `\@itempenalty` .... [497](#), [I16](#), [F23](#), [F175](#)
- `\@itemspacing` ..... [508](#)
- `\@iwhiledim` ..... [i7](#)
- `\@iwhilenum` ..... [i3](#)
- `\@iwhilesw` ..... [i10](#)
- `\@ixpt` ..... [r688](#)
- `\@ixstackcr` ..... [I142](#)
- `\@kernel@after@{hookname}` ..... [113](#)
- `\@kernel@after@begindocument` [n60](#), [n77](#)
- `\@kernel@after@begindocument@before`  
..... [197](#), [n18](#), [n77](#), [s613](#)
- `\@kernel@after@enddocument` .....  
..... [D14](#), [D40](#), [D102](#), [R276](#)
- `\@kernel@after@enddocument@afterlastpage`  
..... [D18](#), [D40](#), [D103](#), [R282](#)
- `\@kernel@after@shipout@lastpage` .  
..... [710](#), [R83](#), [R100](#), [R293](#), [R298](#)
- `\@kernel@before@{hookname}` .... [113](#)
- `\@kernel@before@begindocument` ...  
..... [n58](#), [n77](#), [R322](#)
- `\@kernel@before@shipout@background`  
..... [R75](#), [R100](#)
- `\@kernel@make@file@csname` .....  
..... [Q205](#), [Q208](#), [Q234](#)
- `\@kernel@rename@newcommand` .. [82](#),  
[82](#), [84](#), [f275](#), [f292](#), [f329](#), [f357](#), [f362](#), [f375](#)
- `\@killglue` ... [I59](#), [I73](#), [I103](#), [I115](#), [I123](#)
- `\@kludgeins` ..... [S319](#), [S320](#),  
[S321](#), [S323](#), [S376](#), [S377](#), [S423](#), [S424](#),  
[S502](#), [S518](#), [S519](#), [S525](#), [S526](#), [S527](#),  
[S536](#), [S552](#), [S556](#), [S566](#), [S1852](#), [S1883](#)
- `\@labels` ..... [496](#),  
[F27](#), [F146](#), [F147](#), [F189](#), [F206](#), [F207](#)
- `\@largefloatcheck` .....  
..... [L192](#), [L213](#), [L238](#), [L256](#)
- `\@lastchclass` .....  
.. [H262](#), [H272](#), [H273](#), [H275](#), [H283](#),  
[H308](#), [H322](#), [H326](#), [H335](#), [H348](#), [H349](#)
- `\@latex@error` .....  
..... [e58](#), [e76](#), [f118](#), [f145](#), [f268](#),  
[f307](#), [f335](#), [f459](#), [j136](#), [j168](#), [j184](#),  
[j190](#), [j192](#), [j195](#), [j197](#), [j199](#), [j202](#),  
[j204](#), [j206](#), [j209](#), [j213](#), [j218](#), [j222](#),  
[j224](#), [j226](#), [j227](#), [j229](#), [j232](#), [j236](#),  
[j238](#), [n225](#), [n269](#), [n287](#), [o50](#), [o84](#),  
[r5](#), [r28](#), [r58](#), [r102](#), [r144](#), [r187](#), [r253](#),  
[r310](#), [t105](#), [u100](#), [u111](#), [v23](#), [v68](#),  
[v97](#), [v117](#), [v159](#), [v190](#), [v222](#), [v245](#),  
[v261](#), [v325](#), [v346](#), [v378](#), [v418](#), [v422](#),  
[v464](#), [v469](#), [v524](#), [v592](#), [v598](#), [v642](#),  
[v646](#), [v650](#), [v685](#), [v689](#), [v693](#), [v750](#),  
[v760](#), [v845](#), [v850](#), [v853](#), [v885](#), [v888](#),  
[v961](#), [v964](#), [v967](#), [v1034](#), [v1040](#),  
[w46](#), [w57](#), [w450](#), [w533](#), [z143](#), [D164](#),  
[D219](#), [D236](#), [D269](#), [D495](#), [D510](#),  
[D525](#), [D537](#), [E405](#), [F219](#), [H100](#),  
[H109](#), [K31](#), [L6](#), [L83](#), [N47](#), [P442](#),  
[P477](#), [P490](#), [P593](#), [P672](#), [P715](#),  
[P806](#), [P823](#), [P831](#), [P836](#), [P858](#),  
[P913](#), [P989](#), [P1044](#), [P1380](#), [P1410](#)
- `\@latex@info` ..... [f214](#),  
[f288](#), [f326](#), [f354](#), [f720](#), [j136](#), [o85](#), [A97](#)
- `\@latex@info@no@line` .... [j136](#), [S576](#)
- `\@latex@warning` ..... [j136](#),  
[j166](#), [o55](#), [r33](#), [C14](#), [L260](#), [N22](#),  
[N45](#), [P952](#), [P958](#), [P1083](#), [P1089](#),  
[P1172](#), [P1178](#), [R107](#), [S1996](#), [I449](#)
- `\@latex@warning@no@line` .....  
.. [f192](#), [j136](#), [j167](#), [n21](#), [n90](#), [n147](#),  
[n600](#), [C8](#), [C26](#), [C27](#), [D52](#), [D59](#),  
[D92](#), [K32](#), [P213](#), [P505](#), [P636](#), [P743](#),  
[P888](#), [P894](#), [P917](#), [P1019](#), [P1025](#),  
[P1048](#), [P1131](#), [P1138](#), [P1205](#),  
[P1282](#), [S243](#), [S275](#), [S1827](#), [S2062](#)
- `\@latexbug` ..... [j225](#), [S333](#), [S1813](#)
- `\@latexerr` .....  
..... [j166](#), [S234](#), [S390](#), [S437](#), [S1874](#), [S1891](#)
- `\@lbibitem` ..... [N3](#), [N4](#)
- `\@ldots` ..... [x504](#), [x506](#)
- `\@leftcolumn` .....  
... [S121](#), [S2203](#), [S2224](#), [S2248](#), [S2257](#)
- `\@leftmark` ..... [O16](#), [O50](#)
- `\@let@token` ..... [e27](#),  
[e29](#), [f667](#), [f670](#), [f673](#), [f681](#), [l410](#),  
[l411](#), [l418](#), [z83](#), [z96](#), [E240](#), [E242](#), [E245](#)
- `\@lign` ..... [E195](#), [E197](#)
- `\@linechar` .....  
..... [I190](#), [I191](#), [I192](#), [I196](#), [I197](#), [I199](#),  
[I204](#), [I206](#), [I207](#), [I208](#), [I209](#), [I211](#),  
[I215](#), [I216](#), [I219](#), [I220](#), [I225](#), [I272](#), [I670](#)
- `\@linefnt` ..... [I124](#),  
[I127](#), [I190](#), [I265](#), [I273](#), [I304](#), [I307](#), [I677](#)
- `\@linelen` ..... [I164](#),  
[I165](#), [I176](#), [I177](#), [I203](#), [I210](#), [I219](#),  
[I221](#), [I226](#), [I227](#), [I228](#), [I241](#), [I242](#),  
[I256](#), [I257](#), [I300](#), [I303](#), [I305](#), [I306](#), [I671](#)
- `\@list` ..... [497](#)
- `\@listctr` ..... [496](#), [F202](#), [F225](#), [N9](#)
- `\@listdepth` .....  
.. [496](#), [F23](#), [F35](#), [F38](#), [F43](#), [F99](#), [G331](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \@listfiles [n64](#), [n132](#), [n187](#), [n606](#), [n621](#)
- \@listi ..... [497](#)
- \@listii ..... [497](#)
- \@listvi ..... [497](#)
- \@loadwithoptions .....  
..... [P448](#), [P454](#), [P464](#), [P473](#)
- \@lowpenalty ..... [l117](#), [U3](#)
- \@ltab ..... [H71](#), [H106](#)
- \@m ..... [154](#), [b21](#), [b362](#), [b364](#),  
[b365](#), [b398](#), [b399](#), [l288](#), [l429](#), [l434](#),  
[n47](#), [n116](#), [n174](#), [F80](#), [N17](#), [I213](#), [I217](#)
- \@mainaux ..... [n5](#),  
[n39](#), [n40](#), [n108](#), [n109](#), [n166](#), [n167](#),  
[n218](#), [n299](#), [n338](#), [n346](#), [n371](#), [D21](#), [D76](#)
- \@makebox ..... [G11](#), [G20](#), [G25](#)
- \@makecaption ..... [L24](#)
- \@makecol ..... [S261](#), [S413](#), [S460](#), [S480](#)
- \@makefcolumn ..... [S393](#),  
[S394](#), [S402](#), [S404](#), [S440](#), [S442](#), [S450](#),  
[S452](#), [S2161](#), [S2163](#), [S2179](#), [S2180](#)
- \@makefnmark ..... [L376](#), [L464](#)
- \@makefntext ..... [G359](#), [L447](#)
- \@makeother ..... [a76](#), [a97](#), [a126](#),  
[f685](#), [f686](#), [r377](#), [r378](#), [r379](#), [r380](#),  
[r381](#), [r382](#), [r383](#), [r384](#), [r385](#), [r386](#),  
[r387](#), [D417](#), [D438](#), [D531](#), [D546](#),  
[D556](#), [P277](#), [P278](#), [P934](#), [P1065](#), [P1154](#)
- \@makepicbox [G10](#), [G19](#), [G46](#), [I366](#), [I424](#)
- \@makespecialcolbox ..... [S503](#), [S522](#)
- \@marbox ..... [L320](#),  
[L322](#), [L326](#), [L330](#), [L331](#), [L355](#),  
[S1812](#), [S1822](#), [S1825](#), [S1833](#), [S1835](#),  
[S1836](#), [S1838](#), [S1839](#), [S1840](#), [S1849](#)
- \@marginparreset ..... [L339](#), [L346](#)
- \@markright ..... [O33](#), [O48](#)
- \@maxdepth .....  
[n62](#), [n130](#), [n185](#), [S91](#), [S486](#), [S514](#), [U85](#)
- \@maxtab ..... [H2](#), [H94](#)
- \@medpenalty ..... [l118](#), [U3](#)
- \@meta@family@list .....  
..... [w76](#), [w88](#), [w178](#), [w356](#)
- \@midlist .. [S66](#), [S499](#), [S500](#), [S1027](#),  
[S1029](#), [S1141](#), [S1305](#), [S1923](#), [S1950](#)
- \@minipagefalse ..... [F181](#),  
[G304](#), [G306](#), [G344](#), [L187](#), [L250](#), [L341](#)
- \@minipagerestore ..... [G332](#), [G334](#)
- \@minipagetrue ..... [G305](#), [L186](#)
- \@minus .....  
[f26](#), [S2306](#), [S2307](#), [S2308](#), [S2311](#), [S2312](#)
- \@missing@onefilewithoptions ...  
..... [P611](#), [P649](#), [P756](#)
- \@missingfile@area .....  
..... [n507](#), [n548](#), [n561](#), [P651](#)
- \@missingfile@base .....  
..... [n507](#), [n549](#), [n562](#), [P651](#)
- \@missingfile@ext .....  
..... [n507](#), [n550](#), [n563](#), [P652](#)
- \@missingfileerror .....  
..... [207](#), [208](#), [208](#), [652](#),  
[n502](#), [n517](#), [n527](#), [n536](#), [P650](#), [P736](#)
- \@mkboth ..... [O11](#), [O13](#)
- \@mklab ..... [F45](#), [F140](#)
- \@mkpream ..... [H189](#), [H234](#), [H262](#)
- \@mparbottom [L363](#), [L364](#), [S118](#), [S476](#),  
[S1823](#), [S1831](#), [S1832](#), [S1833](#), [S1834](#)
- \@mpargs ..... [G323](#), [G347](#)
- \@mparswitchfalse ..... [S102](#)
- \@mpfn .. [G329](#), [L428](#), [L433](#), [L473](#), [L477](#)
- \@mpfootins .....  
[G338](#), [G339](#), [G342](#), [G348](#), [G351](#), [G352](#)
- \@mpfootnotetext ..... [G330](#), [G350](#)
- \@mplistdepth ..... [G331](#), [G348](#)
- \@multicnt .... [H370](#), [H372](#), [H373](#),  
[H374](#), [H381](#), [H382](#), [H383](#), [I103](#),  
[I104](#), [I106](#), [I115](#), [I116](#), [I118](#), [I667](#),  
[I704](#), [I706](#), [I707](#), [I708](#), [I710](#), [I711](#),  
[I717](#), [I723](#), [I734](#), [I738](#), [I764](#), [I766](#),  
[I768](#), [I770](#), [I771](#), [I775](#), [I779](#), [I790](#), [I794](#)
- \@multiplelabels ..... [n35](#), [n104](#),  
[n162](#), [C25](#), [C31](#), [D50](#), [D56](#), [D90](#), [D96](#)
- \@multiput ..... [I86](#), [I95](#), [I98](#)
- \@multispan ..... [H371](#), [H375](#), [H379](#)
- \@namedef .... [f50](#), [n384](#), [r135](#), [r136](#),  
[r160](#), [s7](#), [s448](#), [t372](#), [A78](#), [A114](#),  
[A778](#), [C28](#), [D197](#), [D207](#), [D234](#),  
[D260](#), [D469](#), [D478](#), [E409](#), [E410](#),  
[H175](#), [J12](#), [J13](#), [J18](#), [J19](#), [J23](#), [J24](#),  
[J25](#), [P849](#), [P980](#), [Q351](#), [U378](#), [U379](#)
- \@nameuse ..... [f51](#), [n336](#),  
[n369](#), [n383](#), [J23](#), [O5](#), [Q354](#), [S607](#), [S665](#)
- \@nbitem ..... [F168](#), [F221](#)
- \@ne ..... [154](#), [b16](#)
- \@needsf@rmat ..... [P500](#), [P503](#), [P508](#)
- \@needsformat ..... [P488](#), [P498](#), [P502](#)
- \@negargfalse ..... [I186](#)
- \@negargtrue ..... [I185](#)
- \@newcommand ..... [f69](#), [f70](#)
- \@newctr ..... [p13](#), [p15](#), [J8](#)
- \@newenv ..... [f140](#), [f141](#), [f150](#)
- \@newenva ..... [f138](#), [f139](#)
- \@newenvb ..... [f140](#), [f141](#)
- \@newl@bel ..... [C22](#), [D23](#), [D78](#), [N10](#)
- \@newline ..... [194](#), [196](#)
- \@newlistfalse .....  
... [F29](#), [F33](#), [F108](#), [F182](#), [S600](#), [S658](#)
- \@newlisttrue ..... [F29](#), [F33](#), [F87](#)

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- \@next [b275](#), [L60](#), [L129](#), [L319](#), [L320](#),  
[S9](#), [S213](#), [S311](#), [S877](#), [S897](#), [S1812](#)
- \@nextchar ..... [H269](#), [H270](#), [H330](#), [H331](#), [H332](#)
- \@nil ..... [a161](#), [a162](#),  
[c13](#), [c19](#), [c83](#), [c84](#), [f53](#), [f54](#), [f55](#),  
[f125](#), [f429](#), [f430](#), [f575](#), [f661](#), [f662](#),  
[i13](#), [i19](#), [i27](#), [m14](#), [n248](#), [n249](#), [n250](#),  
[o89](#), [o110](#), [o979](#), [o983](#), [o1037](#), [o1049](#),  
[o1051](#), [r329](#), [r340](#), [r456](#), [r471](#), [r575](#),  
[r578](#), [r579](#), [r587](#), [s393](#), [s395](#), [s528](#),  
[s530](#), [t304](#), [t305](#), [t307](#), [t320](#), [t326](#),  
[t330](#), [t331](#), [t367](#), [t388](#), [t393](#), [t473](#),  
[t487](#), [u26](#), [u44](#), [u53](#), [u57](#), [v40](#), [v388](#),  
[v396](#), [v429](#), [v1045](#), [v1047](#), [z58](#), [z62](#),  
[H367](#), [H368](#), [P62](#), [P68](#), [P74](#), [P79](#),  
[P133](#), [P134](#), [P145](#), [P146](#), [P157](#),  
[P158](#), [P160](#), [P286](#), [P410](#), [P414](#),  
[P420](#), [P424](#), [P568](#), [P577](#), [P1255](#),  
[P1260](#), [P1263](#), [P1265](#), [P1266](#),  
[P1281](#), [P1301](#), [P1318](#), [P1372](#),  
[P1394](#), [P1418](#), [Q240](#), [Q282](#), [Q284](#)
- \@nmbulistfalse ..... [F33](#), [F46](#), [F91](#)
- \@nmbulisttrue ..... [F225](#)
- \@nnil ..... [f407](#),  
[f413](#), [i13](#), [i20](#), [i21](#), [i22](#), [i28](#), [n249](#),  
[n250](#), [r214](#), [r218](#), [r219](#), [r220](#), [r235](#),  
[t133](#), [t135](#), [t299](#), [t301](#), [t313](#), [t315](#),  
[t320](#), [t334](#), [t336](#), [t343](#), [t354](#), [t355](#),  
[t357](#), [t388](#), [t393](#), [P540](#), [P541](#), [P548](#), [I13](#)
- \@no@font@optfalse ..... [u17](#), [u129](#)
- \@no@lnbk ..... [l9](#), [l10](#), [l40](#)
- \@no@pgbk ..... [l7](#), [l8](#), [l32](#)
- \@nobreakfalse .....  
..... [l120](#), [l122](#), [F193](#), [K94](#), [K129](#),  
[K157](#), [L182](#), [S165](#), [S192](#), [S1150](#), [S1316](#)
- \@nobreaktrue ..... [l121](#), [K126](#), [L181](#)
- \@nocnterr ..... [j191](#)
- \@nocounterr .....  
..... [j191](#), [p4](#), [p8](#), [p16](#), [p62](#), [p64](#), [J21](#)
- \@nodocument [j196](#), [n70](#), [n138](#), [n193](#),  
[D155](#), [L39](#), [L108](#), [S156](#), [S183](#), [S212](#)
- \@noitemargfalse ..... [F32](#), [F200](#)
- \@noitemargtrue ..... [F32](#), [F143](#)
- \@noitemerr ..... [j228](#),  
[l248](#), [l266](#), [l303](#), [l326](#), [F69](#), [F81](#), [F107](#)
- \@noligs [D418](#), [D439](#), [D547](#), [D557](#), [D568](#)
- \@nolnerr .. [j189](#), [l42](#), [l113](#), [D310](#), [D317](#)
- \@nomath ..... [r1](#), [r308](#),  
[w401](#), [w436](#), [w442](#), [w463](#), [w465](#), [w487](#)
- \@noparitemfalse ..... [F30](#), [F145](#)
- \@noparitemtrue ..... [F30](#), [F66](#)
- \@nparlistfalse ..... [F31](#), [F70](#)
- \@nparlisttrue ..... [F31](#), [F67](#)
- \@normalcr ..... [l52](#), [l92](#), [G303](#)
- \@normalsize ..... [P4](#), [P5](#)
- \@noskipsec ..... [496](#)
- \@noskipsecfalse .....  
... [n56](#), [n125](#), [n180](#), [K98](#), [S158](#), [S185](#)
- \@noskipsectrue ..... [K38](#), [K95](#)
- \@notdefinable .....  
..... [f126](#), [f127](#), [f131](#), [f456](#), [j183](#)
- \@notprerr ..... [j231](#), [n68](#), [n136](#), [n191](#)
- \@nthm ..... [J3](#), [J4](#)
- \@nxxtabmar ..... [H11](#), [H21](#), [H23](#),  
[H25](#), [H75](#), [H111](#), [H112](#), [H118](#), [H119](#)
- \@obsoletefile ..... [n599](#)
- \@oddfloat .....  
... [O11](#), [O14](#), [O15](#), [S124](#), [S610](#), [S669](#)
- \@oddhead . [O11](#), [O14](#), [S123](#), [S610](#), [S669](#)
- \@onefilewithoptions ..... [682](#),  
[P532](#), [P536](#), [P542](#), [P560](#), [P564](#),  
[P570](#), [P586](#), [P587](#), [P647](#), [P703](#), [P1231](#)
- \@onelevel@sanitize . [f687](#), [L42](#), [L111](#)
- \@onfilewithoptions ..... [655](#)
- \@onlypreamble ... [f56](#), [f178](#), [f180](#),  
[f189](#), [f197](#), [g939](#), [n198](#), [n207](#), [n244](#),  
[n601](#), [n627](#), [o23](#), [o24](#), [o61](#), [o62](#),  
[o66](#), [o125](#), [o145](#), [o189](#), [o190](#), [o204](#),  
[r17](#), [r115](#), [r117](#), [r123](#), [r139](#), [r167](#),  
[r182](#), [r203](#), [r208](#), [r250](#), [r483](#), [t373](#),  
[u28](#), [u36](#), [u42](#), [u79](#), [u83](#), [u88](#), [u93](#),  
[u98](#), [u108](#), [u126](#), [u127](#), [u128](#), [u134](#),  
[u138](#), [u142](#), [v17](#), [v19](#), [v44](#), [v46](#),  
[v107](#), [v116](#), [v136](#), [v275](#), [v276](#), [v279](#),  
[v311](#), [v349](#), [v351](#), [v353](#), [v366](#), [v381](#),  
[v428](#), [v430](#), [v472](#), [v511](#), [v527](#), [v604](#),  
[v698](#), [v707](#), [v763](#), [v766](#), [v769](#), [v789](#),  
[v802](#), [v856](#), [v891](#), [v902](#), [v916](#), [v970](#),  
[v990](#), [v994](#), [v1058](#), [z140](#), [z141](#), [A79](#),  
[A80](#), [A81](#), [A779](#), [C30](#), [M12](#), [M29](#),  
[N40](#), [P10](#), [P12](#), [P18](#), [P19](#), [P57](#), [P76](#),  
[P84](#), [P86](#), [P89](#), [P92](#), [P93](#), [P100](#),  
[P103](#), [P104](#), [P112](#), [P113](#), [P114](#),  
[P127](#), [P154](#), [P166](#), [P167](#), [P170](#),  
[P209](#), [P218](#), [P266](#), [P268](#), [P304](#),  
[P307](#), [P308](#), [P319](#), [P320](#), [P321](#),  
[P328](#), [P334](#), [P347](#), [P360](#), [P378](#),  
[P398](#), [P403](#), [P427](#), [P432](#), [P436](#),  
[P439](#), [P447](#), [P452](#), [P455](#), [P465](#),  
[P484](#), [P497](#), [P502](#), [P508](#), [P517](#),  
[P522](#), [P582](#), [P647](#), [P761](#), [P770](#),  
[P778](#), [P779](#), [P797](#), [P804](#), [P813](#),  
[P820](#), [P821](#), [P829](#), [P834](#), [P839](#),  
[P1211](#), [P1212](#), [P1213](#), [P1214](#), [P1216](#)
- \@opargbegintheorem ..... [J32](#), [J35](#)
- \@opcol ..... [S262](#),  
[S270](#), [S394](#), [S413](#), [S442](#), [S460](#), [S465](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lt hooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspage.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=lt pictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

|                                   |                                                                                                                                                                |                                       |                                                                                                                                                                |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\@options</code> .....      | <a href="#">P397</a>                                                                                                                                           | <code>\@ovyy</code> .....             | <a href="#">I431</a> , <a href="#">I481</a> , <a href="#">I482</a> ,                                                                                           |
| <code>\@othm</code> .....         | <a href="#">J3</a> , <a href="#">J20</a>                                                                                                                       |                                       | <a href="#">I483</a> , <a href="#">I488</a> , <a href="#">I495</a> , <a href="#">I509</a> , <a href="#">I510</a> , <a href="#">I511</a> ,                      |
| <code>\@outerparskip</code> ..... |                                                                                                                                                                |                                       | <a href="#">I517</a> , <a href="#">I526</a> , <a href="#">I538</a> , <a href="#">I539</a> , <a href="#">I544</a> , <a href="#">I551</a> ,                      |
| .....                             | <a href="#">F8</a> , <a href="#">F88</a> , <a href="#">F117</a> , <a href="#">F152</a> , <a href="#">F222</a>                                                  |                                       | <a href="#">I561</a> , <a href="#">I574</a> , <a href="#">I697</a> , <a href="#">I698</a> , <a href="#">I699</a> , <a href="#">I703</a> ,                      |
| <code>\@outputbox</code> .....    | <a href="#">S120</a> , <a href="#">S483</a> , <a href="#">S485</a> ,                                                                                           |                                       | <a href="#">I705</a> , <a href="#">I721</a> , <a href="#">I722</a> , <a href="#">I723</a> , <a href="#">I736</a> , <a href="#">I757</a> ,                      |
|                                   | <a href="#">S505</a> , <a href="#">S508</a> , <a href="#">S509</a> , <a href="#">S529</a> , <a href="#">S531</a> , <a href="#">S532</a> ,                      |                                       | <a href="#">I758</a> , <a href="#">I759</a> , <a href="#">I763</a> , <a href="#">I765</a> , <a href="#">I778</a> , <a href="#">I779</a> , <a href="#">I792</a> |
|                                   | <a href="#">S537</a> , <a href="#">S540</a> , <a href="#">S545</a> , <a href="#">S547</a> , <a href="#">S554</a> , <a href="#">S560</a> ,                      | <code>\@p@pfilename</code>            | <a href="#">P62</a> , <a href="#">P68</a> , <a href="#">P74</a> , <a href="#">P79</a> , <a href="#">P84</a>                                                    |
|                                   | <a href="#">S562</a> , <a href="#">S636</a> , <a href="#">S695</a> , <a href="#">S723</a> , <a href="#">S729</a> , <a href="#">S739</a> ,                      | <code>\@pagedp</code> .....           | <a href="#">S117</a> ,                                                                                                                                         |
|                                   | <a href="#">S740</a> , <a href="#">S763</a> , <a href="#">S770</a> , <a href="#">S856</a> , <a href="#">S859</a> , <a href="#">S862</a> ,                      |                                       | <a href="#">S308</a> , <a href="#">S313</a> , <a href="#">S1091</a> , <a href="#">S1244</a> , <a href="#">S1841</a> , <a href="#">S1851</a>                    |
|                                   | <a href="#">S868</a> , <a href="#">S869</a> , <a href="#">S2203</a> , <a href="#">S2207</a> , <a href="#">S2208</a> ,                                          | <code>\@pageht</code> .....           |                                                                                                                                                                |
|                                   | <a href="#">S2222</a> , <a href="#">S2228</a> , <a href="#">S2248</a> , <a href="#">S2254</a> , <a href="#">S2263</a>                                          | ...                                   | <a href="#">S116</a> , <a href="#">S309</a> , <a href="#">S313</a> , <a href="#">S315</a> , <a href="#">S316</a> ,                                             |
| <code>\@outputdblcol</code> ..... |                                                                                                                                                                |                                       | <a href="#">S317</a> , <a href="#">S321</a> , <a href="#">S1090</a> , <a href="#">S1243</a> , <a href="#">S1824</a> , <a href="#">S1831</a>                    |
| ...                               | <a href="#">S468</a> , <a href="#">S2198</a> , <a href="#">S2200</a> , <a href="#">S2244</a> , <a href="#">S2245</a>                                           | <code>\@par</code> .....              | <a href="#">k3</a> , <a href="#">k5</a>                                                                                                                        |
| <code>\@outputpage</code> .....   | <a href="#">S403</a> , <a href="#">S452</a> ,                                                                                                                  | <code>\@parboxrestore</code> .....    | <a href="#">G247</a> ,                                                                                                                                         |
|                                   | <a href="#">S470</a> , <a href="#">S590</a> , <a href="#">S2232</a> , <a href="#">S2237</a> , <a href="#">S2270</a> , <a href="#">S2278</a>                    |                                       | <a href="#">G303</a> , <a href="#">G328</a> , <a href="#">G355</a> , <a href="#">L19</a> , <a href="#">L100</a> ,                                              |
| <code>\@oval</code> .....         | <a href="#">I453</a> , <a href="#">I471</a>                                                                                                                    |                                       | <a href="#">L169</a> , <a href="#">L338</a> , <a href="#">L442</a> , <a href="#">S219</a> , <a href="#">S601</a> , <a href="#">S659</a>                        |
| <code>\@ovbtrue</code> .....      | <a href="#">I476</a> , <a href="#">I504</a> , <a href="#">I534</a>                                                                                             | <code>\@parboxto</code> .....         | <a href="#">G242</a>                                                                                                                                           |
| <code>\@ovdx</code> .....         | <a href="#">I431</a> , <a href="#">I487</a> ,                                                                                                                  | <code>\@parmoderr</code> ....         | <a href="#">j221</a> , <a href="#">L58</a> , <a href="#">L127</a> , <a href="#">L316</a>                                                                       |
|                                   | <a href="#">I489</a> , <a href="#">I495</a> , <a href="#">I497</a> , <a href="#">I516</a> , <a href="#">I518</a> , <a href="#">I526</a> ,                      | <code>\@parse@version</code> .....    |                                                                                                                                                                |
|                                   | <a href="#">I528</a> , <a href="#">I543</a> , <a href="#">I551</a> , <a href="#">I553</a> , <a href="#">I589</a> , <a href="#">I592</a> ,                      |                                       | <a href="#">c83</a> , <a href="#">c84</a> , <a href="#">P139</a> , <a href="#">P145</a> , <a href="#">P146</a> , <a href="#">P157</a> ,                        |
|                                   | <a href="#">I599</a> , <a href="#">I601</a> , <a href="#">I693</a> , <a href="#">I694</a> , <a href="#">I695</a> , <a href="#">I696</a> ,                      |                                       | <a href="#">P1266</a> , <a href="#">P1281</a> , <a href="#">P1318</a> , <a href="#">P1394</a> , <a href="#">P1418</a>                                          |
|                                   | <a href="#">I712</a> , <a href="#">I713</a> , <a href="#">I714</a> , <a href="#">I717</a> , <a href="#">I733</a> , <a href="#">I753</a> ,                      | <code>\@parse@version@</code> .....   |                                                                                                                                                                |
|                                   | <a href="#">I754</a> , <a href="#">I755</a> , <a href="#">I756</a> , <a href="#">I772</a> , <a href="#">I773</a> , <a href="#">I775</a> , <a href="#">I789</a> | .....                                 | <a href="#">P133</a> , <a href="#">P134</a> , <a href="#">P139</a> , <a href="#">P151</a>                                                                      |
| <code>\@ovdy</code> .....         | <a href="#">I431</a> , <a href="#">I488</a> ,                                                                                                                  | <code>\@parse@version@dash</code> ... | <a href="#">P158</a> , <a href="#">P160</a>                                                                                                                    |
|                                   | <a href="#">I490</a> , <a href="#">I496</a> , <a href="#">I497</a> , <a href="#">I517</a> , <a href="#">I519</a> , <a href="#">I527</a> ,                      | <code>\@partaux</code> .....          | <a href="#">n5</a> , <a href="#">n224</a> , <a href="#">n268</a> ,                                                                                             |
|                                   | <a href="#">I528</a> , <a href="#">I544</a> , <a href="#">I552</a> , <a href="#">I553</a> , <a href="#">I564</a> , <a href="#">I569</a> ,                      |                                       | <a href="#">n286</a> , <a href="#">n309</a> , <a href="#">n311</a> , <a href="#">n312</a> , <a href="#">n332</a> , <a href="#">n356</a> ,                      |
|                                   | <a href="#">I577</a> , <a href="#">I581</a> , <a href="#">I700</a> , <a href="#">I701</a> , <a href="#">I702</a> , <a href="#">I703</a> ,                      |                                       | <a href="#">n358</a> , <a href="#">n359</a> , <a href="#">n365</a> , <a href="#">n377</a> , <a href="#">n379</a> , <a href="#">n382</a>                        |
|                                   | <a href="#">I718</a> , <a href="#">I719</a> , <a href="#">I720</a> , <a href="#">I723</a> , <a href="#">I737</a> , <a href="#">I760</a> ,                      | <code>\@partlist</code> .....         | <a href="#">n233</a> , <a href="#">n237</a> ,                                                                                                                  |
|                                   | <a href="#">I761</a> , <a href="#">I762</a> , <a href="#">I763</a> , <a href="#">I776</a> , <a href="#">I777</a> , <a href="#">I779</a> , <a href="#">I793</a> |                                       | <a href="#">n238</a> , <a href="#">n240</a> , <a href="#">n264</a> , <a href="#">n283</a> , <a href="#">n305</a> , <a href="#">n352</a>                        |
| <code>\@ovhlinefalse</code> ..... | <a href="#">I477</a> , <a href="#">I505</a>                                                                                                                    | <code>\@partswfalse</code> .....      | <a href="#">n8</a>                                                                                                                                             |
| <code>\@ovhlinetrue</code> .....  |                                                                                                                                                                | <code>\@partswtrue</code> .....       | <a href="#">n232</a> , <a href="#">n262</a> , <a href="#">n282</a>                                                                                             |
|                                   | <a href="#">I456</a> , <a href="#">I460</a> , <a href="#">I465</a> , <a href="#">I483</a> , <a href="#">I489</a> , <a href="#">I511</a> , <a href="#">I518</a> | <code>\@pass@options</code> .....     |                                                                                                                                                                |
| <code>\@ovhorz</code> .....       |                                                                                                                                                                | ..                                    | <a href="#">P281</a> , <a href="#">P282</a> , <a href="#">P284</a> , <a href="#">P295</a> , <a href="#">P296</a> ,                                             |
|                                   | <a href="#">I494</a> , <a href="#">I495</a> , <a href="#">I525</a> , <a href="#">I526</a> , <a href="#">I550</a> , <a href="#">I551</a> , <a href="#">I584</a> |                                       | <a href="#">P297</a> , <a href="#">P304</a> , <a href="#">P305</a> , <a href="#">P306</a> , <a href="#">P657</a> , <a href="#">P729</a>                        |
| <code>\@ovltrue</code> .....      | <a href="#">I476</a> , <a href="#">I504</a> , <a href="#">I534</a>                                                                                             | <code>\@pboxswfalse</code> .....      | <a href="#">G245</a> , <a href="#">G321</a>                                                                                                                    |
| <code>\@ovri</code> .....         | <a href="#">G33</a> , <a href="#">I431</a> ,                                                                                                                   | <code>\@pboxswtrue</code> .....       | <a href="#">G255</a>                                                                                                                                           |
|                                   | <a href="#">I486</a> , <a href="#">I515</a> , <a href="#">I542</a> , <a href="#">I564</a> , <a href="#">I577</a> , <a href="#">I593</a> , <a href="#">I602</a> | <code>\@penup</code> .....            | <a href="#">E186</a> , <a href="#">E187</a>                                                                                                                    |
| <code>\@ovro</code> .....         | <a href="#">I431</a> ,                                                                                                                                         | <code>\@percentchar</code> .....      |                                                                                                                                                                |
|                                   | <a href="#">I486</a> , <a href="#">I495</a> , <a href="#">I496</a> , <a href="#">I515</a> , <a href="#">I526</a> , <a href="#">I527</a> ,                      | .....                                 | <a href="#">a106</a> , <a href="#">P926</a> , <a href="#">P928</a> , <a href="#">P930</a> ,                                                                    |
|                                   | <a href="#">I542</a> , <a href="#">I551</a> , <a href="#">I552</a> , <a href="#">I563</a> , <a href="#">I569</a> , <a href="#">I576</a> ,                      |                                       | <a href="#">P932</a> , <a href="#">P1057</a> , <a href="#">P1059</a> , <a href="#">P1061</a> , <a href="#">P1063</a> ,                                         |
|                                   | <a href="#">I581</a> , <a href="#">I588</a> , <a href="#">I598</a> , <a href="#">I614</a> , <a href="#">I621</a> , <a href="#">I630</a> , <a href="#">I639</a> |                                       | <a href="#">P1146</a> , <a href="#">P1148</a> , <a href="#">P1150</a> , <a href="#">P1152</a> , <a href="#">P1200</a>                                          |
| <code>\@ovrtrue</code> .....      | <a href="#">I476</a> , <a href="#">I504</a> , <a href="#">I534</a>                                                                                             | <code>\@picbox</code> .....           | <a href="#">I6</a> , <a href="#">I31</a> , <a href="#">I43</a> , <a href="#">I51</a> , <a href="#">I52</a>                                                     |
| <code>\@ovttrue</code> .....      | <a href="#">I476</a> , <a href="#">I504</a> , <a href="#">I534</a>                                                                                             | <code>\@picht</code> .....            | <a href="#">I6</a> , <a href="#">I29</a> , <a href="#">I42</a> , <a href="#">I51</a>                                                                           |
| <code>\@ovvert</code> .....       |                                                                                                                                                                | <code>\@picture</code> .....          | <a href="#">I23</a> , <a href="#">I24</a>                                                                                                                      |
|                                   | <a href="#">I492</a> , <a href="#">I493</a> , <a href="#">I521</a> , <a href="#">I523</a> , <a href="#">I546</a> , <a href="#">I548</a> , <a href="#">I557</a> | <code>\@picture@warn</code> .         | <a href="#">I223</a> , <a href="#">I441</a> , <a href="#">I445</a> , <a href="#">I449</a>                                                                      |
| <code>\@ovvlinefalse</code> ..... | <a href="#">I477</a> , <a href="#">I505</a>                                                                                                                    | <code>\@pkgextension</code> .....     |                                                                                                                                                                |
| <code>\@ovvlinetrue</code>        | <a href="#">I459</a> , <a href="#">I482</a> , <a href="#">I490</a> , <a href="#">I510</a> , <a href="#">I519</a>                                               |                                       | <a href="#">654</a> , <a href="#">P16</a> , <a href="#">P90</a> , <a href="#">P101</a> , <a href="#">P164</a> , <a href="#">P305</a> ,                         |
| <code>\@ovxx</code> .....         | <a href="#">I431</a> , <a href="#">I480</a> ,                                                                                                                  |                                       | <a href="#">P438</a> , <a href="#">P441</a> , <a href="#">P464</a> , <a href="#">P473</a> , <a href="#">P543</a> ,                                             |
|                                   | <a href="#">I482</a> , <a href="#">I483</a> , <a href="#">I487</a> , <a href="#">I493</a> , <a href="#">I494</a> , <a href="#">I508</a> ,                      |                                       | <a href="#">P571</a> , <a href="#">P662</a> , <a href="#">P689</a> , <a href="#">P815</a> , <a href="#">Q351</a> , <a href="#">Q357</a>                        |
|                                   | <a href="#">I510</a> , <a href="#">I511</a> , <a href="#">I516</a> , <a href="#">I523</a> , <a href="#">I525</a> , <a href="#">I537</a> ,                      | <code>\@plus</code> .....             | <a href="#">f26</a> ,                                                                                                                                          |
|                                   | <a href="#">I539</a> , <a href="#">I543</a> , <a href="#">I548</a> , <a href="#">I550</a> , <a href="#">I588</a> , <a href="#">I598</a> ,                      |                                       | <a href="#">I456</a> , <a href="#">K16</a> , <a href="#">K191</a> , <a href="#">K214</a> , <a href="#">O54</a> , <a href="#">S2306</a> ,                       |
|                                   | <a href="#">I690</a> , <a href="#">I691</a> , <a href="#">I692</a> , <a href="#">I696</a> , <a href="#">I705</a> , <a href="#">I706</a> ,                      |                                       | <a href="#">S2307</a> , <a href="#">S2308</a> , <a href="#">S2311</a> , <a href="#">S2312</a> , <a href="#">S2316</a> ,                                        |
|                                   | <a href="#">I715</a> , <a href="#">I716</a> , <a href="#">I717</a> , <a href="#">I732</a> , <a href="#">I750</a> , <a href="#">I751</a> ,                      |                                       | <a href="#">S2317</a> , <a href="#">S2318</a> , <a href="#">S2322</a> , <a href="#">S2323</a> , <a href="#">S2324</a>                                          |
|                                   | <a href="#">I752</a> , <a href="#">I756</a> , <a href="#">I765</a> , <a href="#">I766</a> , <a href="#">I774</a> , <a href="#">I775</a> , <a href="#">I788</a> | <code>\@pnumwidth</code> .....        | <a href="#">K203</a> , <a href="#">K226</a>                                                                                                                    |

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- \@popfilename ..... [637](#), [638](#), [652](#), [P20](#), [P644](#), [P751](#)
- \@pr@videopackage ..... [P217](#),  
[P219](#), [P240](#), [P242](#), [P253](#), [P255](#), [P266](#)
- \@preamble ..... [H190](#),  
[H192](#), [H200](#), [H237](#), [H256](#), [H258](#),  
[H259](#), [H263](#), [H278](#), [H296](#), [H297](#), [H334](#)
- \@preamblecmds .....  
.. [f56](#), [n69](#), [n137](#), [n192](#), [P1432](#), [P1433](#)
- \@preamerr ... [j210](#), [H199](#), [H274](#), [H355](#)
- \@process@pti@ns ..... [P346](#),  
[P359](#), [P364](#), [P365](#), [P378](#), [P382](#), [P384](#)
- \@process@ptions ... [P333](#), [P335](#), [P347](#)
- \@protected@testopt [f79](#), [f91](#), [f570](#), [f582](#)
- \@providesfile . [a98](#), [a99](#), [P269](#), [U539](#)
- \@optionlist ..... [P87](#), [P169](#),  
[P332](#), [P597](#), [P603](#), [P719](#), [P725](#), [P816](#)
- \@pushfilename .....  
..... [637](#), [638](#), [P20](#), [P588](#), [P706](#)
- \@put . [I452](#), [I497](#), [I528](#), [I553](#), [I621](#), [I639](#)
- \@qend ..... [f126](#), [f661](#), [j187](#)
- \@qrelax ..... [f127](#), [f661](#)
- \@rc@ifdefinable . [f120](#), [f122](#), [f228](#), [o14](#)
- \@reargdef ..... [f112](#)
- \@refundefined .....  
..... [n57](#), [n126](#), [n181](#), [C3](#), [D48](#), [D88](#)
- \@reinserts ..... [S327](#), [S330](#), [S516](#)
- \@remove@tlig ..... [o979](#), [o987](#)
- \@remove@tlig@ ..... [o979](#), [o980](#)
- \@remove@tlig@@ ..... [o980](#), [o983](#)
- \@remove@tlig@@@ ..... [o1013](#)
- \@remove@tlig@@@ ..... [o993](#)
- \@removeelement ..... [i32](#), [P400](#)
- \@removefromreset .....  
..... [p46](#), [p69](#), [p72](#), [p91](#), [p92](#)
- \@reqcolroom .....  
.... [S1090](#), [S1091](#), [S1094](#), [S1096](#),  
[S1097](#), [S1102](#), [S1106](#), [S1108](#), [S1136](#),  
[S1137](#), [S1243](#), [S1244](#), [S1248](#), [S1251](#),  
[S1252](#), [S1257](#), [S1264](#), [S1266](#), [S1298](#),  
[S1299](#), [S1410](#), [S1412](#), [S1414](#), [S1417](#),  
[S1419](#), [S1493](#), [S1496](#), [S1499](#), [S1504](#),  
[S1506](#), [S1986](#), [S2103](#), [S2108](#), [S2111](#)
- \@reserveda ..... [303](#)
- \@reset@ptions .....  
[P609](#), [P645](#), [P655](#), [P710](#), [P752](#), [P762](#)
- \@resetactivechars . [S575](#), [S598](#), [S656](#)
- \@resethfps ..... [S1205](#), [S1374](#), [S2053](#)
- \@restorepar .....  
[k5](#), [l341](#), [l357](#), [l375](#), [l391](#), [F127](#), [F135](#)
- \@reversemarginfalse .... [L364](#), [S101](#)
- \@reversemargintrue ..... [L363](#)
- \@rightmark ..... [O16](#), [O51](#)
- \@rightskip .....  
.. [D349](#), [D368](#), [D386](#), [F75](#), [G276](#), [G297](#)
- \@rjfieldfalse ..... [H34](#), [H77](#)
- \@rjfieldtrue ..... [H125](#)
- \@rmfamilyhook .... [w261](#), [w304](#), [w340](#)
- \@roman ..... [p103](#), [p109](#)
- \@rsbox ..... [G395](#), [G402](#), [G406](#)
- \@rtab ..... [H71](#), [H86](#)
- \@rule ..... [G367](#), [G372](#), [G376](#)
- \@sanitize .. [f685](#), [M7](#), [M18](#), [M24](#), [M35](#)
- \@savebox ..... [G103](#), [G110](#), [G116](#)
- \@savemarbox .. [L326](#), [L327](#), [L330](#), [L333](#)
- \@savepicbox ..... [G103](#), [G110](#), [G120](#)
- \@savsf ..... [l123](#),  
[l129](#), [l138](#), [l157](#), [l171](#), [l183](#), [l197](#), [l211](#)
- \@savsk ..... [l123](#),  
[l128](#), [l139](#), [l158](#), [l172](#), [l184](#), [l198](#), [l212](#)
- \@scolelt ..... [S788](#), [S853](#)
- \@sdbcolelt ..... [S805](#), [S825](#), [S854](#)
- \@seccntformat ..... [K60](#), [K111](#)
- \@secondoftwo .....  
..... [a88](#), [e14](#), [e18](#), [f202](#), [f435](#),  
[f529](#), [f579](#), [f630](#), [f637](#), [f657](#), [f704](#),  
[n425](#), [n463](#), [o131](#), [p156](#), [p161](#), [w362](#),  
[A92](#), [A747](#), [A798](#), [A814](#), [C21](#), [O17](#),  
[P96](#), [P135](#), [P147](#), [P184](#), [P202](#), [P1423](#)
- \@secpenalty ..... [l17](#), [K36](#), [K50](#)
- \@sect ..... [K54](#), [K55](#)
- \@seqncr ..... [E408](#)
- \@set@curr@file@aux ..... [Q234](#)
- \@setckpt ..... [n377](#), [n384](#), [D22](#), [D77](#)
- \@setfloattypecounts [S1074](#), [S1224](#),  
[S1395](#), [S1476](#), [S1571](#), [S1692](#), [S2000](#)
- \@setfontsize ..... [w487](#)
- \@setfps ..... [L34](#)
- \@setfpsbit ..... [L73](#),  
[L75](#), [L77](#), [L85](#), [L143](#), [L146](#), [L149](#), [S2044](#)
- \@setmarks ..... [S2214](#), [S2216](#), [S2231](#)
- \@setminipage .....  
..... [G333](#), [L21](#), [L177](#), [L185](#), [L352](#)
- \@setnobreak ..... [L179](#), [L351](#)
- \@setpar ..... [k3](#), [F78](#)
- \@setref ..... [C10](#)
- \@setsize ..... [w487](#)
- \@settab ..... [H71](#), [H93](#)
- \@settodim ..... [q17](#)
- \@settopoint ..... [q22](#)
- \@setupverbvisiblespace .....  
.... [D459](#), [D470](#), [D482](#), [D499](#), [D514](#)
- \@sffamilyhook .... [w261](#), [w309](#), [w341](#)
- \@sharp ..... [H196](#), [H235](#), [H265](#),  
[H280](#), [H281](#), [H301](#), [H303](#), [H305](#), [H333](#)
- \@shipoutsetup ..... [S590](#)
- \@shortstack ..... [l132](#), [l133](#)

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=ltlooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \@show@... 89
- \@show@DeclareRobustCommand .... f497, f511, f556, f607, f610
- \@show@newcommand ..... 90, f498, f511, f564, f590, f607, f613
- \@show@newcommand@aux . 91, f590, f617
- \@showcommandlisthook ..... 88, 89, f494, f496, f504
- \@sline ..... I167, I179, I184, I269
- \@slowromancap ..... p110, p111
- \@spaces ..... j169
- \@specialoutput ..... S256
- \@specialpagefalse .. S97, S607, S665
- \@specialpagetrue ..... O9
- \@specialstyle ..... O9, S607, S665
- \@sptoken ..... f670, f680
- \@sqrt ..... E339
- \@ssect ..... K53, K112
- \@stackcr ..... I139, I142
- \@star@or@long ..... f62, f67, f114, f136, f142, f168, f177, f211
- \@startcolumn ..... S263, S270, S775
- \@startdblcolumn ..... S775, S2236, S2239, S2276, S2282
- \@startfield ..... H28, H46, H92, H104, H125, H133
- \@startline ..... H20, H57, H62, H68, H83, H154
- \@startpbox ..... H193, H236, H266, H332, H384, H386
- \@startsection ..... K39
- \@starttoc ..... K149
- \@stopfield ..... H32, H48, H86, H93, H125, H127, H140, H142, H154
- \@stopline ..... H30, H56, H85
- \@stpelt ..... p20, p23
- \@string@makeletter ..... 95, f691
- \@strip@args ..... o76
- \@strip@tex@ext ..... 200, n228, n238, n240, n245, n275
- \@strip@tex@ext@aux ..... n245, n276
- \@svector ..... I244, I259, I269
- \@sverb . 477, D486, D549, D558, D561
- \@svsec ..... K57, K60, K66, K78
- \@svsechd ..... K76, K101, K121
- \@swaptwoargs ..... n480, n482, P619, Q106, Q128
- \@sxverbatim ..... D394, D471, D478
- \@tabacckludge ..... o223, o225, o451, o452, A197, A204, A206
- \@tabacol ..... H178, H258
- \@tabarray ..... H170, H180, H181
- \@tabclassiv ..... H180, H330
- \@tabclassz ..... H179, H282
- \@tabcr ..... H56, H73
- \@tabfbox ..... H16, H80, H82
- \@tablab ..... H72, H126
- \@tabminus ..... H72, H117
- \@tabplus ..... H72, H110
- \@tabpush ..... H11, H77, H85, H140, H143, H145
- \@tabrj ..... H72, H124
- \@tabular ..... H174, H177, H178
- \@tabularcr ..... H180, H208
- \@tempa ..... C47, C48, C59, C60
- \@tempboxa .... h13, o69, q17, q18, F205, F211, F212, F214, G29, G30, G31, G32, G37, G38, G39, G40, G156, G186, G193, G203, G324, G347, G412, G413, G414, G421, G422, G423, G424, K138, K139, L322, L356, S305, S377, S382, S383, S424, S429, S430, S566, S626, S633, S634, S685, S692, S693, S721, S725, S737, S743, S750, S751, S752, S753, S757, S765, I304, I305, I447, I448, I486, I491, I496, I497, I515, I520, I527, I528, I542, I545, I552, I553, I614, I615, I620, I621, I630, I631, I638, I639, I724, I742, I780, I798
- \@tempcnta ..... h7, v771, v772, v773, v774, v778, H242, H243, H244, H245, L62, L68, L70, L79, L80, L90, L91, L131, L137, L139, L152, L153, L159, L160, P872, P874, P875, P876, P1003, P1005, P1006, P1007, P1117, P1119, P1120, P1121, S16, S18, S20, S934, S935, S936, S937, S957, S958, S959, S960, S982, S985, S1018, S1021, S1132, S1294, S1574, S1577, S1695, S1698, S1813, S1815, S1818, S1820, S1822, S1844, S2034, S2035, S2039, S2045, S2049, U160, U165, U166, U167, U262, U264, U265, U266, U273, U275, U276, U277, U283, U285, U286, U287, U294, U296, U297, U298, U324, U326, U327, U328, U350, U352, U353, U354, U360, U362, U363, U364, U393, U398, U399, U400, I187, I188, I214, I215, I216, I229, I230, I231, I232, I239, I240, I254, I255, I270, I271, I276, I278, I279, I280, I281, I282, I285, I287, I288, I289, I290, I291, I292, I293, I294, I295, I296, I335, I336, I337, I338, I339, I360, I361, I362, I363,

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- I364, I365, I392, I393, I394, I395,  
 I396, I414, I416, I418, I419, I421,  
 I423, I438, I439, I440, I442, I444,  
 I446, I448, I562, I567, I575, I579,  
 I616, I617, I618, I619, I632, I633,  
 I635, I636, I658, I659, I660, I661,  
 I662, I663, I711, I731, I771, I787  
 \@tempcntb ... [h7](#), v772, v776, v778,  
 L88, L89, L90, L157, L158, L159,  
 S17, S20, S21, S2045, S2046, S2047,  
 U161, U165, U394, U398, I279,  
 I280, I281, I283, I284, I285, I562,  
 I563, I567, I568, I575, I576, I579, I580  
 \@tempdima ... [h10](#),  
 r219, r224, E173, E176, E182, G43,  
 G44, G185, G186, G191, G192,  
 G193, G195, G246, G247, G322,  
 G326, G379, G382, G383, G410,  
 G412, G418, G421, H35, H36, H37,  
 H88, H89, H90, H91, H218, H219,  
 K196, K197, K219, K220, K233,  
 L196, L198, L218, L220, L258,  
 L259, L260, S229, S230, S231, S487,  
 S489, S535, S537, S538, S543, S548,  
 S552, S557, S561, S917, S920, S940,  
 S950, S962, S972, S1637, S1638,  
 S1641, S1642, S1762, S1763, S1767,  
 S1768, S1823, S1824, S1825, S1826,  
 S1829, S1832, S1835, S1837, S2152,  
 S2153, S2155, S2156, I210, I211,  
 I213, I214, I215, I216, I217, I218,  
 I437, I438, I439, I448, I487, I488,  
 I492, I493, I516, I517, I521, I523,  
 I543, I544, I546, I548, I617, I619,  
 I634, I636, I637, I657, I658, I659  
 \@tempdimb ...  
 . [h10](#), r220, r225, r595, r599, t133,  
 t134, t391, t414, t415, t424, t425,  
 t429, t447, t450, t453, t455, G249,  
 G250, G380, G383, G411, G413,  
 G419, G422, S940, S941, S942,  
 S943, S950, S962, S963, S964, S965,  
 S972, I211, I212, I357, I359, I362,  
 I365, I482, I484, I485, I510, I513,  
 I514, I539, I540, I541, I612, I613,  
 I622, I628, I629, I640, I648, I649, I654  
 \@tempdimc ...  
 . [h10](#), t408, t409, t411, t412, t414,  
 t415, G53, G54, G64, G65, G381,  
 G382, G383, I30, I31, I32, I33, I34,  
 I35, I60, I61, I63, I64, I332, I333, I334  
 \@tempskipa ... [h14](#), I44, I47, I48,  
 I285, I292, I294, I297, t135, t136,  
 F116, F117, F118, F150, F152,  
 F153, F154, F222, F223, F224,  
 K42, K44, K45, K50, K62, K63,  
 K88, K89, K91, K103, K104, K113,  
 K114, S1872, S1873, S1875, S1883  
 \@tempskipb [184](#), [h14](#), I220, I222, I224,  
 I227, I229, I243, I261, I283, I285,  
 I286, I290, I292, I294, I295, I318, I321  
 \@tempswafalse .....  
 ... a78, b262, n303, n350, o1497,  
 r94, r644, v313, v368, v432, v513,  
 v1033, v1039, D24, D79, D409,  
 D430, N13, P849, P865, P980,  
 P996, Q204, S988, S1024, S1580, S1701  
 \@tempswatruetrue a79, b268, n301, n306,  
 n348, n353, o1500, o1501, r97, r645,  
 r646, r649, r652, v316, v371, v435,  
 v516, v996, D110, D414, D435,  
 N13, P846, P977, Q204, S1582,  
 S1605, S1703, S1728, S2113, S2130  
 \@temptokena .....  
[464](#), [h16](#), D122, D126, D135, D148,  
 D149, O26, O27, O34, O35, O48, O49  
 \@testdef ..... D23, D78, [D108](#)  
 \@testfalse ..... S12, S14, S15  
 \@testfp ..... S882,  
 S902, S938, S961, [S2037](#), S2166, S2183  
 \@testopt ..... f33,  
 f69, [f89](#), f93, f138, I7, I8, I9, I10, E379  
 \@testpach ..... H270, H348  
 \@testpatch ..... [H348](#)  
 \@testtrue ..... S13, S21,  
 S356, S885, S904, S944, S966, S2041  
 \@testwrongwidth .....  
[S345](#), S883, S939, S1112, S1426, S1631  
 \@text@composite ... [o76](#), o1044, o1049  
 \@text@composite@x ..... [o76](#)  
 \@textbottom .....  
 ... O54, O56, S511, S549, S563, [S572](#)  
 \@textfloatsheight .. S476, S1087,  
 S1089, S1139, S1140, S1145, S1240,  
 S1242, S1302, S1304, S1310, [S1986](#)  
 \@textmin . L285, L286, L299, L300,  
 S112, S1089, S1093, S1096, S1097,  
 S1242, S1247, S1251, S1252, S1414,  
 S1499, S1598, S1600, S1616, S1720,  
 S1722, S1740, S2094, S2096, S2098  
 \@textsubscript ..... L400, [L408](#)  
 \@textsuperscript .. L377, L379, [L380](#)  
 \@texttop . O54, O56, S507, S530, [S572](#)  
 \@tf@r ..... i25, i26  
 \@tfor .....  
 . i25, n426, n464, n608, z88, G57,  
 G76, H268, L63, L132, I478, I506, I535  
 \@tforloop ..... i27, i28, i30

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx,  
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 Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \@thanks ..... K11, [K34](#)
- \@thefnmark [G357](#), [L376](#), [L377](#), [L429](#),  
[L434](#), [L444](#), [L453](#), [L458](#), [L469](#), [L474](#)
- \@thefoot ..... [S124](#),  
[S610](#), [S613](#), [S640](#), [S669](#), [S672](#), [S699](#)
- \@thehead ..... [S123](#),  
[S610](#), [S612](#), [S630](#), [S669](#), [S671](#), [S689](#)
- \@themargin ..... [S74](#),  
[S611](#), [S613](#), [S625](#), [S670](#), [S672](#), [S684](#)
- \@themark [O25](#), [O26](#), [O33](#), [O34](#), [O49](#), [O52](#)
- \@thirdofthree ..... [f206](#), [o197](#)
- \@thm ..... [J12](#), [J18](#), [J24](#), [J26](#)
- \@thmcounter ..... [J11](#), [J17](#), [J33](#)
- \@thmcountersep ..... [J10](#), [J33](#)
- \@title ..... [K7](#), [K31](#)
- \@tocrmarg ..... [K192](#), [K215](#)
- \@toodeep ..... [j203](#), [F36](#), [F232](#), [F243](#)
- \@toplist ..... [S64](#),  
[S384](#), [S385](#), [S431](#), [S432](#), [S716](#), [S722](#),  
[S732](#), [S733](#), [S1025](#), [S1037](#), [S1921](#), [S1948](#)
- \@topnewpage ..... [S199](#)
- \@topnum ..... [L271](#), [S105](#), [S1022](#),  
[S1023](#), [S1037](#), [S1041](#), [S1458](#), [S1463](#),  
[S1551](#), [S1558](#), [S1912](#), [S1939](#), [S1980](#)
- \@toproom ..... [L273](#),  
[S106](#), [S1025](#), [S1037](#), [S1913](#), [S1940](#)
- \@topsep ..... [F1](#), [F71](#), [F73](#), [F171](#)
- \@topsepadd .. [F1](#), [F59](#), [F61](#), [F71](#), [F124](#)
- \@totalleftmargin .....  
..... [496](#), [D405](#), [D427](#), [F9](#),  
[F53](#), [F54](#), [G275](#), [G296](#), [H35](#), [H76](#), [H81](#)
- \@trivlist ..... [F48](#), [F57](#), [F92](#)
- \@tryfcolumn .....  
[S778](#), [S798](#), [S816](#), [S832](#), [S2167](#), [S2184](#)
- \@trylist . [S841](#), [S844](#), [S877](#), [S897](#), [S919](#)
- \@ttfamilyhook .... [w261](#), [w314](#), [w342](#)
- \@twoclasseserror ..... [P429](#), [P835](#)
- \@twocolumnfalse ..... [S99](#), [S147](#)
- \@twocolumntrue ..... [S206](#)
- \@twoloadclasserror [P643](#), [P750](#), [P830](#)
- \@twosidefalse ..... [S100](#)
- \@typein ..... [f32](#), [f33](#), [f40](#), [f48](#)
- \@typeset@protect ..... [80](#),  
[f92](#), [f233](#), [f240](#), [f242](#), [o26](#), [o32](#), [o210](#),  
[o218](#), [w488](#), [D182](#), [D227](#), [D245](#), [U256](#)
- \@uclclist . [o1466](#), [o1467](#), [o1520](#), [U463](#)
- \@undefind ..... [I57](#), [I71](#), [I82](#),  
[I91](#), [I162](#), [I174](#), [I237](#), [I252](#), [I313](#), [I371](#)
- \@undefined ..... [a68](#), [a69](#), [a108](#),  
[a109](#), [a110](#), [a131](#), [a139](#), [a147](#), [a154](#),  
[a205](#), [a209](#), [a235](#), [a242](#), [a326](#), [a327](#),  
[b65](#), [b81](#), [b105](#), [b106](#), [b121](#), [b122](#),  
[b127](#), [b136](#), [b149](#), [b184](#), [b189](#), [b222](#),  
[b223](#), [b246](#), [b256](#), [b291](#), [b459](#), [b502](#),  
[b548](#), [b549](#), [c49](#), [c57](#), [d2](#), [d15](#), [d16](#),  
[d17](#), [d29](#), [d30](#), [d74](#), [d84](#), [d173](#), [d181](#),  
[d189](#), [d197](#), [d229](#), [d230](#), [d231](#), [d232](#),  
[d233](#), [d234](#), [d235](#), [d236](#), [d237](#), [d238](#),  
[d239](#), [d240](#), [d241](#), [d242](#), [d243](#), [d244](#),  
[d245](#), [d246](#), [d247](#), [d253](#), [f34](#), [f213](#),  
[f297](#), [f298](#), [f329](#), [f357](#), [f361](#), [f362](#),  
[f379](#), [f393](#), [f440](#), [f441](#), [f442](#), [f443](#),  
[f444](#), [f445](#), [f446](#), [f480](#), [f481](#), [f482](#),  
[f483](#), [f484](#), [f485](#), [f503](#), [f504](#), [f608](#),  
[f609](#), [f610](#), [f611](#), [f612](#), [f613](#), [f615](#),  
[f616](#), [f617](#), [f632](#), [f639](#), [f713](#), [f714](#),  
[f715](#), [f724](#), [j28](#), [l89](#), [l470](#), [l476](#), [n63](#),  
[n64](#), [n131](#), [n132](#), [n186](#), [n187](#), [n275](#),  
[n276](#), [n413](#), [n441](#), [n442](#), [n443](#), [n445](#),  
[n450](#), [n491](#), [o195](#), [o197](#), [o333](#), [o335](#),  
[o337](#), [o339](#), [o341](#), [o343](#), [o345](#), [o347](#),  
[o349](#), [o351](#), [o370](#), [o372](#), [o374](#), [o455](#),  
[o694](#), [o697](#), [p170](#), [r405](#), [r445](#), [r507](#),  
[r540](#), [r604](#), [r611](#), [s452](#), [s457](#), [s462](#),  
[s583](#), [s584](#), [s586](#), [s587](#), [s588](#), [s589](#),  
[s590](#), [s591](#), [s592](#), [s593](#), [s594](#), [s595](#),  
[s596](#), [s597](#), [s598](#), [s599](#), [s600](#), [s601](#),  
[s602](#), [s603](#), [s604](#), [t506](#), [t507](#), [u4](#), [u5](#),  
[u6](#), [u7](#), [u8](#), [u9](#), [u10](#), [u11](#), [u12](#), [u13](#),  
[u14](#), [u15](#), [u16](#), [u17](#), [u18](#), [u19](#), [u20](#),  
[v629](#), [v736](#), [w35](#), [w55](#), [w166](#), [w167](#),  
[w168](#), [w169](#), [w170](#), [w171](#), [w172](#),  
[w173](#), [w174](#), [w175](#), [w176](#), [w178](#),  
[w179](#), [w180](#), [w322](#), [w340](#), [w341](#),  
[w342](#), [w384](#), [w385](#), [w386](#), [w387](#),  
[w388](#), [w428](#), [w429](#), [w430](#), [w431](#),  
[w432](#), [w433](#), [w444](#), [w529](#), [x15](#), [x50](#),  
[x65](#), [z37](#), [z38](#), [z39](#), [z122](#), [A52](#), [A179](#),  
[A294](#), [A536](#), [A537](#), [A567](#), [A568](#),  
[A569](#), [A571](#), [A572](#), [A573](#), [A574](#),  
[A575](#), [A576](#), [A579](#), [A580](#), [A581](#),  
[A582](#), [A585](#), [A586](#), [A587](#), [A588](#),  
[A590](#), [A591](#), [A592](#), [A594](#), [A595](#),  
[A600](#), [A601](#), [A602](#), [A603](#), [A604](#),  
[A605](#), [A606](#), [A607](#), [A608](#), [A609](#),  
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[A615](#), [A617](#), [A618](#), [A620](#), [A621](#),  
[A622](#), [A623](#), [A624](#), [A625](#), [A626](#),  
[A627](#), [A628](#), [A629](#), [A631](#), [A632](#),  
[A633](#), [A634](#), [A635](#), [A636](#), [A637](#),  
[A638](#), [A639](#), [A641](#), [A642](#), [A643](#),  
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[A649](#), [A650](#), [A651](#), [A652](#), [A653](#),  
[A654](#), [A655](#), [A656](#), [A657](#), [A658](#),  
[A659](#), [A660](#), [A661](#), [A662](#), [A663](#),  
[A664](#), [A665](#), [A666](#), [A667](#), [A672](#),  
[A673](#), [A675](#), [A676](#), [A677](#), [A678](#),  
[A679](#), [A680](#), [A681](#), [A682](#), [A684](#),

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- A685, A687, A688, A690, A691,  
 A692, A693, A695, A696, A697,  
 A699, A701, A702, A703, A704,  
 A705, A706, A707, A709, A710,  
 A711, A712, A713, A714, A715,  
 A716, A717, C53, C69, C70, D102,  
 D103, D104, D142, D143, D144,  
 D145, D298, D299, D300, D301,  
 D453, D480, D481, D482, D483,  
 D516, E223, E267, E270, E313,  
 E326, G21, G111, G175, G231,  
 G373, G403, K230, L5, L405, L424,  
 N33, P4, P151, P262, P648, P679,  
 P681, P687, P740, P755, P756,  
 P771, P885, P964, P967, P1016,  
 P1095, P1098, P1108, P1109,  
 P1110, P1111, P1112, P1113,  
 P1114, P1185, P1188, P1204,  
 P1224, P1231, Q18, Q19, Q20, Q21,  
 Q94, Q187, Q188, Q231, Q357,  
 Q363, Q364, Q365, R348, R349,  
 R350, R351, R353, R354, R355,  
 R362, R363, R365, R367, R368,  
 R369, R371, R373, R374, R375,  
 R376, R380, R403, S36, S368, S369,  
 U10, U18, U25, U40, U59, U68,  
 U75, U93, U94, U203, U216, U228,  
 U249, U250, U251, U280, U282,  
 U321, U322, U341, U342, U343,  
 U344, U345, U346, U347, U348,  
 U349, U366, U382, U383, U384,  
 U432, U433, U493, U528, U529,  
 U530, U531, U532, I18, I467, I468  
 \@unexpandable@protect .....  
 ... [f210](#), [f245](#), [f251](#), [f256](#), [n212](#), [H264](#)  
 \@unknownoptionerror [P766](#), [P805](#), [P818](#)  
 \@unprocessedoptions .....  
 ..... [653](#), [655](#), [P394](#), [P472](#),  
[P648](#), [P680](#), [P681](#), [P737](#), [P741](#), [P820](#)  
 \@unused [f10](#), [f17](#), [j15](#), [j32](#), [j59](#), [n3](#), [P1209](#)  
 \@unusedoptionlist . [n20](#), [n22](#), [n89](#),  
[n91](#), [n146](#), [n148](#), [P11](#), [P324](#), [P325](#), [P401](#)  
 \@upline ..... [I297](#), [I298](#), [I304](#)  
 \@upordown . [I195](#), [I196](#), [I204](#), [I225](#), [I273](#)  
 \@upvector ..... [I268](#), [I304](#)  
 \@use@option ..... [P342](#),  
[P354](#), [P368](#), [P370](#), [P387](#), [P389](#), [P399](#)  
 \@use@text@encoding [o150](#), [A16](#), [A1050](#)  
 \@vbsphack ..... [I219](#)  
 \@verb ..... [D549](#), [D558](#), [D561](#)  
 \@verbatim ... [D399](#), [D445](#), [D469](#), [D478](#)  
 \@verbvisiblespacebox .....  
 ..... [D464](#), [D465](#), [D468](#), [D483](#)  
 \@vereq ..... [x457](#), [x458](#)  
 \@viipt ..... [r687](#)  
 \@vipt ..... [r686](#)  
 \@vpt ..... [r685](#)  
 \@vline ..... [I166](#), [I178](#), [I297](#)  
 \@vobeyspaces .....  
 ..... [D392](#), [D445](#), [D471](#), [D499](#), [D514](#), [D561](#)  
 \@vpt ..... [r684](#)  
 \@vspace ..... [I330](#)  
 \@vspace@calcify .....  
 ..... [I79](#), [I101](#), [I241](#), [I337](#), [I342](#),  
[I352](#), [I360](#), [D328](#), [E387](#), [H62](#), [H224](#), [I148](#)  
 \@vspacer ..... [I330](#)  
 \@vtryfc ..... [S847](#), [S855](#)  
 \@vvector ..... [I243](#), [I258](#), [I268](#)  
 \@warning ..... [j166](#)  
 \@wckptelt ..... [n378](#), [n381](#)  
 \@whiledim ..... [i7](#), [I123](#), [I203](#)  
 \@whilenoop ..... [i3](#)  
 \@whilenum ..... [i3](#),  
[H244](#), [I104](#), [I116](#), [I336](#), [I338](#), [I361](#),  
[I364](#), [I393](#), [I395](#), [I416](#), [I421](#), [I731](#), [I787](#)  
 \@whilesw ..... [i10](#), [S264](#),  
[S394](#), [S403](#), [S441](#), [S451](#), [S2237](#), [S2277](#)  
 \@whileswnoop ..... [i10](#)  
 \@wholewidth ..... [G141](#), [G143](#),  
[G144](#), [G146](#), [G148](#), [G149](#), [G150](#),  
[G151](#), [I2](#), [I126](#), [I129](#), [I131](#), [I299](#),  
[I302](#), [I350](#), [I359](#), [I406](#), [I413](#), [I565](#),  
[I578](#), [I590](#), [I600](#), [I679](#), [I680](#), [I728](#), [I784](#)  
 \@width ..... [b405](#), [f26](#),  
[I452](#), [o289](#), [o294](#), [t146](#), [x618](#), [G146](#),  
[G148](#), [G199](#), [G206](#), [G383](#), [G427](#),  
[H188](#), [H219](#), [H347](#), [H366](#), [L371](#),  
[S1851](#), [S2226](#), [S2260](#), [I227](#), [I299](#),  
[I302](#), [I325](#), [I333](#), [I350](#), [I359](#), [I384](#),  
[I392](#), [I406](#), [I413](#), [I565](#), [I578](#), [I728](#), [I784](#)  
 \@wrglossary ..... [M25](#), [M30](#)  
 \@wrindex ..... [M8](#), [M13](#)  
 \@writeckpt ..... [n330](#), [n363](#), [n375](#)  
 \@writefile ..... [463](#), [464](#), [464](#),  
[464](#), [596](#), [n34](#), [n103](#), [n161](#), [D129](#), [K183](#)  
 \@writesetup ..... [S590](#)  
 \@wrong@font@char [o161](#), [r508](#), [r542](#), [r555](#)  
 \@wtryfc ..... [S857](#), [S867](#)  
 \@x@protect ..... [f95](#), [f232](#)  
 \@x@sf ..... [L463](#), [L465](#)  
 \@xDeclareMathDelimiter .. [v801](#), [v857](#)  
 \@xaddvskip ..... [I219](#), [I244](#), [I262](#)  
 \@xarg . [I163](#), [I166](#), [I175](#), [I178](#), [I185](#),  
[I189](#), [I190](#), [I226](#), [I228](#), [I238](#), [I239](#),  
[I243](#), [I253](#), [I254](#), [I258](#), [I266](#), [I274](#), [I664](#)  
 \@xargarraycr .... [H205](#), [H214](#), [H218](#)  
 \@xargdef ..... [f70](#)  
 \@xarraycr ..... [H202](#), [H203](#)

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 L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx,  
 Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

|                                         |                                                                                                          |                                               |                                                                                                         |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------|
| <code>\@xbitor</code> .....             | S15, S17                                                                                                 | <code>\@ythm</code> .....                     | J28, J29                                                                                                |
| <code>\@xcentercr</code> .....          | D311, D318, D322                                                                                         | <code>\@ytryfc</code> .....                   | S890, S909, S913                                                                                        |
| <code>\@xdblarg</code> .....            | f683                                                                                                     | <code>\@yyarg</code> .....                    | I185, I186, I187, I190, I274, I664                                                                      |
| <code>\@xdblfloat</code> .....          | L264                                                                                                     | <code>\@ztryfc</code> .....                   | S918, S929                                                                                              |
| <code>\@xdim</code> .....               | I84, I93, I105, I107,<br>I117, I119, I668, I732, I733, I734,<br>I735, I741, I788, I789, I790, I791, I797 | <code>\@zend</code> .....                     | 117                                                                                                     |
| <code>\@xeqncr</code> .....             | E371                                                                                                     | <code>\accent@spacefactor</code> ...          | o70, o73, o74                                                                                           |
| <code>\@exxnoop</code> .....            | H238, H248                                                                                               | <code>\active@math@prime</code> .             | E237, E238, S588                                                                                        |
| <code>\@exxpast</code> .....            | H239, H240                                                                                               | <code>\add@accent</code> .....                | o65, o67                                                                                                |
| <code>\@xfloat</code> .....             | L28, L29, L34, L266                                                                                      | <code>\add@percent@to@temptokena</code> ..... | 465, D116, D132, D134, D143                                                                             |
| <code>\@xfootnote</code> .....          | L428, L431                                                                                               | <code>\add@unicode@accent</code> ...          | o1023, o1027                                                                                            |
| <code>\@xfootnotemark</code> .....      | L451, L455                                                                                               | <code>\addto@hook</code> .                    | r152, r154, r683, v295,<br>v391, v395, v412, v536, v542, v550,<br>v566, v569, v572, v1005, v1012, v1015 |
| <code>\@xfootnotenext</code> .....      | L468, L471                                                                                               | <code>\alloc@</code> .....                    | b90, b91, b92, b93, b94, b95, b96,<br>b97, b98, b99, b226, d22, d26, d38, r14                           |
| <code>\@xhline</code> .....             | H360, H361                                                                                               | <code>\alpha@elt</code> .....                 | v45, v299, v486, v588, v1004, v1005                                                                     |
| <code>\@xifnch</code> .....             | f671, f681                                                                                               | <code>\alpha@list</code> .....                | v41, v43, v308, v474, v486,<br>v531, v586, v587, v1000, v1006, v1007                                    |
| <code>\@xiip</code> .....               | r691, x164, x166, x167                                                                                   | <code>\atveryend@DEPRECATED</code> ..         | Q438, Q440                                                                                              |
| <code>\@xipt</code> .....               | r690, x163                                                                                               | <code>\best@size</code> .....                 | t392, t416, t422, t428                                                                                  |
| <code>\@xivpt</code> .....              | r692, x165, x167                                                                                         | <code>\bf@def@ult</code> .....                | w190                                                                                                    |
| <code>\@xmpar</code> .....              | L324, L325                                                                                               | <code>\bfdef@ult</code> .....                 | 304, 374, 381,<br>w135, w194, w205, w206, w207, w274                                                    |
| <code>\@xnewline</code> .....           | l60, l61, l72, l73, l93                                                                                  | <code>\bfdefault@previous</code> .....        | 374, 374, w201, w204, x106, x116                                                                        |
| <code>\@xnext</code> .....              | S10, S11                                                                                                 | <code>\bfseries@...</code> .....              | 369                                                                                                     |
| <code>\@xnthm</code> .....              | J5, J6                                                                                                   | <code>\bfseries@rm</code> ..                  | 369, 372, 380, w63,<br>w142, w145, w167, w205, w210, w282                                               |
| <code>\@xobeysp</code> .....            | 188, l420, D393, D394, D461, D465                                                                        | <code>\bfseries@rm@kernel</code> .....        | 372, w66, w142, w170                                                                                    |
| <code>\@xprocess@options</code> ..      | P333, P348, P360                                                                                         | <code>\bfseries@sf</code> .....               | 367, 372, w63,<br>w146, w149, w168, w206, w211, w283                                                    |
| <code>\@xpt</code> .....                | r689, x162, x165, x166                                                                                   | <code>\bfseries@sf@kernel</code> ..           | w67, w146, w171                                                                                         |
| <code>\@xssect</code> .....             | K86, K87, K123                                                                                           | <code>\bfseries@tt</code> .....               | 372, w63,<br>w150, w153, w169, w207, w212, w284                                                         |
| <code>\@xtabcr</code> .....             | H56, H57                                                                                                 | <code>\bfseries@tt@kernel</code> ..           | w68, w150, w172                                                                                         |
| <code>\@xtabularcr</code> .....         | H209, H210                                                                                               | <code>\bm@b</code> .....                      | G37                                                                                                     |
| <code>\@xthm</code> .....               | J28, J29                                                                                                 | <code>\bm@c</code> .....                      | G37                                                                                                     |
| <code>\@xtryfc</code> .....             | S844, S872                                                                                               | <code>\bm@l</code> .....                      | G37                                                                                                     |
| <code>\@xtypein</code> .....            | f33, f35, f42                                                                                            | <code>\bm@r</code> .....                      | G37                                                                                                     |
| <code>\@xverbatim</code> .....          | D394, D445                                                                                               | <code>\bm@s</code> .....                      | G37                                                                                                     |
| <code>\@xviip</code> .....              | r693, x166, x168                                                                                         | <code>\bm@t</code> .....                      | G37                                                                                                     |
| <code>\@xxDeclareMathDelimiter</code> . | v786, v790                                                                                               | <code>\bx@A</code> .....                      | S30, S57                                                                                                |
| <code>\@xxpt</code> .....               | r694, x167, x168                                                                                         | <code>\bx@AA</code> .....                     | S40                                                                                                     |
| <code>\@xxvpt</code> .....              | r695, x168                                                                                               | <code>\bx@B</code> .....                      | S30, S57                                                                                                |
| <code>\@xxxii</code> .....              | h2, o422,<br>o424, L89, L158, S879, S880, S899,<br>S900, S935, S936, S958, S959, S2003                   | <code>\bx@BB</code> .....                     | S40                                                                                                     |
| <code>\@xympar</code> .....             | L328, L332, L354                                                                                         | <code>\bx@C</code> .....                      | S30, S57                                                                                                |
| <code>\@yarg</code> .....               | I163, I167,<br>I175, I179, I185, I186, I195, I238,<br>I244, I253, I259, I268, I270, I297, I664           | <code>\bx@CC</code> .....                     | S40                                                                                                     |
| <code>\@yargarraycr</code> ....         | H206, H216, H220                                                                                         | <code>\bx@D</code> .....                      | S30, S57                                                                                                |
| <code>\@yargd@f</code> .....            | f97                                                                                                      | <code>\bx@DD</code> .....                     | S40                                                                                                     |
| <code>\@yargdef</code> .....            | f74, f84, f97, f113                                                                                      |                                               |                                                                                                         |
| <code>\@ydim</code> .....               | I85, I94, I105, I108,<br>I117, I119, I668, I736, I737, I738,<br>I739, I740, I792, I793, I794, I795, I796 |                                               |                                                                                                         |
| <code>\@yeqncr</code> .....             | E371                                                                                                     |                                               |                                                                                                         |
| <code>\@ympar</code> .....              | L324, L329                                                                                               |                                               |                                                                                                         |
| <code>\@ynthm</code> .....              | J5, J14                                                                                                  |                                               |                                                                                                         |

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|                                         |                         |                                                                                           |                                                                                                                                          |
|-----------------------------------------|-------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\bx@E</code> .....                | S30, S57                | <code>\c@page</code> .....                                                                | B3, B6, B7, S138, S1818                                                                                                                  |
| <code>\bx@EE</code> .....               | S40                     | <code>\c@secnumdepth</code> ..                                                            | K56, K71, K81, K140                                                                                                                      |
| <code>\bx@F</code> .....                | S31, S58                | <code>\c@tocdepth</code> .....                                                            | K140, K190, K213                                                                                                                         |
| <code>\bx@FF</code> .....               | S41                     | <code>\c@topnumber</code> .....                                                           | L267, L271, S2288                                                                                                                        |
| <code>\bx@G</code> .....                | S31, S58                | <code>\c@totalnumber</code> ...                                                           | L270, L276, S2295                                                                                                                        |
| <code>\bx@GG</code> .....               | S41                     | <code>\c@totalpages</code> .....                                                          | R272, R350                                                                                                                               |
| <code>\bx@H</code> .....                | S31, S58                | <code>\calculate@math@sizes</code> ...                                                    | r591, t173                                                                                                                               |
| <code>\bx@HH</code> .....               | S41                     | <code>\catcodetable@atletter</code> ....                                                  | d93, d238                                                                                                                                |
| <code>\bx@I</code> .....                | S31, S58                | <code>\catcodetable@initex</code> .....                                                   | d93, d235                                                                                                                                |
| <code>\bx@II</code> .....               | S41                     | <code>\catcodetable@latex</code> .....                                                    | d93, d237                                                                                                                                |
| <code>\bx@J</code> .....                | S31, S58                | <code>\catcodetable@string</code> .....                                                   | d93, d236                                                                                                                                |
| <code>\bx@JJ</code> .....               | S41                     | <code>\cdp@elt</code> .....                                                               | r96, r116,<br>r127, r128, r149, r152, r154, v233,<br>v315, v370, v434, v515, U370, U371                                                  |
| <code>\bx@K</code> .....                | S32, S59                | <code>\cdp@list</code> r98, r114, r128, r156, r157,<br>v251, v317, v372, v436, v517, U371 |                                                                                                                                          |
| <code>\bx@KK</code> .....               | S42                     | <code>\cf@encoding</code> .....                                                           | o34, o41,<br>o44, o51, o154, r256, r266, r276, r297                                                                                      |
| <code>\bx@L</code> .....                | S32, S59                | <code>\ch@ck</code> ....                                                                  | b206, b207, b208, b209,<br>b236, b248, b249, b250, b251, b279,<br>b281, b293, b294, b295, b296, b302,<br>P890, P911, P1021, P1042, P1134 |
| <code>\bx@LL</code> .....               | S42                     | <code>\char@if@alph</code> .....                                                          | f691                                                                                                                                     |
| <code>\bx@M</code> .....                | S32, S59                | <code>\chardef@text@cmd</code> .....                                                      | o3                                                                                                                                       |
| <code>\bx@MM</code> .....               | S42                     | <code>\check@command</code> .....                                                         | f177, f179                                                                                                                               |
| <code>\bx@N</code> .....                | S32, S59                | <code>\check@icl</code> z9, z44, z49, z55, z63, z70, z72                                  |                                                                                                                                          |
| <code>\bx@NN</code> .....               | S42                     | <code>\check@icr</code> z9, z44, z50, z56, z64, z73, z78                                  |                                                                                                                                          |
| <code>\bx@O</code> .....                | S33, S60                | <code>\check@mathfonts</code> ..                                                          | m5, o302, o328,<br>o360, o1220, r319, r321, t204, A584                                                                                   |
| <code>\bx@OO</code> .....               | S43                     | <code>\check@nocorr@</code> .....                                                         | z46                                                                                                                                      |
| <code>\bx@P</code> .....                | S33, S60                | <code>\check@range</code> .....                                                           | t333, t334                                                                                                                               |
| <code>\bx@PP</code> .....               | S43                     | <code>\check@single</code> .....                                                          | t332, t354                                                                                                                               |
| <code>\bx@Q</code> .....                | S33, S60                | <code>\cl@ckpt</code> .....                                                               | n378, p35                                                                                                                                |
| <code>\bx@QQ</code> .....               | S43                     | <code>\cl@page</code> .....                                                               | B4                                                                                                                                       |
| <code>\bx@R</code> .....                | S33, S60                | <code>\col@number</code> ....                                                             | S95, S148, S208, S220                                                                                                                    |
| <code>\bx@RR</code> .....               | S43                     | <code>\color@begingroup</code> .....                                                      | r614,<br>r674, E104, E134, G29, G89, G157,<br>G325, G358, H47, H51, L446, S491                                                           |
| <code>\bx@S</code> .....                | S38                     | <code>\color@endbox</code> .....                                                          | G89, L253,<br>L344, S224, S631, S641, S690, S700                                                                                         |
| <code>\bx@SS</code> .....               | S44                     | <code>\color@endgroup</code> .....                                                        | r619, r680,<br>E104, E134, G29, G89, G115, G136,<br>G159, G345, G361, H49, L449, S495                                                    |
| <code>\bx@T</code> .....                | S38                     | <code>\color@hbox</code> G89, S628, S638, S687, S697                                      |                                                                                                                                          |
| <code>\bx@TT</code> .....               | S44                     | <code>\color@setgroup</code> ...                                                          | G89, G115, G134                                                                                                                          |
| <code>\bx@U</code> .....                | S38                     | <code>\color@vbox</code> .....                                                            | .. G89, L96, L165, L335, L357, S215                                                                                                      |
| <code>\bx@UU</code> .....               | S44                     | <code>\conditionally@traceoff</code> ...                                                  | 169, j239                                                                                                                                |
| <code>\bx@V</code> .....                | S38                     | <code>\conditionally@traceon</code> .....                                                 | j239                                                                                                                                     |
| <code>\bx@VV</code> .....               | S44                     | <code>\contionally@traceon</code> .....                                                   | 169                                                                                                                                      |
| <code>\bx@W</code> .....                | S39                     | <code>\copy@kernel@robust@command</code> f531, f615                                       |                                                                                                                                          |
| <code>\bx@WW</code> .....               | S45                     | <code>\count@</code> .....                                                                | . a66, a179, a180, a181, a186, b41,<br>b191, b192, b197, b199, b205, b206,                                                               |
| <code>\bx@X</code> .....                | S39                     |                                                                                           |                                                                                                                                          |
| <code>\bx@XX</code> .....               | S45                     |                                                                                           |                                                                                                                                          |
| <code>\bx@Y</code> .....                | S39                     |                                                                                           |                                                                                                                                          |
| <code>\bx@YY</code> .....               | S45                     |                                                                                           |                                                                                                                                          |
| <code>\bx@Z</code> .....                | S39                     |                                                                                           |                                                                                                                                          |
| <code>\bx@ZZ</code> .....               | S25, S45, S55           |                                                                                           |                                                                                                                                          |
| <code>\c@bottomnumber</code> ..         | L269, L274, S2292       |                                                                                           |                                                                                                                                          |
| <code>\c@dbltopnumber</code>            | L268, L283, L297, S2299 |                                                                                           |                                                                                                                                          |
| <code>\c@enumi</code> .....             | F227                    |                                                                                           |                                                                                                                                          |
| <code>\c@enumii</code> .....            | F227                    |                                                                                           |                                                                                                                                          |
| <code>\c@enumiv</code> .....            | F227                    |                                                                                           |                                                                                                                                          |
| <code>\c@equation</code> .....          | E333, E366, E508        |                                                                                           |                                                                                                                                          |
| <code>\c@errorcontextlines</code> ..... | j163                    |                                                                                           |                                                                                                                                          |
| <code>\c@footnote</code> .....          | K12, L373, L457         |                                                                                           |                                                                                                                                          |
| <code>\c@mpfootnote</code> .....        | G329, L375              |                                                                                           |                                                                                                                                          |
| <code>\c@ncel</code> .....              | x461, x462              |                                                                                           |                                                                                                                                          |

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 v775, v776, v814, v815, v816, v822,  
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 v946, v947, z115, z118, P935, P937,  
 P938, P939, P1066, P1068, P1069,  
 P1070, P1155, P1157, P1158,  
 P1159, U172, U173, U180, U182,  
 U437, U438, U445, U447, I730,  
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 I786, I787, I788, I791, I792, I795, I799  
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 \default@mextra ..... u10, u89  
 \default@series ..... r129,  
 r162, r459, r473, r476, r497, r532, U372  
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 \define@mathgroup ..... u19, u135  
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 l383, l388, o426, o427, o429, o430,  
 o790, o791, r214, r216, r222, r235,  
 r238, r242, r594, r595, r596, r600,  
 t405, t406, t407, t408, t412, A123,  
 A125, A840, A842, E72, E73, E186,  
 E187, E188, E189, G420, G423,  
 H176, H177, S508, S510, S531, S533  
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 Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

`\e@alloc@whatsit@count` .....  
     ... [d69](#), [d181](#), [d182](#), [d183](#), [d187](#), [d243](#)  
`\e@ch@ck` ..... [b142](#), [b152](#), [d51](#), [d55](#)  
`\e@insert@top` . [b257](#), [b259](#), [b276](#), [b291](#)  
`\e@mathgroup@top` .....  
     ... [b79](#), [b124](#), [v56](#), [v145](#), [v176](#)  
`\em@currfont` ..... [383](#), [w406](#), [w417](#)  
`\em@force` .....  
     ... [383](#), [383](#), [w415](#), [w420](#), [w423](#), [w433](#)  
`\emfontdeclare@clist` . [382](#), [w396](#),  
     [w398](#), [w402](#), [w407](#), [w412](#), [w418](#), [w429](#)  
`\empty@sfcnt` .....  
     ... [t444](#), [t445](#), [t446](#), [t460](#), [t465](#), [t517](#)  
`\enc@update` [r257](#), [r259](#), [r275](#), [r278](#), [t129](#)  
`\end@dblfloat` ..... [L205](#)  
`\end@float` [613](#), [L189](#), [L227](#), [L243](#), [L359](#)  
`\err@rel@i` ..... [u12](#), [u99](#), [u132](#), [u136](#)  
`\error@fontshape` .....  
     [r453](#), [r468](#), [r493](#), [r528](#), [t107](#), [t481](#), [v254](#)  
`\et@xmaxfam` ..... [d22](#), [d26](#), [d30](#), [d38](#)  
`\et@xmaxregs` .....  
     [d29](#), [d31](#), [d32](#), [d33](#), [d34](#), [d35](#), [d36](#), [d37](#)  
`\every@math@size` ..... [r78](#), [t189](#), [t201](#)  
`\execute@size@function` .....  
     ... [t316](#), [t344](#), [t358](#), [t375](#)  
`\expand@font@defaults` .....  
     [118](#), [w83](#), [w190](#), [w200](#), [w220](#), [w270](#),  
     [w281](#), [w292](#), [w322](#), [w351](#), [A26](#), [A104](#)  
`expand@font@defaults` ..... [w252](#)  
`\external@font` .....  
     ... [t84](#), [t87](#), [t98](#), [t102](#), [t104](#),  
     [t345](#), [t359](#), [t421](#), [t455](#), [t523](#), [t525](#), [t527](#)  
`\extra@def` ..... [u9](#), [u84](#)  
`\extract@alph@from@version` .....  
     ... [r568](#), [r574](#), [v151](#), [v182](#), [v214](#)  
`\extract@default@composite` .....  
     ... [o1036](#), [o1043](#)  
`\extract@default@composite@a` ...  
     ... [o1045](#), [o1049](#)  
`\extract@default@composite@b` ...  
     ... [o1047](#), [o1051](#)  
`\extract@font` ..... [r349](#), [t81](#)  
`\extract@fontinfo` ..... [t312](#), [t319](#)  
`\extract@rangefontinfo` .....  
     ... [t329](#), [t336](#), [t355](#), [t388](#)  
`\extract@sizefn` ..... [t304](#), [t326](#)  
`\f@baselineskip` .....  
     ... [o1186](#), [r288](#), [r295](#), [r479](#),  
     [t119](#), [t136](#), [t140](#), [t155](#), [t169](#), [t180](#), [t194](#)  
`\f@depth` ..... [L291](#), [S345](#)  
`\f@encoding` [d252](#), [d267](#), [d275](#), [o178](#),  
     [r251](#), [r270](#), [r273](#), [r274](#), [r276](#), [r297](#),  
     [r329](#), [r334](#), [r353](#), [r355](#), [r357](#), [r362](#),  
     [r364](#), [r395](#), [r457](#), [r489](#), [r524](#), [s402](#),  
     [s406](#), [s536](#), [s540](#), [t91](#), [t261](#), [t471](#), [v239](#)  
`\f@family` ..... [276](#), [374](#), [380](#), [r279](#),  
     [r283](#), [r291](#), [r330](#), [r334](#), [r353](#), [r355](#),  
     [r357](#), [r362](#), [r364](#), [r396](#), [r475](#), [r500](#),  
     [r535](#), [s402](#), [s406](#), [s536](#), [s540](#), [t91](#),  
     [v239](#), [v270](#), [w86](#), [w113](#), [w114](#), [w210](#),  
     [w211](#), [w212](#), [w229](#), [w230](#), [w231](#),  
     [w282](#), [w283](#), [w284](#), [w293](#), [w294](#),  
     [w295](#), [w354](#), [w367](#), [w509](#), [A23](#),  
     [A27](#), [A29](#), [A31](#), [A84](#), [A87](#), [A101](#),  
     [A105](#), [A107](#), [A109](#), [A114](#), [A121](#),  
     [A806](#), [A809](#), [A823](#), [A832](#), [A838](#), [A1053](#)  
`\f@linespread` ..... [r291](#), [t118](#),  
     [t137](#), [t138](#), [t141](#), [t149](#), [t152](#), [t163](#), [t166](#)  
`\f@series` .. [293](#), [293](#), [302](#), [302](#), [303](#),  
     [304](#), [307](#), [370](#), [371](#), [372](#), [376](#), [379](#),  
     [380](#), [381](#), [m14](#), [r279](#), [r284](#), [r292](#),  
     [r331](#), [r334](#), [r476](#), [r497](#), [r532](#), [s386](#),  
     [s391](#), [s425](#), [s426](#), [s536](#), [s540](#), [s581](#),  
     [v271](#), [w79](#), [w95](#), [w97](#), [w101](#), [w102](#),  
     [w103](#), [w124](#), [w130](#), [w133](#), [w135](#),  
     [w157](#), [w370](#), [w374](#), [w510](#), [A7](#), [A48](#)  
`\f@shape` ..... [307](#),  
     [r279](#), [r285](#), [r293](#), [r332](#), [r334](#), [r477](#),  
     [r495](#), [r530](#), [s402](#), [s406](#), [s522](#), [s526](#),  
     [s533](#), [s538](#), [s541](#), [s544](#), [s582](#), [v272](#), [w511](#)  
`\f@size` .....  
     ... [o180](#), [o1185](#), [r88](#), [r288](#), [r294](#), [r333](#),  
     [r478](#), [r517](#), [r551](#), [r593](#), [r594](#), [r597](#),  
     [r598](#), [t119](#), [t121](#), [t134](#), [t154](#), [t169](#),  
     [t172](#), [t175](#), [t180](#), [t187](#), [t194](#), [t206](#),  
     [t209](#), [t215](#), [t221](#), [t238](#), [t239](#), [t242](#),  
     [t247](#), [t313](#), [t320](#), [t339](#), [t341](#), [t356](#),  
     [t407](#), [t409](#), [t411](#), [t427](#), [t428](#), [t433](#),  
     [t447](#), [t459](#), [t464](#), [t476](#), [t484](#), [t489](#),  
     [t515](#), [t529](#), [w406](#), [w415](#), [A123](#), [A840](#)  
`\f@user@size` ... [t427](#), [t432](#), [t476](#), [t489](#)  
`\famdef@ult` ..... [w276](#)  
`\filec@ntents` .....  
     ... [P844](#), [P847](#), [P850](#), [P861](#),  
     [P882](#), [P976](#), [P978](#), [P981](#), [P992](#),  
     [P1013](#), [P1106](#), [P1128](#), [P1216](#), [P1431](#)  
`\filec@ntents@checkdir` [P867](#), [P869](#),  
     [P883](#), [P998](#), [P1000](#), [P1014](#), [P1113](#)  
`\filec@ntents@force` [P863](#), [P994](#), [P1109](#)  
`\filec@ntents@noheader` .....  
     ... [P865](#), [P996](#), [P1111](#)  
`\filec@ntents@nosearch` .....  
     ... [P866](#), [P997](#), [P1112](#)  
`\filec@ntents@opt` ..... [P847](#),  
     [P850](#), [P852](#), [P978](#), [P981](#), [P983](#), [P1108](#)  
`\filec@ntents@OPTION` ..... [659](#)

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`\filec@ntents@overwrite` .....  
                                   P864, P995, P1110  
`\filec@ntents@where` . P868, P870,  
                                   P895, P999, P1001, P1026, P1114  
`\filename@area` .....  
                                   a246, a252, a259, a265, a272, a278,  
                                   a285, n503, n518, n528, n560, n561,  
                                   n565, n590, n593, n610, n622, n624  
`\filename@base` ..... a295, a302,  
                                   a315, n503, n518, n528, n560, n562,  
                                   n565, n590, n593, n617, n622, P626  
`\filename@dot` ..... a313, a319  
`\filename@dots` ..... a297, a299, a304  
`\filename@ext` .....  
                                   a294, a301, a311, a313, n504, n519,  
                                   n529, n556, n557, n560, n563, n565,  
                                   n586, n587, n590, n593, n618, P627  
`\filename@parse` a110, a242, n501,  
                                   n516, n526, n555, n585, n615, P625  
`\filename@path` .. a247, a248, a253,  
                                   a260, a261, a266, a273, a274, a279  
`\filename@simple` ..... a250, a263,  
                                   a276, a286, a290, a292, a307, a309  
`\finph@nt` .....  
                                   E104, E106, E110, E111, E119, E120  
`\finsm@sh` .....  
                                   E134, E136, E140, E141, E145, E146  
`\fix@penalty` ..... z101  
`\fixed@sfcnt` ..... t519, t520, t521  
`\fl@trace` ..... S240, S267,  
                                   S323, S351, S358, S379, S426, S472,  
                                   S525, S540, S541, S542, S543, S554,  
                                   S555, S556, S557, S558, S568, S781,  
                                   S800, S819, S837, S839, S978, S982,  
                                   S994, S995, S996, S997, S1003,  
                                   S1006, S1014, S1018, S1029, S1034,  
                                   S1039, S1040, S1041, S1042, S1049,  
                                   S1052, S1060, S1071, S1077, S1082,  
                                   S1087, S1093, S1094, S1099, S1104,  
                                   S1105, S1106, S1114, S1118, S1123,  
                                   S1127, S1132, S1143, S1144, S1146,  
                                   S1164, S1173, S1179, S1188, S1191,  
                                   S1197, S1207, S1211, S1221, S1227,  
                                   S1233, S1239, S1246, S1248, S1254,  
                                   S1259, S1261, S1263, S1271, S1276,  
                                   S1282, S1287, S1293, S1307, S1308,  
                                   S1311, S1332, S1341, S1347, S1356,  
                                   S1359, S1366, S1376, S1380, S1392,  
                                   S1398, S1403, S1408, S1412, S1416,  
                                   S1417, S1424, S1429, S1433, S1440,  
                                   S1449, S1453, S1457, S1458, S1462,  
                                   S1463, S1473, S1479, S1485, S1491,  
                                   S1495, S1501, S1503, S1511, S1516,  
                                   S1521, S1529, S1538, S1543, S1548,  
                                   S1550, S1555, S1557, S1568, S1574,  
                                   S1584, S1590, S1594, S1595, S1600,  
                                   S1601, S1607, S1610, S1611, S1612,  
                                   S1619, S1620, S1621, S1629, S1634,  
                                   S1646, S1647, S1654, S1657, S1665,  
                                   S1669, S1673, S1674, S1678, S1679,  
                                   S1689, S1695, S1705, S1711, S1715,  
                                   S1716, S1722, S1723, S1730, S1733,  
                                   S1734, S1735, S1743, S1744, S1745,  
                                   S1754, S1759, S1772, S1774, S1781,  
                                   S1784, S1793, S1797, S1801, S1802,  
                                   S1806, S1807, S1859, S1864, S1870,  
                                   S1880, S1887, S1897, S1993, S2006,  
                                   S2007, S2011, S2014, S2016, S2019,  
                                   S2022, S2024, S2065, S2072, S2077,  
                                   S2083, S2088, S2092, S2098, S2106,  
                                   S2108, S2115, S2120, S2125, S2127,  
                                   S2133, S2135, S2142, S2171, S2173,  
                                   S2188, S2190, S2204, S2229, S2233,  
                                   S2238, S2250, S2267, S2272, S2280  
`\fl@tracemessage` ..... S1897  
`\fl@traceval` ..... S1897  
`\float@count` .....  
                                   b51, b52, b53, b62, b188,  
                                   b205, b210, b212, b213, b222, b230  
`\fmtversion@topatch` .....  
                                   U490, U492, U504, U505, U517, U525  
`\font@info` ..... t99, t319, t388, t393  
`\font@name` ..... o179, o182,  
                                   r86, r194, r196, r325, r340, r516,  
                                   r550, t84, t88, t90, t105, t120, t123,  
                                   t126, t284, t285, t286, t287, t288, t293  
`\font@submax` .... t395, t424, t425,  
                                   D43, D45, D83, D85, U231, U233, U242  
`\fps@dbl` ..... L34  
`\frozen@everydisplay` .... r315, r321  
`\frozen@everymath` ..... r315, r319  
`\g@addto@macro` ... 122, f803, s613,  
                                   P776, P792, P793, R276, R282, R323  
`\G@refundefinedfalse` ..... 455, C5  
`\G@refundefinedtrue` C3, C12, N21, N44  
`\gen@sfcnt` ..... t456, t457, t458  
`\genb@sfcnt` ..... t461, t462, t463  
`\genb@x` ..... t464, t466  
`\genb@y` ..... t466  
`\get@cdp` ..... v388, v396, v429  
`\get@external@font` .... t83, t96, t490  
`\getanddefine@fonts` .. r563, r581,  
                                   t274, v59, v87, v132, v148, v179,  
                                   v210, v295, v359, v393, v395, v412,  
                                   v535, v536, v568, v569, v1011, v1012  
`\glb@currsize` ..... n43, n112,  
                                   n170, r312, t171, t206, t210, t216, t239  
`\glb@settings` .. r313, t171, t218, t249

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- \group@elt ..... v35,  
v293, v330, v331, v352, v356, v1043
- \group@list .....  
... v297, v337, v350, v355, v356,  
v385, v611, v659, v720, v805, v808,  
v859, v862, v928, v931, v998, v1049
- \h@false ..... E81
- \h@true ..... E82, E83
- \hb@xt@ .....  
b449, f29, o422, E197, E359, E421,  
E436, E448, E475, E505, G44, G65,  
G83, G186, G428, G432, G433,  
G434, H37, K203, K226, K233,  
S630, S640, S689, S699, S1843,  
S2223, S2224, S2228, S2255, S2256,  
S2262, I31, I43, I62, I74, I105,  
I117, I265, I299, I302, I305, I307,  
I314, I373, I452, I588, I598, I741, I797
- \hexnumber@ .... v632, v640, v675,  
v683, v704, v714, v740, v748, v756,  
v765, v768, v777, v778, v817, v825,  
v871, v879, v898, v899, v909, v910,  
v915, v941, v949, v954, v956, w495
- \hgl@ ..... b404, b405
- \hmode@bgroup .... o67, o75, o327,  
o356, o390, o396, o424, o435, o442,  
o473, o480, o483, o485, o493, o509,  
o724, o754, o760, o792, o799, o827,  
o830, o876, o1219, z7, A541, A548
- \hmode@start@before@group .....  
..... o68, o151, o153, o159, o184
- \if@afterindent ..... K124, K131
- \if@compatibility ..... P2, P430
- \if@endpe D203, D210, D262, D277, F138
- \if@eqnsw ..... E341, E406
- \if@fcolmade .... S95, S264, S394,  
S403, S441, S451, S779, S799, S817,  
S846, S926, S2170, S2187, S2237, S2277
- \if@files w ..... n7, n38,  
n107, n165, n298, n310, n331, n345,  
n357, n364, n376, D20, D49, D75,  
D89, K153, N4, N8, N19, N28, N36,  
N43, P893, P912, P1024, P1043, R285
- \if@firstamp ..... H251
- \if@firstcolumn ..... S95, S246,  
S279, S396, S444, S1815, S2201, S2246
- \if@font@series@context .....  
..... 380, w359, w378, w386
- \if@forced@series ..... s385, w78
- \if@ignore D4, D205, D212, D263, D278
- \if@includeinrelease c68, c71, c98, f757
- \if@inlabel ..... F28,  
F65, F102, F160, F183, S161, S188
- \if@insert .....  
S95, S1057, S1169, S1203, S1337,  
S1372, S1446, S1535, S1662, S1790
- \if@minipage . l239, l257, l276, l311,  
D404, D426, F149, G304, H79, L20
- \if@mparswitch ..... S95, S1817
- \if@multiplelabels ..... C31
- \if@negarg ..... I157, I198, I212, I273
- \if@newlist .....  
..... D446, F29, F33, F69, F78,  
F106, F166, S599, S644, S657, S703
- \if@nmbrrlist ..... F33, F201
- \if@no@font@opt .... u16, u110, u129
- \if@nobreak ..... I120, I147, I278,  
I313, n204, n216, F167, F192, G267,  
G288, K47, K128, L180, L349, O29,  
O37, S165, S192, S335, S1148, S1314
- \if@noitemarg ..... F32, F199
- \if@noparitem ..... F30, F157
- \if@noparlist ..... F31, F114
- \if@noskipsec ... I147, F58, G268,  
G289, K38, K40, K97, L350, S155, S182
- \if@ovb I427, I495, I526, I551, I562, I575
- \if@ovhline ..... I459, I590
- \if@ovl I427, I493, I522, I547, I592, I601
- \if@ovr I427, I492, I521, I546, I589, I599
- \if@ovt I427, I494, I525, I550, I567, I579
- \if@ovvline ..... I459, I565
- \if@partsw ..... n7, n302, n349
- \if@pboxsw ..... G259, G362
- \if@reversemargin ..... S101, S1820
- \if@reversemarginpar ..... S95
- \if@rjfield ..... H19, H33
- \if@specialpage .... S95, S606, S664
- \if@tempswa .....  
... a78, a79, a80, b270, h9, n308,  
n355, o1502, r99, r658, v318, v373,  
v437, v518, v1042, D51, D91, D411,  
D432, N52, P924, P1055, P1144,  
Q210, Q211, S990, S1026, S1626, S1751
- \if@test S12, S13, S887, S906, S946,  
S968, S1032, S1116, S1125, S1274,  
S1285, S1427, S1514, S1632, S1757
- \if@twocolumn .....  
... n28, n97, n154, L32, L210, L235,  
S95, S139, S267, S278, S395, S443,  
S467, S781, S837, S1814, S2172, S2189
- \if@twoside .... S95, S138, S609, S667
- \ifdt@p ..... E190, E192
- \IfFileExists@ .... n409, n410, n445
- \ifG@refundefined ..... C3, C4, C5
- \ifh@ ..... E76, E114, E123
- \ifin@ ..... o1518, o1521,  
u50, u52, v1, v22, v282, v384, v386,

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- v447, v460, v530, v532, v560, v612,  
 v626, v660, v672, v721, v737, v806,  
 v809, v830, v860, v863, v926, v929,  
 v932, v999, v1001, v1030, w145,  
 w149, w153, P182, P200, P341, P353  
 \ifmath@fonts ..... [r204](#), [t176](#)  
 \ifmaybe@ic ..... [z82](#), [z91](#)  
 \ifnot@nil ..... [t297](#), [t314](#), [t335](#)  
 \iftc@forced ..... [A780](#), [A791](#), [A1059](#)  
 \ifv@ ..... [E75](#), [E113](#), [E122](#)  
 \in@ ..... [304](#), [o1516](#), [o1519](#),  
     [u49](#), [u51](#), [v1](#), [v21](#), [v281](#), [v383](#), [v385](#),  
     [v443](#), [v456](#), [v529](#), [v531](#), [v558](#), [v610](#),  
     [v621](#), [v658](#), [v669](#), [v719](#), [v733](#), [v804](#),  
     [v807](#), [v827](#), [v858](#), [v861](#), [v923](#), [v927](#),  
     [v930](#), [v997](#), [v1000](#), [v1028](#), [w143](#),  
     [w147](#), [w151](#), [P181](#), [P198](#), [P338](#), [P352](#)  
 \in@ .....  
     [s432](#), [s433](#), [s435](#), [s436](#), [v5](#), [v6](#), [v7](#), [v9](#)  
 \in@false ..... [v10](#)  
 \in@true ..... [v12](#)  
 \init@restore@glb@settings .....  
     [t219](#), [t222](#), [t224](#)  
 \init@restore@version .....  
     [v62](#), [v91](#), [v108](#), [v123](#), [v124](#)  
 \init@series@setup .....  
     [s614](#), [s619](#), [w141](#), [w182](#)  
 \input@path ..... [10](#),  
     [677](#), [684](#), [688](#), [a109](#), [a131](#), [a133](#),  
     [a139](#), [a141](#), [a147](#), [a149](#), [a154](#), [a156](#),  
     [a166](#), [a233](#), [n413](#), [n427](#), [n450](#), [n465](#)  
 \insc@unt ..... [b37](#), [b51](#), [b52](#),  
     [b53](#), [b62](#), [b90](#), [b91](#), [b92](#), [b94](#), [b247](#),  
     [b248](#), [b249](#), [b250](#), [b251](#), [b252](#), [b263](#),  
     [b264](#), [b265](#), [b266](#), [b267](#), [b271](#), [b273](#),  
     [b292](#), [b293](#), [b294](#), [b295](#), [b296](#), [b297](#), [S61](#)  
 \install@mathalphabet .....  
     [r558](#), [r575](#), [r582](#), [v301](#),  
     [v304](#), [v390](#), [v391](#), [v488](#), [v540](#), [v543](#),  
     [v550](#), [v565](#), [v566](#), [v573](#), [v1013](#), [v1015](#)  
 \is@range ..... [t330](#), [t331](#)  
 \kernel@ifnextchar .....  
     [c76](#), [f71](#), [f90](#), [f140](#), [f668](#), [f683](#), [P279](#)  
 \kernel@make@fragile ..... [f365](#),  
     [f784](#), [f785](#), [f786](#), [f787](#), [f788](#), [f789](#),  
     [f790](#), [f791](#), [f792](#), [f793](#), [f794](#), [f795](#),  
     [f796](#), [f797](#), [f798](#), [f799](#), [l24](#), [l25](#), [l26](#),  
     [l27](#), [l28](#), [o172](#), [o173](#), [D380](#), [D381](#),  
     [D382](#), [E90](#), [E91](#), [E92](#), [E93](#), [E166](#),  
     [E167](#), [E168](#), [H160](#), [H161](#), [H162](#),  
     [K23](#), [K24](#), [K25](#), [K26](#), [K27](#), [O43](#),  
     [O44](#), [I823](#), [I824](#), [I825](#), [I826](#), [I827](#),  
     [I828](#), [I829](#), [I830](#), [I831](#), [I832](#), [I833](#), [I834](#)  
 \l@ngrel@x ..... [f64](#), [f65](#), [f66](#), [f110](#), [f157](#)  
 \l@nohyphenation .. [D408](#), [D548](#), [U216](#)  
 \last@fontshape [r491](#), [r509](#), [r526](#), [r543](#)  
 \leavevmode@ifvmode .....  
     [l461](#), [l462](#), [l470](#), [x624](#), [x626](#), [x628](#),  
     [x630](#), [E115](#), [E141](#), [E206](#), [E226](#), [E227](#)  
 \load@onefile@withoptions .....  
     [653](#), [P629](#), [P653](#), [P755](#)  
 \load@onefilewithoptions .....  
     [655](#), [P583](#), [P705](#), [P1231](#)  
 \lower@bound ..... [t340](#), [t341](#), [t352](#)  
 \ltx@sh@ft ..... [b441](#),  
     [o390](#), [o397](#), [o473](#), [o481](#), [o754](#), [o761](#)  
 \m@ne ..... [154](#), [b39](#)  
 \m@th ..... [b421](#), [b433](#),  
     [m13](#), [x337](#), [x459](#), [x461](#), [x462](#), [x465](#),  
     [x506](#), [x530](#), [x533](#), [x537](#), [x540](#), [x547](#),  
     [x550](#), [x557](#), [x560](#), [x642](#), [E68](#), [E71](#),  
     [E106](#), [E136](#), [E154](#), [E156](#), [E172](#),  
     [E191](#), [E350](#), [E436](#), [E448](#), [E475](#),  
     [E485](#), [G259](#), [G388](#), [H181](#), [K199](#),  
     [K222](#), [L376](#), [L385](#), [L392](#), [L413](#), [L420](#)  
 \makeph@nt ..... [E101](#), [E103](#)  
 \makesm@sh ..... [E131](#), [E133](#)  
 \mandatory@arg ..... [t368](#),  
     [t455](#), [t459](#), [t464](#), [t471](#), [t473](#), [t478](#),  
     [t480](#), [t485](#), [t487](#), [t500](#), [t516](#), [t523](#), [t525](#)  
 \math@bgroup ..... [344](#),  
     [r589](#), [t260](#), [t266](#), [v53](#), [v81](#), [v142](#),  
     [v164](#), [v173](#), [v204](#), [z130](#), [z131](#), [z138](#)  
 \math@egroup .....  
     [r589](#), [t264](#), [t265](#), [z131](#), [z132](#), [z139](#)  
 \math@fonts ..... [r559](#), [r564](#),  
     [t186](#), [t290](#), [v60](#), [v89](#), [v149](#), [v180](#), [v212](#)  
 \math@fontsfalse .....  
     [m7](#), [o302](#), [o329](#), [o360](#), [o1221](#),  
     [r77](#), [r206](#), [r216](#), [r239](#), [A124](#), [A584](#), [A841](#)  
 \math@fontstrue ..... [r204](#), [r601](#)  
 \math@version .....  
     [r7](#), [r307](#), [r563](#), [r567](#), [r569](#),  
     [r570](#), [r572](#), [t184](#), [v56](#), [v59](#), [v64](#), [v65](#),  
     [v69](#), [v84](#), [v88](#), [v93](#), [v94](#), [v98](#), [v111](#),  
     [v112](#), [v113](#), [v126](#), [v127](#), [v128](#), [v145](#),  
     [v148](#), [v152](#), [v154](#), [v156](#), [v160](#), [v176](#),  
     [v179](#), [v183](#), [v185](#), [v187](#), [v191](#), [v207](#),  
     [v211](#), [v215](#), [v217](#), [v219](#), [v223](#), [w467](#)  
 \mathchar@type . [v704](#), [v714](#), [v765](#),  
     [v768](#), [v777](#), [v793](#), [v898](#), [v909](#), [v972](#)  
 \mathph@nt ..... [E99](#), [E105](#)  
 \mathsm@sh ..... [E129](#), [E135](#)  
 \maybe@ic ..... [z63](#), [z64](#), [z83](#)  
 \maybe@ic@ ..... [z83](#)  
 \maybe@icfalse ..... [z97](#)  
 \maybe@ictrue ..... [z87](#)

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 q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx,  
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 Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- \maybe@load@fontshape . . . . .
- . 219, o71, s401, [s423](#), s535, s590, w99
- \mb@b . . . . . [G55](#), [G66](#), [G74](#), [G84](#)
- \mb@l . . . . . [G55](#),
- [G59](#), [G65](#), [G74](#), [G78](#), [G83](#), [I137](#), [I141](#)
- \mb@r . . . . . [G55](#),
- [G59](#), [G65](#), [G74](#), [G78](#), [G83](#), [I137](#), [I141](#)
- \mb@t . . . . . [G56](#), [G63](#), [G75](#), [G82](#)
- \md@def@ult . . . . . [w190](#)
- \mddef@ult . . . . .
- [w133](#), [w195](#), [w224](#), [w225](#), [w226](#), [w275](#)
- \mddefault@previous . . . . .
- . . . . . [w221](#), [w223](#), [x107](#), [x117](#)
- \mdseries@. . . . . [368](#), [373](#)
- \mdseries@rm . . . . .
- . . . . . [w63](#), [w173](#), [w224](#), [w229](#), [w293](#)
- \mdseries@sf . . . . .
- . . . . . [w63](#), [w174](#), [w225](#), [w230](#), [w294](#)
- \mdseries@tt . . . . .
- . . . . . [w63](#), [w175](#), [w226](#), [w231](#), [w295](#)
- \merge@font@series . . . . .
- . . . . . [302](#), [302](#), [s387](#), [s388](#), [s587](#)
- \merge@font@series@ . . . . . [s390](#), [s395](#), [s588](#)
- \merge@font@shape . . . . . [s521](#), [s523](#), [s595](#)
- \merge@font@shape@ . . . . . [s525](#), [s530](#), [s596](#)
- \n@space . . . . . [x625](#), [x627](#), [x629](#),
- [x631](#), [x636](#), [x637](#), [x638](#), [x639](#), [x642](#)
- \new@command . . . . .
- . . . . . [f67](#), [f68](#), [f121](#), [f155](#), [f174](#), [f229](#)
- \new@environment . . . . . [f136](#), [f137](#), [f149](#)
- \new@fontshape . . . . . [u2](#), [u4](#), [u22](#), [u24](#)
- \new@mathalphabet . . . . . [v441](#), [v462](#), [v473](#)
- \new@mathgroup . . . . .
- . . . . . [b78](#), [b80](#), [b98](#), [b100](#), [d27](#), [r14](#), [v321](#)
- \new@mathversion . . . . . [v20](#), [v278](#), [v280](#)
- \new@symbolfont . . . . . [v322](#), [v354](#)
- \newmathalphabet@ . . . . . [u14](#)
- \newmathalphabet@@ . . . . . [u109](#)
- \newmathalphabet@@@ . . . . . [u15](#), [u109](#)
- \nfss@catcodes [282](#), [r19](#), [r120](#), [r358](#),
- [r359](#), [r366](#), [r413](#), [x40](#), [x45](#), [x135](#), [S3](#)
- \nfss@text . . . . .
- . . . . . [o315](#), [o317](#), [w498](#), [z5](#), [z122](#), [C13](#)
- \no@alphabet@error [r4](#), [v300](#), [v302](#),
- [v478](#), [v479](#), [v493](#), [v502](#), [v588](#), [v589](#)
- \noaccents@ . . . . . [r604](#), [x129](#)
- \non@alpherr . . . . . [r583](#), [r585](#), [v72](#),
- [v101](#), [v117](#), [v163](#), [v194](#), [v226](#), [v1050](#)
- \not@base . . . . . [w533](#),
- [w537](#), [w538](#), [w539](#), [w540](#), [w541](#),
- [w542](#), [w543](#), [w544](#), [w545](#), [w546](#), [w547](#)
- \not@math@alphabet . . . . . [s450](#),
- [s455](#), [s460](#), [s551](#), [s555](#), [s558](#), [s561](#),
- [s564](#), [s567](#), [s570](#), [s573](#), [w5](#), [w8](#), [w11](#),
- [w14](#), [w17](#), [w20](#), [w23](#), [w26](#), [w29](#),
- [w199](#), [w219](#), [w238](#), [w243](#), [w248](#),
- [w280](#), [w291](#), [w302](#), [w307](#), [w312](#),
- [w325](#), [w328](#), [w331](#), [w334](#), [w337](#), [w447](#)
- \now@and@everyjob . . . . . [d207](#), [d213](#), [o994](#)
- \o@align . . . . . [b435](#),
- [o390](#), [o397](#), [o473](#), [o481](#), [o754](#), [o761](#)
- \on@line . . . . . [g196](#),
- [g416](#), [j8](#), [j15](#), [j165](#), [w79](#), [w82](#), [D166](#),
- [D221](#), [D238](#), [D271](#), [G131](#), [P637](#), [P744](#)
- \operator@font . . . . .
- . . . . . [x643](#), [E3](#), [E4](#), [E5](#), [E6](#), [E7](#), [E8](#),
- [E9](#), [E10](#), [E11](#), [E12](#), [E13](#), [E14](#), [E15](#),
- [E16](#), [E17](#), [E18](#), [E19](#), [E20](#), [E21](#), [E22](#),
- [E23](#), [E24](#), [E25](#), [E26](#), [E27](#), [E28](#), [E29](#),
- [E30](#), [E31](#), [E32](#), [E33](#), [E34](#), [E37](#), [E40](#)
- \optional@arg [t369](#), [t448](#), [t450](#), [t522](#), [t525](#)
- \outer@nobreak [L181](#), [L251](#), [L255](#), [L342](#)
- \p@ . . . . . [b309](#)
- \p@enum . . . . . [508](#)
- \p@equation . . . . . [E348](#), [E484](#)
- \p@selectfont . . . . . [t117](#)
- \par@deathcycles . . . . . [F56](#), [F77](#), [F79](#), [F80](#)
- \patch@level . . . . . [34](#), [c1](#), [c36](#), [c41](#),
- [c43](#), [c45](#), [c48](#), [c56](#), [U493](#), [U505](#), [U507](#)
- \ph@nt . . . . . [E81](#), [E82](#), [E83](#), [E97](#)
- \pickup@font . . . . . [o181](#), [r195](#),
- [r324](#), [r518](#), [r552](#), [t122](#), [t285](#), [t287](#), [t289](#)
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- \pkgcls@arg . . . . . [P1242](#), [P1365](#)
- \pkgcls@candidate . . . . . [P1229](#), [P1244](#),
- [P1320](#), [P1324](#), [P1328](#), [P1396](#), [P1399](#)
- \pkgcls@debug . . . . . [P1219](#),
- [P1235](#), [P1236](#), [P1237](#), [P1238](#),
- [P1239](#), [P1296](#), [P1297](#), [P1298](#),
- [P1299](#), [P1308](#), [P1313](#), [P1331](#),
- [P1340](#), [P1355](#), [P1389](#), [P1390](#), [P1391](#)
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- \pkgcls@parse@date@arg@ [P1260](#), [P1263](#)
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- . . . . . [P1270](#), [P1291](#)
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- [P1256](#), [P1264](#), [P1267](#), [P1268](#),

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| P1272, P1280, P1281, P1294,<br>P1302, P1317, P1319, P1349,<br>P1360, P1362, P1387, P1393, P1395                                        | \requested@test@context . . . . .<br>380, w353, w370, w374                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| \pkgcls@targetlabel . . . . .<br>669, P1224, P1257, P1277, P1292,<br>P1304, P1336, P1369, P1407, P1410                                 | \reserved@b . . . . . 357                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| \pkgcls@use@this@release . P1305,<br>P1322, P1324, P1337, P1347, P1399                                                                 | \reserved@a . 380, a121, a125, a126,<br>a195, a196, a199, a217, a221, a243,<br>a250, a253, a255, a256, a263, a266,<br>a268, a269, a276, a279, a281, a331,<br>a332, a333, b193, c13, c19, c34,<br>e25, e30, e67, e73, f107, f110, f123,<br>f124, f125, f127, f174, f175, f176,<br>f182, f183, f184, f185, f188, f208,<br>f216, f220, f278, f282, f316, f320,<br>f344, f348, f459, f467, f468, f516,<br>f519, f534, f536, f539, f548, f569,<br>f576, f598, f601, f665, f674, i33, i37,<br>j185, l409, l412, n213, n214, n236,<br>n245, n254, n306, n353, n414, n416,<br>n421, n423, n425, n431, n435, n451,<br>n453, n458, n460, n463, n469, n473,<br>n502, n505, n506, n508, n517, n520,<br>n527, n530, n552, n553, n554, n558,<br>n566, n583, n584, n588, n594, n616,<br>n620, n624, o81, o82, o86, o89, o97,<br>o107, o110, o119, o138, o143, o978,<br>o982, o1032, o1041, r30, r31, r32,<br>r41, r44, r47, r63, r66, r69, r105,<br>r108, r110, r147, r151, r360, r363,<br>r490, r491, r506, r509, r514, r525,<br>r526, r539, r543, r548, r575, r578,<br>r579, r587, s397, s398, s402, s403,<br>s418, s419, s531, s532, s536, s537,<br>t150, t152, t154, t164, t166, t169,<br>t298, t299, t312, t313, u53, u57,<br>v388, v397, v399, v443, v446, v456,<br>v459, v557, v559, v621, v625, v669,<br>v671, v732, v735, v827, v829, v923,<br>v925, v1027, v1029, v1045, v1047,<br>v1048, v1053, w37, w38, w109,<br>w110, w366, w367, z47, z48, z53,<br>z54, z65, z68, z88, z95, D109, D110,<br>D164, D165, D170, D219, D220,<br>D224, D236, D237, D241, D269,<br>D270, D274, D282, D283, E401,<br>E402, E403, E404, E406, G57, G58,<br>G61, G76, G77, G80, G126, G132,<br>H241, H245, H250, H269, H360,<br>H361, L29, L30, L32, L33, L63,<br>L67, L72, L74, L76, L78, L83,<br>L84, L132, L136, L142, L145, L148,<br>L151, P176, P184, P188, P194,<br>P202, P206, P287, P288, P289,<br>P290, P410, P414, P420, P424,<br>P486, P487, P490, P531, P535,<br>P547, P548, P550, P559, P563, |
| \prepare@family@series@update . . .<br>377, w76, w179,<br>w239, w244, w249, w303, w308, w313                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \prim@s . . . . . E237, E239, E251                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \prime@s . . . . . E238                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \process@table . n42, n111, n169, v232                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \protected . . . . . 145                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \protected@edef . . . . .<br>. 227, 361, 804, f243, p158, w396,<br>C43, C47, C55, C59, C66, G356,<br>K60, L443, U470, U479, U484, U485 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \protected@file@percent . . . . .<br>463, 464, 464, 596, D111,<br>D118, D133, D141, D142, K165, K172                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \protected@wlog P232, P234, P248, P262                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \protected@write . . . . .<br>. n203, n208, C33, K181, M14, M31                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \protected@xdef . . . . . f243,<br>K11, L429, L453, L469, P224, P243                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \provide@command . . . . . f168, f169                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \ps@empty . . . . . O10, U91                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \ps@plain . . . . . O13                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \q@curr@file . . . . .<br>P844, P884, P886, P891,<br>P919, P1015, P1017, P1022, P1050                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \quote@name . . . . . n400, n442                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \quote@name . . . . .<br>. n400, n428, n430, n439, n441, P1015                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \r@t . . . . . E66                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \reenable@package@load . . . . .<br>680, 692, 713, Q346, R381                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \reinstall@nfss@defs . . . . .<br>s553, s606, s612, s614, s618, s619, s622                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \rem@pt . . . . . r300                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \remove@angles . . . . . t301, t324                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \remove@nil . . . . . v36                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \remove@star . . . . . t301, t307                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \remove@tlig . . . . . o984, o986, o988,<br>o1013, o1018, o1054, o1056, o1058                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \remove@to@nnil r299, t301, t327, t440                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \renew@command . . f114, f115, f175, f183                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| \renew@environment . . . . . f142, f143                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

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 P903, P906, P907, P942, P943,  
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- \set@mathradical ..... [v276](#), [v950](#)
- \set@mathsymbol .... [v738](#), [v746](#), [v767](#)
- \set@simple@size@args .....  
  ..... [t302](#), [t315](#), [t322](#), [t343](#), [t357](#)
- \set@size@funct@args [t305](#), [t307](#), [t365](#)
- \set@size@funct@args@ ..... [t365](#)
- \set@target@series .....  
  ... [s399](#), [s404](#), [s407](#), [s410](#), [s424](#), [s591](#)
- \set@typeset@protect .....  
  ..... [f241](#), [f260](#), [H197](#),  
  [H235](#), [R45](#), [S603](#), [S605](#), [S661](#), [S663](#)
- \SetMathAlphabet@ ... [v450](#), [v519](#), [v528](#)
- \SetSymbolFont@ .... [v340](#), [v374](#), [v382](#)
- \sf@def@ult ..... [w190](#)
- \sf@size .....  
  . [m6](#), [o302](#), [r224](#), [r243](#), [r599](#), [t282](#),  
  [t286](#), [A584](#), [L385](#), [L392](#), [L413](#), [L420](#)
- \sfdef@ult ..... [374](#), [w192](#), [w211](#),  
  [w230](#), [w272](#), [w283](#), [w294](#), [A29](#), [A107](#)
- \sh@ft ..... [b439](#)
- \show@kernel@robust@command [f556](#), [f616](#)
- \sixt@on ..... [a71](#), [b16](#), [b64](#), [b66](#),  
  [b96](#), [b97](#), [b98](#), [d30](#), [r14](#), [v84](#), [v207](#),  
  [v616](#), [v618](#), [v664](#), [v666](#), [v725](#), [v727](#),  
  [v773](#), [v775](#), [v813](#), [v815](#), [v821](#), [v823](#),  
  [v867](#), [v869](#), [v875](#), [v877](#), [v936](#), [v938](#),  
  [v944](#), [v946](#), [L62](#), [L80](#), [L131](#), [L153](#),  
  [S1005](#), [S1051](#), [S1190](#), [S1358](#), [S1592](#),  
  [S1656](#), [S1713](#), [S1783](#), [S2009](#), [S2018](#),  
  [S2074](#), [S2090](#), [S2123](#), [I278](#), [I293](#), [I295](#)
- \sixt@on\_ ..... [154](#)
- \size@update ... [t128](#), [t139](#), [t158](#), [t160](#)
- \sizefn@info [t306](#), [t308](#), [t316](#), [t344](#), [t358](#)
- \skip@ ..... [b41](#), [b401](#),  
  [b403](#), [b404](#), [b406](#), [l83](#), [l442](#), [z105](#), [z108](#)
- \sp@n ..... [H379](#)
- \split@name .....  
  ... [r328](#), [r340](#), [r454](#), [r469](#), [t473](#), [t487](#)
- \ssf@size ..... [o328](#), [o360](#),  
  [o1220](#), [r225](#), [r244](#), [r600](#), [t282](#), [t288](#)
- \string@makeletter . [f691](#), [P626](#), [P627](#)
- \strip@prefix ..... [a111](#), [a228](#),  
  [a323](#), [f218](#), [f280](#), [f318](#), [f346](#), [f688](#), [f557](#)
- \strip@pt .....  
  .... [b443](#), [r216](#), [r222](#), [r223](#), [r224](#),  
  [r225](#), [r238](#), [r242](#), [r300](#), [r599](#), [r600](#), [t134](#)
- \sub@sfcnt ..... [t468](#), [t469](#), [t470](#), [t497](#)
- \subf@sfcnt ..... [t511](#), [t512](#), [t513](#)
- \subst@correction ..... [r85](#), [r91](#)
- \subst@fontshape ..... [u8](#), [u80](#)
- \subst@size ..... [t419](#)
- \sw@slant ..... [z91](#), [z101](#)
- \t@st@ic ..... [z90](#), [z94](#)
- \target@meta@family@value .....  
  ..... [w85](#), [w110](#), [w117](#), [w119](#)
- \target@series@value .. [370](#), [375](#),  
  [376](#), [w84](#), [w92](#), [w95](#), [w97](#), [w101](#),  
  [w102](#), [w103](#), [w126](#), [w132](#), [w133](#), [w135](#)
- \tc@check@accent .....  
  . [A130](#), [A180](#), [A181](#), [A182](#), [A183](#),  
  [A184](#), [A185](#), [A186](#), [A187](#), [A188](#),  
  [A189](#), [A190](#), [A191](#), [A192](#), [A193](#),  
  [A194](#), [A195](#), [A847](#), [A923](#), [A925](#), [A927](#)
- \tc@check@symbol ..... [A130](#),  
  [A214](#), [A215](#), [A216](#), [A217](#), [A218](#),  
  [A219](#), [A220](#), [A221](#), [A222](#), [A223](#),  
  [A224](#), [A225](#), [A226](#), [A227](#), [A228](#),  
  [A229](#), [A230](#), [A231](#), [A232](#), [A233](#),  
  [A234](#), [A235](#), [A236](#), [A237](#), [A238](#),  
  [A239](#), [A240](#), [A241](#), [A242](#), [A243](#),  
  [A244](#), [A245](#), [A246](#), [A247](#), [A248](#),  
  [A249](#), [A250](#), [A251](#), [A252](#), [A253](#),  
  [A254](#), [A255](#), [A256](#), [A257](#), [A258](#),  
  [A259](#), [A260](#), [A261](#), [A262](#), [A264](#),  
  [A265](#), [A266](#), [A267](#), [A268](#), [A269](#),  
  [A270](#), [A271](#), [A272](#), [A273](#), [A274](#),  
  [A275](#), [A276](#), [A277](#), [A278](#), [A279](#),

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lt hooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=lt space.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=lt pictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- A280, A281, A282, A283, A284,  
 A287, A288, A289, A290, A291,  
 A292, A293, [A847](#), A917, A919,  
 A921, A929, A931, A933, A935,  
 A937, A939, A941, A943, A945,  
 A947, A949, A951, A953, A955,  
 A957, A959, A961, A963, A965,  
 A967, A969, A971, A973, A975,  
 A977, A979, A981, A983, A985,  
 A987, A989, A991, A993, A995,  
 A997, A999, A1001, A1003, A1005,  
 A1007, A1009, A1011, A1013,  
 A1015, A1017, A1019, A1021,  
 A1023, A1025, A1027, A1029, A1031  
 \tc@error ..... [A131](#), [A827](#), [A848](#)  
 \tc@errorwarn .....  
 .... [A21](#), [A97](#), [A99](#), [A736](#), [A737](#),  
[A738](#), [A739](#), [A786](#), [A787](#), [A788](#), [A821](#)  
 \tc@fake@euro [A118](#), [A286](#), [A835](#), [A916](#)  
 \tc@forcedfalse ..... [A780](#)  
 \tc@forcedtrue ..... [A785](#)  
 \tc@oldstylesubst ..... [A16](#), [A20](#)  
 \tc@subst ..... [A98](#), [A130](#), [A820](#), [A847](#)  
 \tc@swap@accent ..... [A132](#), [A133](#)  
 \test@font@series@context .....  
 ..... [380](#), [w355](#), [w365](#), [w385](#)  
 \text@command ..... [z8](#), [z46](#)  
 \textfont@name ..... [t285](#), [t291](#)  
 \tf@size .. [r223](#), [r243](#), [r598](#), [t282](#), [t284](#)  
 \thr@@ ..... [b16](#), [b484](#), [t58](#), [t208](#),  
[t214](#), [t227](#), [t234](#), [t241](#), [t246](#), [E359](#),  
[E504](#), [F232](#), [F243](#), [U70](#), [U78](#), [I287](#),  
[I288](#), [I290](#), [I291](#), [I329](#), [I355](#), [I388](#), [I411](#)  
 \toks@ .....  
[304](#), [b41](#), [c81](#), [c85](#), [c88](#), [c93](#), [f805](#),  
[f806](#), [l408](#), [l409](#), [l414](#), [r148](#), [r152](#),  
[r154](#), [r157](#), [r221](#), [r226](#), [v6](#), [v7](#), [v291](#),  
[v295](#), [v301](#), [v304](#), [v309](#), [v355](#), [v356](#),  
[v358](#), [v359](#), [v389](#), [v391](#), [v395](#), [v412](#),  
[v415](#), [v474](#), [v486](#), [v487](#), [v488](#), [v534](#),  
[v536](#), [v542](#), [v550](#), [v554](#), [v566](#), [v569](#),  
[v572](#), [v580](#), [v582](#), [v1003](#), [v1005](#),  
[v1007](#), [v1010](#), [v1012](#), [v1015](#), [v1018](#),  
[v1050](#), [v1051](#), [P314](#), [P315](#), [P317](#),  
[P318](#), [S2209](#), [S2210](#), [S2211](#), [S2212](#)  
 \try@load@fontshape ... [303](#), [r343](#),  
[r351](#), [r397](#), [r502](#), [s423](#), [t474](#), [v240](#), [v257](#)  
 \try@simple@size ..... [t310](#), [t435](#)  
 \try@simples ..... [t393](#), [t399](#), [t403](#)  
 \try@size@range .... [t101](#), [t310](#), [t386](#)  
 \try@size@substitution ... [t103](#), [t390](#)  
 \tryif@simple ..... [t401](#), [t402](#)  
 \tryis@simple ..... [t402](#)  
 \tt@def@ult ..... [w190](#)  
 \ttdef@ult ..... [374](#), [w193](#), [w212](#),  
[w231](#), [w273](#), [w284](#), [w295](#), [A31](#), [A109](#)  
 \tw@ ..... [154](#), [b16](#)  
 \two@digits ..... [a86](#), [a185](#), [a186](#),  
[f2](#), [t466](#), [P840](#), [P931](#), [P1062](#), [P1151](#)  
 \type@restoreinfo ..... [t156](#), [t161](#)  
 \unclare@... ..... [713](#)  
 \undeclare@file@substitution ...  
 ..... [679](#), [Q174](#), [R378](#)  
 \unquote@name . [n394](#), [n400](#), [n443](#), [Q222](#)  
 \unrestored@protected@xdef .....  
 ... [f243](#), [L434](#), [L458](#), [L474](#), [O25](#), [O49](#)  
 \update@series@target@value ....  
 ..... [w87](#), [w108](#), [w180](#)  
 \update@ucl@with@cyrillic .....  
 ..... [o1465](#), [o1493](#), [o1523](#), [o1531](#)  
 \upper@bound ... [t337](#), [t338](#), [t339](#), [t352](#)  
 \use@mathgroup .....  
 ..... [r566](#), [r584](#), [r586](#), [t253](#), [v63](#),  
[v92](#), [v456](#), [v558](#), [v561](#), [v1028](#), [v1052](#)  
 \UTF@four@octets@noexpand [U469](#), [U478](#)  
 \UTF@three@octets@noexpand .....  
 ..... [U468](#), [U477](#)  
 \UTF@two@octets@noexpand [U467](#), [U476](#)  
 \UTFviii@four@octets [U308](#), [U313](#), [U319](#)  
 \UTFviii@four@octets@@ .. [U308](#), [U319](#)  
 \UTFviii@four@octets@combine . [U343](#)  
 \UTFviii@four@octets@noexpand . [U349](#)  
 \UTFviii@four@octets@string .. [U346](#)  
 \UTFviii@invalid ..... [U247](#), [U340](#)  
 \UTFviii@invalid@err [U305](#), [U310](#), [U316](#)  
 \UTFviii@invalid@err@@ .. [U305](#), [U316](#)  
 \UTFviii@three@octets .....  
 ..... [U307](#), [U312](#), [U318](#)  
 \UTFviii@three@octets@@ . [U307](#), [U318](#)  
 \UTFviii@three@octets@combine . [U342](#)  
 \UTFviii@three@octets@noexpand [U348](#)  
 \UTFviii@three@octets@string . [U345](#)  
 \UTFviii@two@octets [U306](#), [U311](#), [U317](#)  
 \UTFviii@two@octets@@ .. [U306](#), [U317](#)  
 \UTFviii@two@octets@combine .. [U341](#)  
 \UTFviii@two@octets@noexpand . [U347](#)  
 \UTFviii@two@octets@string ... [U344](#)  
 \UTFviii@undefined@err .....  
 ..... [U304](#), [U309](#), [U315](#)  
 \UTFviii@undefined@err@@ [U304](#), [U315](#)  
 \v@false ..... [E82](#)  
 \v@true ..... [E81](#), [E83](#)  
 \ver@{file}.<ext> ..... [652](#)  
 \verb@balance@group . [D494](#), [D496](#),  
[D509](#), [D511](#), [D524](#), [D526](#), [D532](#), [D533](#)  
 \verb@egroup ..... [D494](#), [D497](#),  
[D509](#), [D512](#), [D524](#), [D527](#), [D533](#), [D537](#)  
 \verb@eol@error .. [D534](#), [D546](#), [D556](#)

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 Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

|                                                                                                                                                                |                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\verbatim@font</code> .....                                                                                                                              | <code>\textasteriskcentered</code> .....                                                                                                      |
| ..... <a href="#">D418</a> , <a href="#">D439</a> , <a href="#">D447</a> , <a href="#">D547</a> , <a href="#">D557</a>                                         | ..... <a href="#">o267</a> , <a href="#">o711</a> , <a href="#">o858</a> , <a href="#">o1181</a> ,                                            |
| <code>\verbatim@nolig@list</code> ... <a href="#">D562</a> , <a href="#">D568</a>                                                                              | <a href="#">p130</a> , <a href="#">p136</a> , <a href="#">A140</a> , <a href="#">A503</a> , <a href="#">A558</a> , <a href="#">A870</a>       |
| <code>\version@elt</code> .....                                                                                                                                | <code>\textbackslash</code> ... <a href="#">o268</a> , <a href="#">o557</a> , <a href="#">o712</a> , <a href="#">o1062</a>                    |
| ..... <a href="#">v18</a> , <a href="#">v31</a> , <a href="#">v32</a> , <a href="#">v288</a> , <a href="#">v289</a> ,                                          | <code>\textbaht</code> .....                                                                                                                  |
| <a href="#">v338</a> , <a href="#">v358</a> , <a href="#">v449</a> , <a href="#">v487</a> , <a href="#">v579</a> , <a href="#">v1008</a>                       | <a href="#">o1131</a> , <a href="#">A235</a> , <a href="#">A641</a> , <a href="#">A1010</a> , <a href="#">A1011</a>                           |
| <code>\version@list</code> .....                                                                                                                               | <code>\textbar</code> .....                                                                                                                   |
| <a href="#">v16</a> ,                                                                                                                                          | <a href="#">o269</a> , <a href="#">o558</a> , <a href="#">o713</a> , <a href="#">o1066</a>                                                    |
| <a href="#">v21</a> , <a href="#">v32</a> , <a href="#">v281</a> , <a href="#">v289</a> , <a href="#">v343</a> , <a href="#">v364</a> ,                        | <code>\textbardbl</code> .....                                                                                                                |
| <a href="#">v383</a> , <a href="#">v454</a> , <a href="#">v499</a> , <a href="#">v529</a> , <a href="#">v584</a> , <a href="#">v1021</a>                       | .. <a href="#">o270</a> , <a href="#">o714</a> , <a href="#">o902</a> , <a href="#">o1136</a> , <a href="#">p135</a> ,                        |
| <code>\vgl@</code> .....                                                                                                                                       | <a href="#">A147</a> , <a href="#">A293</a> , <a href="#">A504</a> , <a href="#">A566</a> , <a href="#">A707</a> , <a href="#">A883</a>       |
| <a href="#">b401</a> , <a href="#">b402</a>                                                                                                                    | <code>\textbf</code> .....                                                                                                                    |
| <code>\voidb@x</code> .....                                                                                                                                    | <a href="#">369</a> , <a href="#">z19</a>                                                                                                     |
| <a href="#">b309</a> , <a href="#">b432</a> , <a href="#">q18</a>                                                                                              | <code>\textbigcircle</code> .....                                                                                                             |
| <code>\warn@rel@i</code> .....                                                                                                                                 | <a href="#">o723</a> ,                                                                                                                        |
| <a href="#">u5</a> , <a href="#">u25</a> ,                                                                                                                     | <a href="#">o875</a> , <a href="#">o1198</a> , <a href="#">A236</a> , <a href="#">A642</a> , <a href="#">A962</a> , <a href="#">A963</a>      |
| <a href="#">u29</a> , <a href="#">u81</a> , <a href="#">u85</a> , <a href="#">u90</a> , <a href="#">u95</a> , <a href="#">u119</a> , <a href="#">u140</a>      | <code>\textblank</code> .....                                                                                                                 |
| <code>\wrong@fontshape</code> .....                                                                                                                            | <a href="#">o855</a> , <a href="#">o1195</a> , <a href="#">A282</a> , <a href="#">A695</a> , <a href="#">A932</a> , <a href="#">A933</a>      |
| <a href="#">r347</a> , <a href="#">r484</a>                                                                                                                    | <code>\textborn</code> .....                                                                                                                  |
| <code>\x@protect</code> .....                                                                                                                                  | <a href="#">o888</a> , <a href="#">A237</a> , <a href="#">A314</a> , <a href="#">A643</a> , <a href="#">A968</a> , <a href="#">A969</a>       |
| <a href="#">f221</a> , <a href="#">f232</a> , <a href="#">f283</a> , <a href="#">f321</a> , <a href="#">f349</a> , <a href="#">f520</a> , <a href="#">f540</a> | <code>\textbraceleft</code> <a href="#">o271</a> , <a href="#">o308</a> , <a href="#">o559</a> , <a href="#">o715</a> , <a href="#">o1065</a> |
| <code>\xe@alloc@</code> .....                                                                                                                                  | <code>\textbraceright</code> .....                                                                                                            |
| <a href="#">U42</a> , <a href="#">U52</a>                                                                                                                      | ..... <a href="#">o272</a> , <a href="#">o309</a> , <a href="#">o560</a> , <a href="#">o716</a> , <a href="#">o1067</a>                       |
| <code>\xe@alloc@intercharclass</code> .....                                                                                                                    | <code>\textbrokenbar</code> .....                                                                                                             |
| <a href="#">U21</a>                                                                                                                                            | ..... <a href="#">o934</a> , <a href="#">o1074</a> , <a href="#">A148</a> , <a href="#">A567</a> , <a href="#">A892</a>                       |
| <code>\xe@ch@ck</code> .....                                                                                                                                   | <code>\textbullet</code> .....                                                                                                                |
| <a href="#">U43</a> , <a href="#">U47</a>                                                                                                                      | <a href="#">o273</a> , <a href="#">o717</a> ,                                                                                                 |
| <code>\z@</code> .....                                                                                                                                         | <a href="#">o904</a> , <a href="#">o1145</a> , <a href="#">A141</a> , <a href="#">A505</a> , <a href="#">A559</a> , <a href="#">A885</a>      |
| <a href="#">154</a> , <a href="#">b309</a>                                                                                                                     | <code>\textcapitalcompwordmark</code> .....                                                                                                   |
| <code>\z@skip</code> .....                                                                                                                                     | ..... <a href="#">o847</a> , <a href="#">A173</a> , <a href="#">A594</a> , <a href="#">A862</a>                                               |
| <a href="#">b309</a>                                                                                                                                           | <code>\textcelsius</code> .....                                                                                                               |
| <code>\zap@space</code> . <a href="#">n263</a> , <a href="#">n283</a> , <a href="#">w396</a> , <a href="#">N29</a> ,                                           | <a href="#">o905</a> ,                                                                                                                        |
| <a href="#">P177</a> , <a href="#">P291</a> , <a href="#">P301</a> , <a href="#">P409</a> , <a href="#">P509</a> ,                                             | <a href="#">o1164</a> , <a href="#">A149</a> , <a href="#">A287</a> , <a href="#">A568</a> , <a href="#">A701</a> , <a href="#">A886</a>      |
| <a href="#">P530</a> , <a href="#">P547</a> , <a href="#">P558</a> , <a href="#">P575</a> , <a href="#">P853</a> , <a href="#">P984</a>                        | <code>\textcent</code> . <a href="#">o930</a> , <a href="#">o1070</a> , <a href="#">A150</a> , <a href="#">A569</a> , <a href="#">A889</a>    |
| tex commands:                                                                                                                                                  | <code>\textcentoldstyle</code> .....                                                                                                          |
| <code>\tex_afterassignment:D</code> .....                                                                                                                      | <a href="#">432</a> , <a href="#">o907</a> ,                                                                                                  |
| <a href="#">R28</a>                                                                                                                                            | <a href="#">A238</a> , <a href="#">A319</a> , <a href="#">A322</a> , <a href="#">A644</a> , <a href="#">A984</a> , <a href="#">A985</a>       |
| <code>\tex_aftergroup:D</code> .....                                                                                                                           | <code>\textcircled</code> .....                                                                                                               |
| <a href="#">701</a> , <a href="#">R36</a>                                                                                                                      | .. <a href="#">241</a> , <a href="#">428</a> , <a href="#">o279</a> , <a href="#">o283</a> , <a href="#">o300</a> , <a href="#">o301</a> ,    |
| <code>\tex_currentgrouplevel:D</code> ..                                                                                                                       | <a href="#">o724</a> , <a href="#">o876</a> , <a href="#">A175</a> , <a href="#">A176</a> , <a href="#">A570</a> ,                            |
| <a href="#">R27</a> , <a href="#">R35</a>                                                                                                                      | <a href="#">A583</a> , <a href="#">A597</a> , <a href="#">A767</a> , <a href="#">A1032</a> , <a href="#">A1034</a>                            |
| <code>\tex_deadcycles:D</code> .....                                                                                                                           | <code>\textcircledP</code> .....                                                                                                              |
| <a href="#">R52</a>                                                                                                                                            | <a href="#">o941</a> ,                                                                                                                        |
| <code>\tex_escapechar:D</code> .....                                                                                                                           | <a href="#">o1166</a> , <a href="#">A239</a> , <a href="#">A645</a> , <a href="#">A1026</a> , <a href="#">A1027</a>                           |
| <a href="#">Q148</a> , <a href="#">Q157</a>                                                                                                                    | <code>\textcolonmonetary</code> .....                                                                                                         |
| <code>\tex_setbox:D</code> .....                                                                                                                               | <a href="#">o909</a> , <a href="#">o1157</a> , <a href="#">A266</a> , <a href="#">A675</a> , <a href="#">A986</a> , <a href="#">A987</a>      |
| <a href="#">R29</a>                                                                                                                                            | <code>\textcommaabove</code> .....                                                                                                            |
| <code>\tex_shipout:D</code> .....                                                                                                                              | <a href="#">o353</a> , <a href="#">o355</a> ,                                                                                                 |
| <a href="#">R88</a> , <a href="#">R295</a>                                                                                                                     | <a href="#">o369</a> , <a href="#">o370</a> , <a href="#">o455</a> , <a href="#">o456</a> , <a href="#">o694</a> , <a href="#">o695</a>       |
| <code>\tex_vss:D</code> .....                                                                                                                                  | <code>\textcommabelow</code> .....                                                                                                            |
| <a href="#">R258</a>                                                                                                                                           | <a href="#">o324</a> , <a href="#">o326</a> ,                                                                                                 |
| <code>\TexOrMath</code> .....                                                                                                                                  | <a href="#">o332</a> , <a href="#">o333</a> , <a href="#">o697</a> , <a href="#">o698</a> , <a href="#">o699</a> , <a href="#">o700</a> ,     |
| <a href="#">p127</a> , <a href="#">p143</a>                                                                                                                    | <a href="#">o701</a> , <a href="#">o702</a> , <a href="#">o703</a> , <a href="#">o704</a> , <a href="#">o705</a> , <a href="#">o706</a> ,     |
| <code>\textacutedbl</code> .....                                                                                                                               | <a href="#">o1218</a> , <a href="#">o1415</a> , <a href="#">o1416</a> , <a href="#">o1417</a> , <a href="#">o1418</a>                         |
| ..... <a href="#">o898</a> , <a href="#">o1128</a> , <a href="#">A226</a> , <a href="#">A631</a> , <a href="#">A880</a>                                        | <code>\textcompsubstdefault</code> .....                                                                                                      |
| <code>\textascendercompwordmark</code> .....                                                                                                                   | ..... <a href="#">A34</a> , <a href="#">A39</a> , <a href="#">A53</a> , <a href="#">A112</a> , <a href="#">A825</a>                           |
| ..... <a href="#">o848</a> , <a href="#">A174</a> , <a href="#">A595</a> , <a href="#">A863</a>                                                                | <code>\textcompwordmark</code> .....                                                                                                          |
| <code>\textasciicircum</code> .....                                                                                                                            | ..... <a href="#">226</a> , <a href="#">o290</a> , <a href="#">o291</a> , <a href="#">o561</a> , <a href="#">o1133</a>                        |
| ..... <a href="#">o948</a> , <a href="#">o1089</a> , <a href="#">A227</a> , <a href="#">A632</a> , <a href="#">A904</a>                                        | <code>\textcopyleft</code> .....                                                                                                              |
| <code>\textasciibreve</code> .....                                                                                                                             | <a href="#">o939</a> ,                                                                                                                        |
| ..... <a href="#">o896</a> , <a href="#">o1127</a> , <a href="#">A228</a> , <a href="#">A633</a> , <a href="#">A877</a>                                        | <a href="#">A240</a> , <a href="#">A295</a> , <a href="#">A646</a> , <a href="#">A1024</a> , <a href="#">A1025</a>                            |
| <code>\textasciicaron</code> .....                                                                                                                             | <code>\textcopyright</code> .....                                                                                                             |
| ..... <a href="#">o897</a> , <a href="#">o1126</a> , <a href="#">A229</a> , <a href="#">A634</a> , <a href="#">A878</a>                                        | <a href="#">o283</a> ,                                                                                                                        |
| <code>\textasciicircum</code> .....                                                                                                                            | <a href="#">o317</a> , <a href="#">o937</a> , <a href="#">o1077</a> , <a href="#">A151</a> , <a href="#">A570</a> , <a href="#">A895</a>      |
| <a href="#">o286</a> , <a href="#">o555</a> , <a href="#">o1063</a>                                                                                            |                                                                                                                                               |
| <code>\textasciidieresis</code> .....                                                                                                                          |                                                                                                                                               |
| ..... <a href="#">o936</a> , <a href="#">o1076</a> , <a href="#">A230</a> , <a href="#">A635</a> , <a href="#">A894</a>                                        |                                                                                                                                               |
| <code>\textasciigrave</code> .....                                                                                                                             |                                                                                                                                               |
| ..... <a href="#">o887</a> , <a href="#">o1055</a> , <a href="#">A231</a> , <a href="#">A636</a> , <a href="#">A875</a>                                        |                                                                                                                                               |
| <code>\textasciimacron</code> .....                                                                                                                            |                                                                                                                                               |
| ..... <a href="#">o943</a> , <a href="#">o1084</a> , <a href="#">A232</a> , <a href="#">A637</a> , <a href="#">A899</a>                                        |                                                                                                                                               |
| <code>\textasciitilde</code> .....                                                                                                                             |                                                                                                                                               |
| <a href="#">o287</a> , <a href="#">o556</a> , <a href="#">o1068</a>                                                                                            |                                                                                                                                               |

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- `\textcurrency` ..... o932, o1072,  
A277, A688, A762, A766, A920, A921
- `\textdagger` .....  
... o275, o312, o719, o900, o1143,  
p131, p137, A143, A507, A561, A881
- `\textdaggerdbl` .....  
... o274, o313, o718, o901, o1144,  
p132, p138, A142, A506, A560, A882
- `\textdblhyphen` .....  
o859, A242, A296, A648, A934, A935
- `\textdblhyphenchar` .....  
o895, A241, A297, A647, A980, A981
- `\textdegree` o944, o1085, A152, A571, A900
- `\textdied` .....  
o890, A243, A315, A649, A972, A973
- `\textdiscount` ..... o924,  
o1156, A244, A650, A1014, A1015
- `\textdiv` .. o961, o1110, A153, A572, A914
- `\textdivorced` .....  
o889, o1201, A245, A651, A970, A971
- `\textdollar` ... o255, o307, o435, o562,  
o792, o856, o1059, A134, A135,  
A539, A541, A868, A1040, A1042
- `\textdollaroldstyle` ..... 432, o906,  
A246, A320, A321, A652, A982, A983
- `\textdong` ..... o918,  
o1161, A267, A676, A1004, A1005
- `\textdownarrow` .....  
o886, o1176, A268, A677, A966, A967
- `\texteightoldstyle` .....  
o869, A216, A311, A620, A952, A953
- `\textellipsis` ..... o296, o321, o1146
- `\textemdash` . o256, o407, o563, o779, o1135
- `\textendash` . o257, o408, o564, o780, o1134
- `\textestimated` ..... o925,  
o1172, A274, A684, A765, A918, A919
- `\texteuro` ..... o959, o1162,  
A285, A286, A699, A763, A915, A916
- `\textexclamdown` .....  
o258, o409, o411, o565, o781, o1069
- `\textfiveoldstyle` .....  
o866, A217, A308, A621, A946, A947
- `\textfloatsep` .....  
... S728, S741, S2104, S2154, S2303
- `\textflorin` o908, o1124, A276, A687, A887
- `\textfont` ..... t291, E235
- `\textfouroldstyle` .....  
o865, A218, A307, A622, A944, A945
- `\textfraction` ..... S1917,  
S1920, S1944, S1947, S2096, S2297
- `\textfractionsolidus` .....  
... o860, o1153, A278, A690, A871
- `\textgravedbl` .....  
... o899, o1129, A233, A638, A879
- `\textgreater` ..... o281, o566, o734, o1061
- `\textguarani` .....  
o912, A247, A318, A653, A992, A993
- `\textheight` ..... n24,  
n25, n93, n94, n150, n151, L257,  
L258, L261, L287, L301, R295, S78,  
S225, S226, S274, S399, S447, S474,  
S645, S704, S763, S815, U89, U90
- `\texthyphen` ..... o260, o414, o568, o783
- `\texthyphenchar` .. o259, o413, o567, o782
- `\textinterrobang` ..... o916,  
o1152, A284, A697, A1000, A1001
- `\textinterrobangdown` ..... o917,  
o1202, A283, A696, A1002, A1003
- `\textit` ..... z21
- `\textlangle` .....  
o871, o1193, A264, A672, A956, A957
- `\textlbrackdbl` .....  
... o883, A214, A316, A617, A873
- `\textleaf` .....  
o891, A248, A300, A654, A974, A975
- `\textleftarrow` .....  
o853, o1173, A269, A678, A928, A929
- `\textlegacyasteriskcentered` A515, A710
- `\textlegacybardbl` ..... A515, A711
- `\textlegacybullet` ..... A515, A712
- `\textlegacydagger` ..... A515, A714
- `\textlegacydaggerdbl` ..... A515, A713
- `\textlegacyparagraph` ..... A515, A715
- `\textlegacyperiodcentered` .. A515, A716
- `\textlegacysection` ..... A515, A717
- `\textless` ..... o280, o569, o733, o1060
- `\textlira` .....  
o914, o1158, A270, A679, A996, A997
- `\textlnot` . o940, o1082, A154, A573, A897
- `\textlquill` ..... o928,  
o1154, A249, A655, A1020, A1021
- `\textmarried` .....  
o892, o1200, A250, A656, A976, A977
- `\textmd` ..... z19
- `\textmho` .....  
o874, o1171, A251, A657, A960, A961
- `\textminus` o872, o1177, A281, A693, A872
- `\textmu` ... o949, o1090, A280, A692, A905
- `\textmusicalnote` .....  
o893, o1199, A252, A658, A978, A979
- `\textnaira` .....  
o911, o1159, A253, A659, A990, A991
- `\textnineoldstyle` .....  
o870, A219, A312, A623, A954, A955
- `\textnormal` ..... z15
- `\textnumero` ..... o923,  
o1165, A275, A685, A1012, A1013
- `\textogonekcentered` .... o484, o692, o693

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lt hooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=lt space.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=lt pictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

|                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>\textohm</code> .....                                                                                                                                                                                                                                         | <code>\textreferencemark</code> ..... <a href="#">o952</a> ,<br><a href="#">o1151</a> , <a href="#">A258</a> , <a href="#">A664</a> , <a href="#">A1028</a> , <a href="#">A1029</a>                                                                                                                                                                                   |
| <a href="#">o882</a> , <a href="#">o1170</a> , <a href="#">A279</a> , <a href="#">A691</a> , <a href="#">A764</a> , <a href="#">A917</a>                                                                                                                            | <code>\textregistered</code> ..... <a href="#">o300</a> ,<br><a href="#">o301</a> , <a href="#">o942</a> , <a href="#">o1083</a> , <a href="#">A164</a> , <a href="#">A583</a> , <a href="#">A898</a>                                                                                                                                                                 |
| <code>\textonehalf</code> <a href="#">o957</a> , <a href="#">o1099</a> , <a href="#">A155</a> , <a href="#">A574</a> , <a href="#">A911</a>                                                                                                                         | <code>\textrightarrow</code> .....<br><a href="#">o854</a> , <a href="#">o1175</a> , <a href="#">A271</a> , <a href="#">A680</a> , <a href="#">A930</a> , <a href="#">A931</a>                                                                                                                                                                                        |
| <code>\textoneoldstyle</code> .....                                                                                                                                                                                                                                 | <code>\textrm</code> ..... <a href="#">z15</a>                                                                                                                                                                                                                                                                                                                        |
| <a href="#">o862</a> , <a href="#">A220</a> , <a href="#">A304</a> , <a href="#">A624</a> , <a href="#">A938</a> , <a href="#">A939</a>                                                                                                                             | <code>\textrquill</code> ..... <a href="#">o929</a> ,<br><a href="#">o1155</a> , <a href="#">A259</a> , <a href="#">A665</a> , <a href="#">A1022</a> , <a href="#">A1023</a>                                                                                                                                                                                          |
| <code>\textonequarter</code> .....                                                                                                                                                                                                                                  | <code>\textsc</code> ..... <a href="#">z21</a>                                                                                                                                                                                                                                                                                                                        |
| <a href="#">o956</a> , <a href="#">o1098</a> , <a href="#">A156</a> , <a href="#">A575</a> , <a href="#">A910</a>                                                                                                                                                   | <code>\textsection</code> ..... <a href="#">o278</a> ,<br><a href="#">o311</a> , <a href="#">o576</a> , <a href="#">o722</a> , <a href="#">o935</a> , <a href="#">o1075</a> ,<br><a href="#">p133</a> , <a href="#">A146</a> , <a href="#">A510</a> , <a href="#">A511</a> , <a href="#">A564</a> , <a href="#">A893</a>                                              |
| <code>\textonesuperior</code> ..... <a href="#">o953</a> ,<br><a href="#">o1093</a> , <a href="#">A157</a> , <a href="#">A288</a> , <a href="#">A576</a> , <a href="#">A702</a> , <a href="#">A908</a>                                                              | <code>\textservicemark</code> ..... <a href="#">o927</a> ,<br><a href="#">o1168</a> , <a href="#">A260</a> , <a href="#">A666</a> , <a href="#">A1018</a> , <a href="#">A1019</a>                                                                                                                                                                                     |
| <code>\textopenbullet</code> ..... <a href="#">o926</a> ,<br><a href="#">o1197</a> , <a href="#">A254</a> , <a href="#">A660</a> , <a href="#">A1016</a> , <a href="#">A1017</a>                                                                                    | <code>\textsevenoldstyle</code> .....<br><a href="#">o868</a> , <a href="#">A221</a> , <a href="#">A310</a> , <a href="#">A625</a> , <a href="#">A950</a> , <a href="#">A951</a>                                                                                                                                                                                      |
| <code>\textordfeminine</code> .....                                                                                                                                                                                                                                 | <code>\textsf</code> ..... <a href="#">z15</a>                                                                                                                                                                                                                                                                                                                        |
| <a href="#">o305</a> , <a href="#">o938</a> , <a href="#">o1078</a> , <a href="#">A158</a> , <a href="#">A577</a> , <a href="#">A896</a>                                                                                                                            | <code>\textsixoldstyle</code> .....<br><a href="#">o867</a> , <a href="#">A222</a> , <a href="#">A309</a> , <a href="#">A626</a> , <a href="#">A948</a> , <a href="#">A949</a>                                                                                                                                                                                        |
| <code>\textordmasculine</code> .....                                                                                                                                                                                                                                | <code>\textsl</code> ..... <a href="#">z21</a>                                                                                                                                                                                                                                                                                                                        |
| <a href="#">o306</a> , <a href="#">o954</a> , <a href="#">o1094</a> , <a href="#">A159</a> , <a href="#">A578</a> , <a href="#">A909</a>                                                                                                                            | <code>\textssc</code> ..... <a href="#">s459</a> , <a href="#">z31</a> , <a href="#">z39</a>                                                                                                                                                                                                                                                                          |
| <code>\TextOrMath</code> ... <a href="#">p130</a> , <a href="#">p131</a> , <a href="#">p132</a> , <a href="#">p133</a> ,<br><a href="#">p134</a> , <a href="#">p135</a> , <a href="#">p136</a> , <a href="#">p137</a> , <a href="#">p138</a> , <a href="#">p150</a> | <code>textssc</code> ..... <a href="#">z25</a>                                                                                                                                                                                                                                                                                                                        |
| <code>\textparagraph</code> <a href="#">o276</a> , <a href="#">o310</a> , <a href="#">o720</a> , <a href="#">o950</a> ,<br><a href="#">o1091</a> , <a href="#">p134</a> , <a href="#">A144</a> , <a href="#">A508</a> , <a href="#">A562</a> , <a href="#">A906</a> | <code>\textsterling</code> . <a href="#">o266</a> , <a href="#">o319</a> , <a href="#">o442</a> , <a href="#">o577</a> ,<br><a href="#">o799</a> , <a href="#">o931</a> , <a href="#">o1071</a> , <a href="#">A136</a> , <a href="#">A137</a> ,<br><a href="#">A540</a> , <a href="#">A548</a> , <a href="#">A890</a> , <a href="#">A1039</a> , <a href="#">A1041</a> |
| <code>\textperiodcentered</code> ..... <a href="#">o277</a> , <a href="#">o721</a> ,<br><a href="#">o951</a> , <a href="#">o1092</a> , <a href="#">A145</a> , <a href="#">A509</a> , <a href="#">A563</a> , <a href="#">A907</a>                                    | <code>\textstyle</code> ..... <a href="#">m15</a> , <a href="#">x469</a> , <a href="#">E63</a>                                                                                                                                                                                                                                                                        |
| <code>\textperthousand</code> .....                                                                                                                                                                                                                                 | <code>\textsubscript</code> ..... <a href="#">L395</a>                                                                                                                                                                                                                                                                                                                |
| <a href="#">o487</a> , <a href="#">o903</a> ,<br><a href="#">o1147</a> , <a href="#">A138</a> , <a href="#">A139</a> , <a href="#">A555</a> , <a href="#">A884</a> , <a href="#">A1043</a>                                                                          | <code>\textsuperscript</code> ..... <a href="#">o303</a> ,<br><a href="#">o305</a> , <a href="#">o306</a> , <a href="#">A577</a> , <a href="#">A578</a> , <a href="#">A589</a> , <a href="#">L378</a>                                                                                                                                                                 |
| <code>\textpeso</code> .....                                                                                                                                                                                                                                        | <code>\textsurd</code> ..... <a href="#">o955</a> ,<br><a href="#">o1192</a> , <a href="#">A261</a> , <a href="#">A667</a> , <a href="#">A1030</a> , <a href="#">A1031</a>                                                                                                                                                                                            |
| <a href="#">o913</a> , <a href="#">o1163</a> , <a href="#">A255</a> , <a href="#">A661</a> , <a href="#">A994</a> , <a href="#">A995</a>                                                                                                                            | <code>\textsw</code> ..... <a href="#">s454</a> , <a href="#">z30</a> , <a href="#">z38</a>                                                                                                                                                                                                                                                                           |
| <code>\textpilcrow</code> ..... <a href="#">o921</a> ,<br><a href="#">A256</a> , <a href="#">A313</a> , <a href="#">A662</a> , <a href="#">A1008</a> , <a href="#">A1009</a>                                                                                        | <code>textsw</code> ..... <a href="#">z25</a>                                                                                                                                                                                                                                                                                                                         |
| <code>\textpm</code> ... <a href="#">o945</a> , <a href="#">o1086</a> , <a href="#">A160</a> , <a href="#">A579</a> , <a href="#">A901</a>                                                                                                                          | <code>\TextSymbolUnavailable</code> ..... <a href="#">o3</a> , <a href="#">o752</a>                                                                                                                                                                                                                                                                                   |
| <code>\textquestiondown</code> .....                                                                                                                                                                                                                                | <code>\textthreeoldstyle</code> .....<br><a href="#">o864</a> , <a href="#">A223</a> , <a href="#">A306</a> , <a href="#">A627</a> , <a href="#">A942</a> , <a href="#">A943</a>                                                                                                                                                                                      |
| <a href="#">o261</a> , <a href="#">o410</a> , <a href="#">o412</a> , <a href="#">o570</a> , <a href="#">o784</a> , <a href="#">o1101</a>                                                                                                                            | <code>\textthreequarters</code> .....<br><a href="#">o958</a> , <a href="#">o1100</a> , <a href="#">A166</a> , <a href="#">A586</a> , <a href="#">A912</a>                                                                                                                                                                                                            |
| <code>\textquotedbl</code> ..... <a href="#">o573</a> , <a href="#">o1057</a>                                                                                                                                                                                       | <code>\textthreequartersemdash</code> ..... <a href="#">o852</a> ,<br><a href="#">A165</a> , <a href="#">A289</a> , <a href="#">A302</a> , <a href="#">A585</a> , <a href="#">A703</a> , <a href="#">A867</a>                                                                                                                                                         |
| <code>\textquotedblleft</code> .....                                                                                                                                                                                                                                | <code>\textthreesuperior</code> ..... <a href="#">o947</a> ,<br><a href="#">o1088</a> , <a href="#">A167</a> , <a href="#">A290</a> , <a href="#">A587</a> , <a href="#">A704</a> , <a href="#">A903</a>                                                                                                                                                              |
| <a href="#">o262</a> , <a href="#">o415</a> , <a href="#">o571</a> , <a href="#">o785</a> , <a href="#">o1140</a>                                                                                                                                                   | <code>\texttildelow</code> .....<br><a href="#">o894</a> , <a href="#">o1130</a> , <a href="#">A234</a> , <a href="#">A639</a> , <a href="#">A876</a>                                                                                                                                                                                                                 |
| <code>\textquotedblright</code> .....                                                                                                                                                                                                                               | <code>\texttimes</code> <a href="#">o960</a> , <a href="#">o1104</a> , <a href="#">A168</a> , <a href="#">A588</a> , <a href="#">A913</a>                                                                                                                                                                                                                             |
| <a href="#">o263</a> , <a href="#">o416</a> , <a href="#">o572</a> , <a href="#">o786</a> , <a href="#">o1141</a>                                                                                                                                                   | <code>\texttrademark</code> .....<br><a href="#">o303</a> , <a href="#">o919</a> , <a href="#">o1169</a> , <a href="#">A169</a> , <a href="#">A589</a> , <a href="#">A888</a>                                                                                                                                                                                         |
| <code>\textquoteleft</code> <a href="#">o264</a> , <a href="#">o417</a> , <a href="#">o574</a> , <a href="#">o787</a> , <a href="#">o1137</a>                                                                                                                       | <code>\texttt</code> ..... <a href="#">z15</a>                                                                                                                                                                                                                                                                                                                        |
| <code>\textquoteright</code> .....                                                                                                                                                                                                                                  | <code>\texttwelveudash</code> ..... <a href="#">o851</a> ,<br><a href="#">A170</a> , <a href="#">A291</a> , <a href="#">A301</a> , <a href="#">A590</a> , <a href="#">A705</a> , <a href="#">A866</a>                                                                                                                                                                 |
| <a href="#">o265</a> , <a href="#">o418</a> , <a href="#">o575</a> , <a href="#">o788</a> , <a href="#">o1138</a>                                                                                                                                                   | <code>\texttwooldstyle</code> .....<br><a href="#">o863</a> , <a href="#">A224</a> , <a href="#">A305</a> , <a href="#">A628</a> , <a href="#">A940</a> , <a href="#">A941</a>                                                                                                                                                                                        |
| <code>\textquotesingle</code> .....                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                       |
| <a href="#">o857</a> , <a href="#">o1053</a> , <a href="#">A161</a> , <a href="#">A580</a> , <a href="#">A869</a>                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\textquotestraightbase</code> .....                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                       |
| <a href="#">o849</a> , <a href="#">A162</a> , <a href="#">A298</a> , <a href="#">A581</a> , <a href="#">A864</a>                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\textquotestraightdblbase</code> .....                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                       |
| <a href="#">o850</a> , <a href="#">A163</a> , <a href="#">A299</a> , <a href="#">A582</a> , <a href="#">A865</a>                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\textrangle</code> .....                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                       |
| <a href="#">o873</a> , <a href="#">o1194</a> , <a href="#">A265</a> , <a href="#">A673</a> , <a href="#">A958</a> , <a href="#">A959</a>                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\textrbrackdbl</code> .....                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                       |
| <a href="#">o884</a> , <a href="#">A215</a> , <a href="#">A317</a> , <a href="#">A618</a> , <a href="#">A874</a>                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                       |
| <code>\textrecipe</code> .....                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                       |
| <a href="#">o915</a> , <a href="#">o1167</a> , <a href="#">A257</a> , <a href="#">A663</a> , <a href="#">A998</a> , <a href="#">A999</a>                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                       |

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lthooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=ltspace.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=ltpictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx



- `\texttwo superior` ..... o946,  
o1087, A171, A292, A591, A706, A902
- `\textulc` ..... s449, z28, z29, z35, z37
- `\textulc` ..... z25
- `\textunderscore` .. o288, o315, o578, o1064
- `\textup` ..... 306, z21
- `\textuparrow` .....  
o885, o1174, A272, A681, A964, A965
- `\textvisiblespace` .... o292, o579, o1196
- `\textwidth` .... n26, n95, n152, G327,  
L266, S79, S144, S201, S218, S630,  
S640, S689, S699, S2223, S2255, U90
- `\textwon` .....  
o910, o1160, A273, A682, A988, A989
- `\textyen` .. o933, o1073, A172, A592, A891
- `\textzerooldstyle` .....  
o861, A225, A303, A629, A936, A937
- `\TH` ..... o532, o1106, U483
- `\th` ..... o580, o1112, U483
- `\thanks` ..... 587
- `\thanks` ..... K10, K26
- `thebibliography` (environment) .... 624
- `\theenum` ..... 508
- `\theequation` .... E336, E348, E423, E484
- `\thefootnote` .... L372, L453, L458, L478
- `\thempfn` G329, L429, L434, L469, L474, L477
- `\thempfootnote` ..... G329, L374
- `\thepage` ..... 709, n210, B6,  
C14, C34, K164, K171, K177, M15,  
M32, N23, O14, S244, S275, S1827
- `\Theta` ..... x299
- `\theta` ..... x275
- `\thetotalpages` .... 698, 709, R274, R351
- `\thicklines` ..... I124
- `\thickmuskip` .... x646, E215, E217, E230
- `\thickspace` ..... E201
- `\thinlines` ..... I124, I816, I833
- `\thinmuskip` . x644, E207, E209, E225, E231
- `\thinspace` l460, l466, l467, E176, E201, E235
- `\thispagestyle` ..... O6
- `\tilde` ..... x519
- `\time` ..... a179, a183
- `\times` ..... x396
- `\title` ..... 587
- `\title` ..... K6, K7, K21, K23, K31
- tl commands:
  - `\c_empty_tl` ..... g768
  - `\c_novaluel_tl` ..... 123
  - `\c_space_tl` ..... Q411, Q414
  - `\tl_const:Nn` ..... R235, R240
  - `\tl_count:N` ..... Q404
  - `\tl_gclear:N` .... 143, 145, g82, g481
  - `\tl_gput_left:Nn` ..... g425
  - `\tl_gput_right:Nn` .....  
..... 135, g309, g427, g513, g765
  - `\tl_gremove_all:Nn` ..... 130
  - `\tl_gremove_once:Nn` .....  
..... 130, 130, g37, g37, g314
  - `\tl_gset:Nn` .....  
.... g69, g244, g247, g349, g355,  
g361, g365, g367, g421, g764, g911, Q51
  - `\tl_gset_eq:NN` ..... g918
  - `\tl_if_empty:N` ..... 147
  - `\tl_if_empty:NTF` .....  
... g78, g124, g126, g648, g761, g763
  - `\tl_if_empty:nTF` ..... g98, g111,  
g114, g237, g277, Q40, Q46, Q58, Q287
  - `\tl_if_empty_p:N` ..... g835, R293
  - `\tl_if_empty_p:n` ..... g260
  - `\tl_if_exist:N` ..... 145
  - `\tl_if_exist:NTF` .....  
..... g76, g771, g811, g819, g843
  - `\tl_if_in:NnTF` ..... g319
  - `\tl_if_novalue:nTF` ..... g89
  - `\tl_log:n` ..... g37, g39, g619
  - `\tl_new:N` .....  
... g25, g26, g27, g29, g30, g34, g49,  
g52, g61, g327, g443, g444, g445,  
Q8, Q9, Q10, Q11, Q59, R32, R129
  - `\tl_set:Nn` ..... g450, g455, g470,  
g471, g476, g477, g492, g499, g500,  
g544, g551, g821, Q80, Q81, Q82,  
Q83, R26, R134, R160, R185, R212
  - `\tl_set_eq:NN` ..... g480, g503
  - `\tl_show:n` ..... g37, g38, g624, g680
  - `\tl_to_str:n` .....  
... g138, g196, g324, g643, g699, Q438
  - `\tl_trim_spaces:n` ... g167, Q41, Q42
  - `\tl_trim_spaces_apply:nN` ..... g92
  - `\tl_use:N` ..... g610
  - `\tmspace` ..... 485, E201
  - `\to` ..... x440, x442
  - `\today` ..... a184, a188, a196, a199, K33
- token commands:
  - `\token_if_eq_meaning:NNTF` Q323, Q335
  - `\token_to_str:N` ..... g135, Q168
  - `\toks` ..... b31, b63,  
b95, d36, v485, v486, v496, v505, U533
  - `\toksdef` ..... b46, b63, b95, d222
  - `\tokszero` ..... d222
  - `\tolerance` b315, r618, r663, r678, O58, O66
  - `\top` ..... x320
  - `\topfigrule` ..... S727, S2325
  - `\topfraction` ..... L273, S2291
  - `\topmargin` ..... S71, S624, S683
  - `\topmark` ..... S2209, S2218
  - `\topsep` ..... 497, E489, F2, F59

**File Key:** a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltluatex.dtx, e=ltexpl.dtx, f=ltdefns.dtx, g=lt hooks.dtx, h=ltalloc.dtx, i=ltcntrl.dtx, j=lterror.dtx, k=ltpar.dtx, l=lt space.dtx, m=ltlogos.dtx, n=ltfiles.dtx, o=ltoutenc.dtx, p=ltcounts.dtx, q=ltlength.dtx, r=ltfssbas.dtx, s=ltfssaxes.dtx, t=ltfssstrc.dtx, u=ltfsscmp.dtx, v=ltfssdcl.dtx, w=ltfssini.dtx, x=fontdef.dtx, y=preload.dtx, z=ltfntcmd.dtx, A=lttextcomp.dtx, B=ltpageno.dtx, C=ltxref.dtx, D=ltmiscen.dtx, E=ltmath.dtx, F=ltlists.dtx, G=ltboxes.dtx, H=lttab.dtx, I=lt pictur.dtx, J=ltthm.dtx, K=ltsect.dtx, L=ltfloat.dtx, M=ltidxglo.dtx, N=ltbibl.dtx, O=ltpage.dtx, P=ltclass.dtx, Q=ltfilehook.dtx, R=ltshipout.dtx, S=ltoutput.dtx, T=ltthyphen.dtx, U=ltfinal.dtx

- `\topskip` [196](#), [b354](#), [n61](#), [n129](#), [n184](#), [F1](#), [S128](#)  
`\totalheight` ..... [G33](#), [G34](#), [G35](#)  
`totalpages` ..... [698](#)  
`\tracefloats` ..... [S1897](#)  
`\tracefloatsoff` ..... [S1897](#)  
`\tracefloatvals` ..... [S1897](#)  
`\traceoff` ..... [169](#)  
`\tracelon` ..... [169](#)  
`\tracingall` ..... [169](#), [b457](#)  
`\tracingassigns` ..... [b486](#), [b519](#)  
`\tracingcommands` .....  
    ..... [b468](#), [b484](#), [b493](#), [b505](#), [b522](#)  
`\tracingfonts` .....  
    .... [t17](#), [t54](#), [t58](#), [t86](#), [t116](#), [t125](#),  
    [t148](#), [t178](#), [t192](#), [t208](#), [t214](#), [t227](#),  
    [t234](#), [t241](#), [t246](#), [t255](#), [t268](#), [t276](#), [t279](#)  
`\tracinggroups` ..... [b477](#), [b530](#)  
`\tracingifs` ..... [b478](#), [b529](#)  
`\tracinglostchars` .....  
    .. [b331](#), [b463](#), [b475](#), [b494](#), [b513](#), [b533](#)  
`\tracingmacros` [b467](#), [b483](#), [b495](#), [b512](#), [b532](#)  
`\tracingnesting` ..... [b480](#), [b527](#)  
`\tracingnone` ..... [b499](#)  
`\tracingoff` ..... [t116](#), [t276](#)  
`\tracingon` ..... [t117](#), [t277](#)  
`\tracingonline` [b452](#), [b504](#), [b521](#), [b542](#), [r627](#)  
`\tracingoutput` ... [b453](#), [b508](#), [b525](#), [b539](#)  
`\tracingpages` [b462](#), [b474](#), [b494](#), [b514](#), [b534](#)  
`\tracingparagraphs` .....  
    ..... [b464](#), [b476](#), [b495](#), [b511](#), [b531](#)  
`\tracingrestores` .....  
    ..... [b469](#), [b485](#), [b495](#), [b510](#), [b520](#)  
`\tracingscantokens` [b459](#), [b479](#), [b502](#), [b528](#)  
`\tracingstats` .....  
    ... [b461](#), [b473](#), [b493](#), [b515](#), [b535](#), [U2](#)  
`\triangle` ..... [x322](#)  
`\triangleleft` ..... [x358](#), [x482](#)  
`\triangleright` ..... [x359](#), [x482](#)  
`trivlist` (environment) ..... [F89](#)  
`\trivlist` .... [504](#), [D337](#), [D387](#), [D389](#),  
    [D403](#), [D425](#), [E474](#), [F89](#), [H78](#), [J35](#), [J37](#)  
`\ttdefault` ..... [w12](#), [w151](#),  
    [w193](#), [w249](#), [w273](#), [w313](#), [w338](#), [x50](#)  
`\ttfamily` .. [118](#), [377](#), [w10](#), [w11](#), [w242](#),  
    [w311](#), [w312](#), [w336](#), [w337](#), [z17](#), [D447](#)  
`ttfamily` ..... [w252](#)  
`\ttsubstdefault` .... [x20](#), [x32](#), [A32](#), [A110](#)  
`\twocolumn` ..... [S199](#)  
`\twocolumn[]` ..... [196](#)  
`\typein` ..... [71](#), [71](#)  
`\typein` ..... [f31](#)  
`\typeout` ..... [71](#)  
`\typeout` ..... [91](#),  
    [697](#), [a73](#), [a116](#), [a172](#), [a197](#), [a199](#),  
    [a211](#), [a226](#), [a233](#), [a244](#), [a257](#), [a270](#),  
    [a283](#), [a321](#), [c21](#), [c38](#), [c43](#), [c48](#), [f3](#),  
    [f36](#), [f43](#), [f557](#), [f558](#), [f591](#), [f592](#), [f597](#),  
    [j74](#), [n202](#), [n534](#), [n535](#), [n541](#), [n575](#),  
    [n613](#), [n623](#), [n626](#), [r337](#), [w73](#), [w413](#),  
    [w557](#), [w567](#), [w577](#), [x9](#), [x125](#), [M8](#),  
    [M25](#), [P230](#), [P246](#), [P258](#), [P1220](#),  
    [P1419](#), [P1422](#), [R66](#), [R80](#), [S1898](#),  
    [U209](#), [U487](#), [U494](#), [U506](#), [U507](#), [U515](#)
- U**
- `\u` ..... [o237](#), [o386](#), [o469](#),  
    [o583](#), [o590](#), [o610](#), [o617](#), [o748](#), [o1208](#),  
    [o1283](#), [o1284](#), [o1299](#), [o1300](#), [o1309](#),  
    [o1310](#), [o1323](#), [o1324](#), [o1325](#), [o1349](#),  
    [o1350](#), [o1375](#), [o1376](#), [A181](#), [A198](#)  
`\uccode` ..... [U173](#),  
    [U181](#), [U188](#), [U190](#), [U193](#), [U195](#),  
    [U438](#), [U446](#), [U453](#), [U455](#), [U458](#), [U460](#)  
`\Ucharcat` ..... [w474](#)  
`\uchyph` ..... [b332](#)  
`\ulcdefault` ..... [s449](#), [s599](#)  
`\ulcshape` .....  
    [305](#), [s449](#), [s566](#), [s567](#), [s598](#), [w399](#), [z29](#)  
`\Umathcode` [b127](#), [d30](#), [l476](#), [x15](#), [x50](#), [x65](#),  
    [A179](#), [A294](#), [D453](#), [U93](#), [U249](#), [U432](#)  
`\unboldmath` ..... [w465](#)  
`\UndeclareTextCommand` [427](#), [o191](#), [A135](#),  
    [A137](#), [A139](#), [A263](#), [A511](#), [A1039](#),  
    [A1040](#), [A1041](#), [A1042](#), [A1043](#), [A1044](#)  
`\undefined` .... [a9](#), [a11](#), [a17](#), [a57](#), [p92](#),  
    [p93](#), [p94](#), [p95](#), [p96](#), [p97](#), [p98](#), [p99](#),  
    [x116](#), [x117](#), [U101](#), [U113](#), [U114](#), [U134](#)  
`\undefinedpagestyle` ..... [O4](#), [O8](#)  
`\underbar` ..... [b422](#), [f778](#), [f799](#)  
`\underbrace` ..... [x540](#)  
`\underline` ..... [512](#)  
`\underline` ..... [b422](#), [G384](#), [G385](#)  
`\unexpanded` ..... [f574](#),  
    [f585](#), [D180](#), [D226](#), [D243](#), [P1248](#), [P1250](#)  
`\unhcopy` ..... [b424](#), [H345](#), [I742](#), [I798](#)  
`\unicodedataline` .....  
    ..... [d143](#), [d146](#), [d160](#), [d161](#), [d162](#)  
`\UnicodeEncodingName` .... [o964](#), [o970](#),  
    [o1022](#), [o1033](#), [o1037](#), [o1053](#), [o1055](#),  
    [o1057](#), [o1059](#), [o1060](#), [o1061](#), [o1062](#),  
    [o1063](#), [o1064](#), [o1065](#), [o1066](#), [o1067](#),  
    [o1068](#), [o1069](#), [o1070](#), [o1071](#), [o1072](#),  
    [o1073](#), [o1074](#), [o1075](#), [o1076](#), [o1077](#),  
    [o1078](#), [o1079](#), [o1081](#), [o1082](#), [o1083](#),  
    [o1084](#), [o1085](#), [o1086](#), [o1087](#), [o1088](#),  
    [o1089](#), [o1090](#), [o1091](#), [o1092](#), [o1093](#),  
    [o1094](#), [o1095](#), [o1097](#), [o1098](#), [o1099](#),  
    [o1100](#), [o1101](#), [o1102](#), [o1103](#), [o1104](#),

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- o1105, o1106, o1107, o1108, o1109,  
 o1110, o1111, o1112, o1113, o1114,  
 o1115, o1116, o1117, o1118, o1119,  
 o1120, o1121, o1122, o1123, o1124,  
 o1125, o1126, o1127, o1128, o1129,  
 o1130, o1131, o1132, o1133, o1134,  
 o1135, o1136, o1137, o1138, o1139,  
 o1140, o1141, o1142, o1143, o1144,  
 o1145, o1146, o1147, o1148, o1149,  
 o1150, o1151, o1152, o1153, o1154,  
 o1155, o1156, o1157, o1158, o1159,  
 o1160, o1161, o1162, o1163, o1164,  
 o1165, o1166, o1167, o1168, o1169,  
 o1170, o1171, o1172, o1173, o1174,  
 o1175, o1176, o1177, o1179, o1180,  
 o1181, o1192, o1193, o1194, o1195,  
 o1196, o1197, o1198, o1199, o1200,  
 o1201, o1202, o1203, o1204, o1205,  
 o1206, o1207, o1208, o1209, o1210,  
 o1211, o1212, o1213, o1214, o1215,  
 o1216, o1217, o1218, A303, A304,  
 A305, A306, A307, A308, A309,  
 A310, A311, A312, A313, A314,  
 A315, A316, A317, A318, A319, A320  
 \UnicodeFontFile ..... o1020  
 \UnicodeFontName ..... o1021  
 \UnicodeFontTeXLigatures ... o976, o1017  
 \unicoderead .....  
 .. d143, d157, d158, d159, d160, d165  
 uninstall ..... d831  
 \unitlength ..... 696,  
 708, G53, G64, G73, G83, R252,  
 U82, I5, I29, I30, I32, I34, I42, I43,  
 I44, I45, I60, I63, I73, I74, I84,  
 I85, I93, I94, I107, I108, I119, I164,  
 I176, I241, I256, I316, I318, I332,  
 I340, I342, I357, I375, I377, I392,  
 I397, I399, I414, I417, I422, I480,  
 I481, I508, I509, I537, I538, I612,  
 I628, I648, I654, I690, I691, I693,  
 I694, I697, I698, I700, I701, I712,  
 I713, I715, I716, I718, I719, I721,  
 I722, I750, I751, I753, I754, I757,  
 I758, I760, I761, I772, I774, I776, I778  
 \unkern ..... r646  
 \unless ..... d151, d159, d161  
 \unlhd ..... w545  
 \unpenalty .. r649, r653, z116, D419, D441  
 \unrhd ..... w547  
 \unsetattribute ..... 39  
 \unsetattribute ..... d82, d232  
 \unvcopy ..... E180  
 \Uparrow ..... x584  
 \uparrow ..... x578  
 \upbracefill ..... x543, x560  
 \updefault ..... 395,  
 s556, w21, x94, x101, x103, x111, x113  
 \Updownarrow ..... x588  
 \updownarrow ..... x582  
 \uplus ..... x378  
 \uppercase ..... U470  
 \upshape ... 305, 306, 381, o439, o726,  
 o796, o878, s554, s555, w19, w20,  
 w399, w410, w443, w501, z24, A545  
 \Upsilon ..... x304  
 \upsilon ..... x286  
 use commands:  
 \use:N ..... g560,  
 g561, g601, Q311, Q315, Q317, Q334  
 \use:n ..... g142  
 \use:nn ..... g531, g741  
 \use\_i:nnn ..... 133  
 \use\_ii:nn ..... 133  
 \use\_ii\_iii:nnn ..... Q165, Q169  
 \use\_iii:nn ..... 133  
 \use\_iii:nnn ..... Q47  
 \use\_none:n 145, g7, g394, g410, g529, R7  
 \use\_none:nn ..... g699  
 \usebox ..... G137  
 \usecounter ..... F225, F238  
 \usefont ..... 386, o1530,  
 r80, r282, r623, w522, A7, A48, D457  
 \UseHook ..... 100, 102, 103, 110,  
 112, 113, 676, 678, 683, g929, g969,  
 n316, n317, n321, n322, n326, n327,  
 w196, w208, w215, w227, w234,  
 w240, w245, w250, w512, D162,  
 D174, D177, D201, D204, D208,  
 D211, P663, P664, P667, P668,  
 P690, P691, P694, P695, Q111,  
 Q112, Q115, Q116, R82, R104, R297  
 \UseLegacyTextSymbols ..... A502, A709  
 \UseOneTimeHook .....  
 .. 100, 102, 112, g929, g970, n17,  
 n59, n72, D13, D17, D27, D28, D30  
 \usepackage ..... 103, 118,  
 676, 677, 678, 698, P430, P476, P1235  
 \UseRawInputEncoding . U279, U335, U382  
 \UseTextAccent . 222, o149, o150, o188,  
 A131, A132, A133, A176, A178,  
 A848, A1033, A1034, A1036, A1037  
 \UseTextSymbol ..... 222,  
 o150, o186, A130, A286, A847, A916
- ## V
- \v ..... o238, o387, o468, o586, o587,  
 o588, o592, o594, o597, o599, o601,  
 o607, o613, o614, o615, o619, o621,

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- o624, o626, o628, o634, o749, o1213,  
o1293, o1294, o1295, o1296, o1305,  
o1306, o1339, o1340, o1345, o1346,  
o1357, o1358, o1365, o1366, o1369,  
o1370, o1392, o1393, o1394, o1395,  
o1396, o1397, o1398, o1399, o1400,  
o1401, o1402, o1405, o1406, o1407,  
o1408, o1411, o1412, A182, A199  
\adjust ..... I37, I59, I71, I100,  
I107, I341, I357, I375, I391, L201, L223  
\align ..... A122, A839  
\value ..... 257  
\value ..... p14, N9  
\varbigtriangledown ..... x362, x365  
\varbigtriangleup ..... x363, x364  
\varepsilon ..... m15, x291  
\varphi ..... x296  
\varpi ..... x293  
\varrho ..... x294  
\varsigma ..... x295  
\vartheta ..... x292  
\vbadness ..... 705,  
b317, R136, R138, R187, R189, S2206  
\vbox ..... 695, 705  
vbox commands:  
  \ vbox\_set\_to\_ht:Nnn .... R139, R190  
  \ vbox\_to\_zero:n ..... R250  
  \ vbox\_unpack:N ..... R150, R200  
\vdash ..... x404  
\vdots ..... x510  
\vec ..... x524  
\vector ..... j219, I233, I817, I834  
\vee ..... x367, x369  
\verb ..... D451, D476, D489, D495,  
D504, D510, D520, D525, D538, D540  
verbatim (environment) ..... D445  
\verbatim ..... D445  
verbatim\* (environment) ..... D469  
\verbvisiblespace .....  
D451, D453, D460, D464, D476, D481  
\Vert ..... x571, x573  
\vert ..... x576  
\vfil ..... b411, A123, A126, A840,  
A843, R308, R320, S175, S194,  
S412, S459, S627, S686, I566, I578  
\vfilneg ..... b411  
\vfuzz ..... 705, b340,  
O61, O68, R135, R137, R186, R188  
\vglue ..... b401  
\vline ..... H366  
\vphantom ..... o494, o510, E75  
\vrule ..... 785, b405, I452, o293, o295, o499,  
o515, t144, x558, x559, x561, x562,  
G146, G148, G199, G206, G383,  
G427, H186, H219, H347, H366,  
S1851, S2226, S2259, I227, I299,  
I302, I324, I333, I350, I359, I383,  
I391, I406, I413, I565, I578, I726, I782  
\vskip ..... 177, 184, 184  
\vspace ..... I330, I400, I401, I402  
\vsplit ..... S382, S429, S2208
- ## W
- \wedge ..... x366, x368  
\whatsit ..... 38, d186  
\widehat ..... x527  
\widetilde ..... x526  
\widowpenalties ..... b106  
\widowpenalty ..... b324, r636  
\width ..... G30  
\wlog ..... 642,  
a100, b40, b145, b239, b254, b284,  
b299, d6, d7, d8, d54, P260, U46, U540  
\wp ..... x312  
\wr ..... x382  
\write ..... 696, 703
- ## X
- \x ..... r304, r305  
\XeTeXcharclass ..... r611,  
U25, U33, U40, U53, U59, U68, U75  
\XeTeXcharclassCL ..... U106  
\XeTeXcharclassCM ..... U110  
\XeTeXcharclassEX ..... U107  
\XeTeXcharclassID ..... U104  
\XeTeXcharclassIS ..... U108  
\XeTeXcharclassNS ..... U109  
\XeTeXcharclassOP ..... U105  
\XeTeXcharglyph ..... o1018  
\XeTeXdashbreakstate ..... U206  
\XeTeXglyph ..... o1018  
\XeTeXintercharclasses ..... U100, U133  
\XeTeXinterchartoks ..... U101,  
U115, U116, U117, U118, U119,  
U120, U121, U122, U123, U124,  
U125, U126, U127, U128, U129,  
U134, U139, U140, U141, U142,  
U143, U144, U145, U146, U147,  
U148, U149, U150, U151, U152, U153  
\XeTeXmathcode ..... U94, U433  
\XeTeXrevision ..... U27  
\XeTeXuseglyphmetrics ..... U203, U205  
\XeTeXversion ..... w473, U27  
\Xi ..... x301  
\xi ..... x281  
\xtxHanGlue .....  
. U113, U137, U145, U146, U147,  
U148, U149, U150, U151, U152, U153

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|-------------------------------------|---------------------------------------------------|--------------------------------------------|
| <code>\xtxHanSpace</code> . . . . . | U114, U138,<br>U139, U140, U141, U142, U143, U144 | <b>Z</b>                                   |
| <b>Y</b>                            |                                                   | <code>\z</code> . . . . . U185, U429, U450 |
| <code>\year</code> . . . . .        | a185, c14, P931, P1062, P1151                     | <code>\z</code> . . . . . U176, U430, U441 |
|                                     |                                                   | <code>\zeta</code> . . . . . x273          |

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