

# The microtype package

Subliminal refinements towards typographical perfection

— IMPLEMENTATION —

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<https://github.com/schlicht/microtype>

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The `microtype` package provides a  $\text{\LaTeX}$  interface to the micro-typographic extensions that were introduced by  $\text{pdf\TeX}$  and have since also propagated to  $\text{Lua\TeX}$  and  $\text{Xe\TeX}$ : most prominently, character protrusion and font expansion, furthermore the adjustment of interword spacing and additional kerning, as well as hyphenatable letterspacing (tracking) and the possibility to disable all or selected ligatures. These features may be applied to customisable sets of fonts, and all micro-typographic aspects of the fonts can be configured in a straight-forward and flexible way. Settings for various fonts are provided.

Note that character protrusion requires  $\text{pdf\TeX}$  (version 0.14f or later),  $\text{Lua\TeX}$ , or  $\text{Xe\TeX}$  (at least version 0.9997). Font expansion works with  $\text{pdf\TeX}$  (version 1.20 for automatic expansion) or  $\text{Lua\TeX}$ . The package will by default enable protrusion and expansion if they can safely be assumed to work. Disabling ligatures requires  $\text{pdf\TeX}$  ( $\geq 1.30$ ) or  $\text{Lua\TeX}$ , while the adjustment of interword spacing and of kerning only works with  $\text{pdf\TeX}$  ( $\geq 1.40$ ). Letterspacing is available with  $\text{pdf\TeX}$  ( $\geq 1.40$ ) or  $\text{Lua\TeX}$  ( $\geq 0.62$ ).

The alternative package `letterspace`, which also works with plain  $\text{\TeX}$ , provides the user commands for letterspacing only, omitting support for all other extensions (see section 7 of the User manual).

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**User manual** (external document)

## 1 Implementation

The docstrip modules in this file are:

driver: The documentation driver, only visible in the dtx file.

package: The code for the microtype package (microtype.sty).

show: The code for the microtype-show package (microtype-show.sty).

pdf-: Definitions specific to pdfTeX (microtype-pdftex.def).

lua-: Definitions specific to LuaTeX (microtype-luatex.def).

xe-: Definitions specific to XeTeX (microtype-xetex.def).

letterspace: The code for the letterspace package (letterspace.sty).

plain: Code for eplain, miniltx (letterspace only).

debug: Code for additional output in the log file.

Used for – surprise! – debugging purposes.

luafile: Lua functions (microtype.lua).

config: Surrounds all configuration modules.

cfg-t: Surrounds (Latin) text configurations.

m-t: The main configuration file (microtype.cfg).

bch: Settings for Bitstream Charter (mt-bch.cfg).

blg: Settings for Bitstream Letter Gothic (mt-blg.cfg).

cmr: Settings for Computer Modern Roman (mt-cmr.cfg).

ebg: Settings for EB Garamond (mt-EBGaramond.cfg).

ppl: Settings for Palatino (mt-ppl.cfg).

ptm: Settings for Times (mt-ptm.cfg).

pmn: Settings for Adobe Minion (mt-pmn.cfg).

Contributed by *Harald Harders*.

ugm: Settings for URW Garamond (mt-ugm.cfg).

cfg-u: Surrounds non-text configurations (U encoding).

msa: Settings for AMS ‘a’ symbol font (mt-msa.cfg).

msb: Settings for AMS ‘b’ symbol font (mt-msb.cfg).

euf: Settings for Euler Fraktur font (mt-euf.cfg).

eur: Settings for Euler Roman font (mt-eur.cfg).

eus: Settings for Euler Script font (mt-eus.cfg).

cfg-e: Surrounds Euro symbol configurations.

zpeu: Settings for Adobe Euro symbol fonts (mt-zpeu.cfg).

mvs: Settings for marvosym Euro symbol (mt-mvs.cfg).

test: A helper file that may be used to create and test protrusion settings (test-microtype.tex).

And now for something completely different.

<sup>1</sup> `<package|letterspace>`

## 1.1 Preliminaries

`\MT@MT` This is us.

```
2 \def\MT@MT
3 (package) {microtype}
4 (letterspace) {letterspace}
```

`\MT@fix@catcode` We have to make sure that the category codes of some characters are correct (the german package, for instance, makes " active). Probably overly cautious. Ceterum censeo: it should be forbidden for packages to change catcodes within the preamble.

`\MT@restore@catcodes` Polite as we are, we'll restore them afterwards.

```
5 \let\MT@restore@catcodes\@empty
6 \def\MT@fix@catcode#1#2{%
7   \edef\MT@restore@catcodes{%
8     \MT@restore@catcodes
9     \catcode#1=\the\catcode#1\relax
10  }%
11  \catcode#1=#2\relax
12 }
13 \MT@fix@catcode{17}{14}% ^^Q (comment)
14 \MT@fix@catcode{24}{9}% ^^X (ignore)
15 (package)\MT@fix@catcode{33}{12}% !
16 (package)\MT@fix@catcode{34}{12}% "
17 \MT@fix@catcode{36}{3}% $ (math shift)
18 \MT@fix@catcode{39}{12}% '
19 \MT@fix@catcode{42}{12}% *
20 \MT@fix@catcode{43}{12}% +
21 \MT@fix@catcode{44}{12}% ,
22 \MT@fix@catcode{45}{12}% -
23 \MT@fix@catcode{58}{12}% :
24 \MT@fix@catcode{60}{12}% <
25 \MT@fix@catcode{61}{12}% =
26 \MT@fix@catcode{62}{12}% >
27 (package)\MT@fix@catcode{63}{12}% ?
28 \MT@fix@catcode{94}{7}% ^ (superscript)
29 \MT@fix@catcode{96}{12}% `
30 (package)\MT@fix@catcode{124}{12}% |
```

These are all commands for the outside world. We define them here as blank commands, so that they won't generate an error if we are not running pdfTeX.

```
31 (package)
32 \newcommand*\DeclareMicrotypeSet[3]{} {}
33 \newcommand*\UseMicrotypeSet[2]{} {}
34 \newcommand*\DeclareMicrotypeSetDefault[2]{} {}
35 \newcommand*\SetProtrusion[3]{} {}
36 \newcommand*\SetExpansion[3]{} {}
37 \newcommand*\SetTracking[3]{} {}
38 \newcommand*\SetExtraKerning[3]{} {}
39 \newcommand*\SetExtraSpacing[3]{} {}
40 \newcommand*\DisableLigatures[2]{} {}
41 \newcommand*\DeclareCharacterInheritance[3]{} {}
42 \newcommand*\DeclareMicrotypeVariants[1]{} {}
43 \newcommand*\DeclareMicrotypeAlias[2]{} {}
44 \newcommand*\LoadMicrotypeFile[1]{} {}
45 \newcommand*\DeclareMicrotypeBabelHook[2]{} {}
46 \newcommand*\microtypesetup[1]{} {}
47 \newcommand*\microtypecontext[1]{} {}
48 \newcommand*\textmicrotypecontext[2]{#2}
49 \newcommand*\leftprotrusion[1]{#1}
50 \newcommand*\rightprotrusion[1]{#1}
51 \ifpackageloaded{letterspace}{\let\MT@textls\relax}{%
52 (package)
53 \newcommand*\lststyle{}
```

```

54 \newcommand\textls[2][]{ }
55 \def\textls#1#{}
56 \newcommand*\lslig[1]{#1}
57 <package>
58 }

```

These commands also have a starred version.

```

59 \def\DeclareMicrotypeSet#1#{\@gobbletwo}
60 \def\DeclareMicrotypeVariants#1#{\@gobble}

```

Set declarations are only allowed in the preamble (resp. the main configuration file). The configuration commands, on the other hand, must be allowed in the document, too, since they may be called inside font configuration files, which, in principle, may be loaded at any time.

```

61 \@onlypreamble\DeclareMicrotypeSet
62 \@onlypreamble\UseMicrotypeSet
63 \@onlypreamble\DeclareMicrotypeSetDefault
64 \@onlypreamble\DisableLigatures
65 \@onlypreamble\DeclareMicrotypeVariants
66 \@onlypreamble\DeclareMicrotypeBabelHook

```

Don't load letterspace.

```

67 \expandafter\let\csname ver@letterspace.sty\endcsname\@empty

```

`\MT@old@cmd` The old command names had one more hunch (`\..MicroType..`). Before finally letting them sink into oblivion, raise an error.

```

68 \def\MT@old@cmd#1#2{%
69   \newcommand*#1{\MT@error{%
70     \string#1 is deprecated. Please use\MessageBreak
71     \string#2 instead}{As I said}%
72   \let #1#2#2}}
73 \MT@old@cmd\DeclareMicroTypeAlias\DeclareMicrotypeAlias
74 \MT@old@cmd\DeclareMicroTypeSet \DeclareMicrotypeSet
75 \MT@old@cmd\UseMicroTypeSet \UseMicrotypeSet
76 \MT@old@cmd\LoadMicroTypeFile \LoadMicrotypeFile
77 <package>

```

`\MT@warning` Communicate.

```

\MT@warning@nl 78 \def\MT@warning{\PackageWarning\MT@MT}
\MT@info 79 \def\MT@warning@nl#1{\MT@warning{#1\@gobble}}
\MT@info@nl 80 <package>
\MT@vinfo 81 \def\MT@info{\PackageInfo\MT@MT}
\MT@vinfo 82 \def\MT@info@nl#1{\MT@info{#1\@gobble}}
\MT@error 83 \let\MT@vinfo\@gobble
\MT@warn@err 84 \def\MT@error{\PackageError\MT@MT}
85 \def\MT@warn@err#1{\MT@error{#1}{%
86   This error message appears because you loaded the \MT@MT'\MessageBreak
87   package with the option `verbose=errors'. Consult the documentation\MessageBreak
88   in \MT@MT.pdf to find out what went wrong.}}

```

### 1.1.1 Debugging

`\tracingmicrotype` Cases for `\tracingmicrotype`:

- `\MT@info` 0: almost none
- `\MT@info@nl` 1: + sets & lists
- 2: + heirs
- 3: + slots
- 4: + factors

```

89 < *debug>
90 \MT@warning@n1{This is the debug version}
91 \newcount\tracingmicrotype
92 \tracingmicrotype=2
93 \def\MT@info#1{\PackageInfo\MT@MT{#1}\MT@addto@annot{#1}}
94 \def\MT@info@n1#1{\PackageInfo\MT@MT{#1\@gobble}\MT@addto@annot{#1}}
95 \let\MT@vinfo\MT@info@n1
96 \def\MT@warning#1{\PackageWarning\MT@MT{#1}\MT@addto@annot{Warning: #1}}
97 \def\MT@warning@n1#1{\PackageWarning\MT@MT{#1\@gobble}\MT@addto@annot{Warning: #1}}
98 \def\MT@info#1#2{\ifnum\tracingmicrotype<#1 \else\MT@info{#2}\fi}
99 \def\MT@info@n1#1#2{\ifnum\tracingmicrotype<#1 \else\MT@info@n1{#2}\fi}

```

\tracingmicrotypeinpdf

Another debug method: font switches can be marked in the PDF file with a small caret, an accompanying popup text box displaying all debug messages.

Cases for \tracingmicrotypeinpdf:

- 1: show new fonts
- 2: + show known fonts

```
100 \newcount\tracingmicrotypeinpdf
```

Let's see how it works ... (if you don't see anything special on this page, your PDF viewer doesn't support annotations).

```
\tracingmicrotypeinpdf=2
```

\MT@pdf@annot  
\MT@addto@annot  
\ifMT@inannot

During font setup, we save the text for the popup in \MT@pdf@annot. (This requires pdfTeX ≥ 1.30.) The pdftexcmds package provides pdfTeX's utility commands in LuaTeX, too.

```

101 \RequirePackage{pdftexcmds}
102 \newif\ifMT@inannot \MT@inannottrue
103 \let\MT@pdf@annot\@empty
104 \def\MT@addto@annot#1{\ifnum\tracingmicrotypeinpdf>z@ \ifMT@inannot
105   {\def\MessageBreak{^J\@spaces}%
106    \MT@xadd\MT@pdf@annot{\pdf@escapestring{#1^J}}}\fi\fi}

```

\iftracingmicrotypeinpdfall

With \tracingmicrotypeinpdfall false, the PDF output is (hopefully) identical, but some font switches will not be displayed; otherwise the output is affected, but *all* font switches are visible. In the latter case, we also insert a small kern so that multiple font switches are discernable.

```
107 \newif\iftracingmicrotypeinpdfall
```

\MT@show@pdfannot

A red caret is shown for fonts which are actually set up by *Microtype*, a green one marks fonts that we have already seen. The /Caret annotation requires a viewer for PDF version 1.5 (you could use /Text if you're using an older PDF viewer).

```

108 \def\MT@show@pdfannot#1{%
109   \ifnum\tracingmicrotypeinpdf<#1 \else
110     \iftracingmicrotypeinpdfall\leavevmode\fi
111     \pdfannot height 4pt width 4pt depth 2pt {%
112       /Subtype/Caret
113       /T(\expandafter\string\font@name)
114       \ifcase#1\or
115       /Subj(New font)/C[1 0 0]
116       \else
117       /Subj(Known font)/C[0 1 0]
118       \fi
119       /Contents(\MT@pdf@annot)
120     }%
121     \iftracingmicrotypeinpdfall\kern1pt \fi
122     \global\MT@inannotfalse
123   \fi
124 }

```

```

125 </debug>
126 </package>
127 </package|letterspace>

```

### 1.1.2 Visual debugging

The `microtype-show` package offers some tools for preparing protrusion settings. We make use of the `microtype` infrastructure, redefining some of its internal commands (done later, in sections 1.2.1 and 1.2.7). First, some preparation:

```

128 <*show>
129 \RequirePackage{iftex}
130 \ifetex\else
131   \PackageError{microtype-show}
132     {This package only works with e-TeX}{Use e-TeX}
133 \fi
134 \ifxetex
135   \PackageError{microtype-show}
136     {This package only works with pdfTeX or luaTeX}{Don't use XeTeX}
137 \fi
138 \PackageWarning{microtype-show}{DO NOT USE THIS PACKAGE FOR REAL DOCUMENTS\@gobble}
139 \DeclareOption*{\PassOptionsToPackage{\CurrentOption}{microtype}}
140 \ProcessOptions\relax
141 \PassOptionsToPackage{verbose}{microtype}
142 \RequirePackage{microtype,graphicx,xcolor}

```

The following commands are configurable:

```

\ifShowGlyphIndex
\ifShowMissingGlyphs
\GlyphScaleFactor
\Showbaselinecolor
\Showposcolor
\Shownegcolor
\MTS@printtext
\MTS@show@index
\MTS@crulefill
\MTS@Prot
\MTS@Char
\MTS@setup
\MTS@glyphlist
\ShowProtrusion

```

```

143 \newif\ifShowGlyphIndex
144 \newif\ifShowMissingGlyphs
145 \newcommand*\GlyphScaleFactor{2}
146 \newcommand*\Showbaselinecolor{\color{black!40}}
147 \newcommand*\Showposcolor{\color{green!50}}
148 \newcommand*\Shownegcolor{\color{red!50}}
149 \ifluatex
150   \def\MTS@printtext#1{{\usefont{TU}{lmr}{m}{n}#1}}
151 \else
152   \def\MTS@printtext#1{{\usefont{T1}{cmr}{m}{n}#1}}
153 \fi
154 \def\MTS@show@index#1{\ifShowGlyphIndex{\tiny$_{#1}$}
155 % \ifluatex^{\mathrm{#1}}
156 % \MT@lua{tex.print(luaotfloat.aux.name_of_slot(tonumber([[#1]])))}}\fi
157 $}\fi\space}
158 \def\MTS@crulefill{\leaders\hrule height \dimexpr1ex/2+.4pt depth -\dimexpr1ex/2\hfill}

159 \g@addto@macro\MTS@setupfont{\MTS@Prot\MTS@Char}
160 \let\MTS@Prot\relax
161 \let\MTS@Char\relax

162 \def\MTS@setup{%
163   \fboxsep=0pt
164   \fboxrule=.1pt
165   \raggedright
166   \let\MTS@glyphlist\@gobble
167   \def\MT@feat{pr}%
168 }

169 \newcommand*\ShowProtrusion{%
170   \begingroup
171     \MTS@setup

```



```

172 \let\MTS@Prot\MTS@Prot@do
173 \def\MT@cat{c}%
174 \selectfont
175 }

```

\MTS@Prot@do But in all other cases of a font being picked up, there should be no special treatment. After we're done, select the previous font again.

```

176 \def\MTS@Prot@do{%
177 \MT@ltx@pickupfont
178 \let\MT@pr@split@val\MTS@pr@split@val
179 \let\MT@load@list\MTS@load@list
180 \let\MT@set@pr@prefixes@\MTS@set@pr@prefixes@
181 \MTS@show@pr
182 \endgroup
183 \aftergroup\selectfont
184 }

```

\ShowCharacterInheritance

```

185 \newcommand*\ShowCharacterInheritance{%
186 \begin{group}
187 \MTS@setup
188 \let\MTS@Char\MTS@Char@do
189 \def\MT@cat{inh}%
190 \selectfont
191 }

```

\MTS@Char@do

```

192 \def\MTS@Char@do{%
193 \MT@ltx@pickupfont
194 \let\MT@set@pr@prefixes@\MTS@set@pr@prefixes@
195 \MTS@show@inheritance
196 \endgroup
197 \aftergroup\selectfont
198 }

```

\ShowProtrusionLineGlyph By glyph.

```

199 \newcommand*\ShowProtrusionLineGlyph[1]{%
200 {\MTS@setup
201 \MTS@showprotrusionline{~#1}}%
202 }

```

\ShowProtrusionLineIndex By glyph number.

```

203 \newcommand*\ShowProtrusionLineIndex[1]{%
204 {\MTS@setup
205 \MTS@showprotrusionline{#1}}%
206 }

```

\MTS@showprotrusionline

```

\MTS@lpcode 207 \def\MTS@showprotrusionline#1{%
\MTS@rprcode 208 \edef\MTS@lpcode{\number\lpcode\font#1}%
209 \edef\MTS@rprcode{\number\rprcode\font#1}%
210 \char#1%
211 lorem ipsum dolor sit amet, \MTS@crulefill\ %
212 \MTS@printtext{\ifnum\MTS@lpcode=z0\Showbaselinecolor\fi[\MTS@lpcode]}
213 \fbox{\char#1}\MTS@show@index{\number#1}
214 \MTS@printtext{\ifnum\MTS@rprcode=z0\Showbaselinecolor\fi[\MTS@rprcode]}
215 \MTS@crulefill\ you know the rest%
216 \char#1\par
217 \ShowDummyLine
218 }

```

\ShowDummyLine The first and last glyphs in this line should have a straight (non-protruded) shape. We also reset to default shape and series, because that's what, say, italic shapes should be matched with.

```

219 \newcommand*\ShowDummyLine{%
220   {\fontencoding{\encodingdefault}\fontseries{\seriesdefault}\fontshape{\shapedefault}%
221    \selectfont\noindent
222    here is the beginning of a line, \dotfill and here is its end}\par
223 }

\ShowProtrusionAll
224 \newcommand*\ShowProtrusionAll{%
225   {\MTS@setup
226    \MTS@lede{}}%
227   \MT@do@font{\iffontchar\font\@tempcnta\MTS@showprotrusionline{\@tempcnta}\fi}}%
228 }

\ShowProtrusionDefined
229 \newcommand*\ShowProtrusionDefined{%
230   {\MTS@setup
231    \MTS@lede{defined}%
232    \let\MTS@first\@gobble
233    \let\MTS@second\@firstofone
234    \MT@do@font{%
235      \MTS@firstorsecond
236      \MTS@temp{%
237        \iffontchar\font\@tempcnta\MTS@showprotrusionline{\@tempcnta}\else
238        \MT@warning@n1{Glyph \the\@tempcnta\space is missing in font
239                      \MessageBreak\font@name}%
240        \fi}}}%
241 }

\ShowProtrusionMissing
242 \newcommand*\ShowProtrusionMissing{%
243   {\MTS@setup
244    \MTS@lede{missing}%
245    \let\MTS@first\@firstofone
246    \let\MTS@second\@gobble
247    \MT@do@font{%
248      \MTS@firstorsecond
249      \iffontchar\font\@tempcnta\MTS@temp{\MTS@showprotrusionline{\@tempcnta}}\fi}}%
250 }

\MTS@lede
251 \def\MTS@lede#1{%
252   \selectfont
253   \edef\MTS@font{\expandafter\string\font@name}%
254   \MTS@printtext{All glyphs \MT@ifempty{#1}{in}{#1 in protrusion list for}
255                font \texttt{\MTS@font}:}\par
256   \ShowDummyLine
257 }

\MTS@firstorsecond
258 \def\MTS@firstorsecond{%
259   \let\MTS@temp\MTS@first
260   \ifnum\lcode\font\@tempcnta=z@ \else
261     \let\MTS@temp\MTS@second
262   \fi
263   \ifnum\rpcode\font\@tempcnta=z@ \else
264     \let\MTS@temp\MTS@second
265   \fi
266 }

\MTS@charwd      Display the glyph with protrusion.
\MTS@lp@ 267 \newdimen\MTS@charwd
\MTS@rp@ 268 \newdimen\MTS@lp@
          269 \newdimen\MTS@rp@
\MTS@show@char@pr 270 \def\MTS@show@char@pr#1{%
          271   \xdef\MTS@glyphlist{\MTS@glyphlist,#1}%

```

```

272 \scalebox{\GlyphScaleFactor}{\strut\escapechar~\
273 \MTS@charwd=\fontcharwd\MT@font#1\relax

```

The baseline rule.

```

274 {\Showbaselinecolor\vrule width \dimexpr\MTS@charwd+.3em\relax height 1sp depth 0pt}%
275 \hskip-\dimexpr\MTS@charwd+.15em\relax

```

Left protrusion.

```

276 {\ifdim\MTS@lp@<\z@\Shownegcolor\else\Showposcolor\fi
277 \vrule width \ifdim\MTS@lp@<\z@ -\fi\MTS@lp@ height 1em depth .2em}%
278 \hskip\dimexpr\MTS@charwd\ifdim\MTS@lp@>\z@-\MTS@lp@\fi
279 \ifdim\MTS@rp@>\z@-\MTS@rp@\fi\relax

```

Right protrusion.

```

280 {\ifdim\MTS@rp@<\z@\Shownegcolor\else\Showposcolor\fi
281 \vrule width \ifdim\MTS@rp@<\z@ -\fi\MTS@rp@ height 1em depth .2em}%
282 \hskip-\dimexpr\MTS@charwd+\fboxrule\ifdim\MTS@rp@<\z@-\MTS@rp@\fi\relax

```

Finally the glyph, so that it's on top.

```

283 \fbox{\char#1}\,%
284 \MTS@show@index{#1}%
285 }

```

\MTS@show@char Just show the glyph; the second command also remembers it.

```

\MTS@show@char@x 286 \def\MTS@show@char#1{\scalebox{\GlyphScaleFactor}{%
287 \strut\fbox{\char#1}}\MTS@show@index{#1}}
288 \def\MTS@show@char@x#1{\xdef\MTS@glyphlist{\MTS@glyphlist,#1}\MTS@show@char{#1}}

```

\MTS@show@missing

```

289 \def\MTS@show@missing{%
290 \MT@ifdefined@c@T\MT@pr@inh@name{%
291 \MTS@lp@=\z@ \MTS@rp@=\z@
292 \par \MTS@printtext{Glyphs not included in configuration (with defined heirs):}%
293 \MT@do@font{%
294 \edef\MT@temp{\the\@tempcnta}%
295 \MT@ifdefined@n@T\MT@inh@\MT@pr@inh@name @\MT@temp @}{%
296 \MT@exp@one@n\MT@in@clist\MT@temp\MTS@glyphlist
297 \ifMT@inlist@else \newline
298 \llap{\MTS@show@char@pr{\MT@temp} \MTS@printtext{=} }%
299 \MT@exp@cs\MT@map@tlist@c
300 {\MT@inh@\MT@pr@inh@name @\the\@tempcnta @}%
301 \MTS@show@char@x
302 \fi
303 }%
304 }%
305 }%
306 \MTS@show@missing@
307 }

```

\MTS@show@missing@

```

308 \def\MTS@show@missing@{%
309 \par \MTS@printtext{Other glyphs not in configuration:}\newline
310 \MT@do@font{%
311 \edef\MT@temp{\the\@tempcnta}%
312 \MT@exp@one@n\MT@in@clist\MT@temp\MTS@glyphlist
313 \ifMT@inlist@else
314 \MTS@show@char\MT@temp
315 \fi
316 }%
317 }

```

\MTS@show@inheritance

```

318 \def\MTS@show@inheritance{%
319 \MT@get@inh@list
320 \MTS@printtext{Character inheritance for font ~\texttt{\MT@font}'}:\\

```

```

321 \MT@ifdefined@c@TF\MT@listname{%
322 \MTS@printtext{First matching list is for ~\texttt{\@tempa}':\\
323 \texttt{\MT@listname}:}\par\leavevmode
324 \MT@do@font{%
325 \MT@ifdefined@n@T{MT@inh@MT@listname @\the\@tempcnta @}{%
326 \newline
327 \xdef\MTS@glyphlist{\MTS@glyphlist,\the\@tempcnta}%
328 \llap{\MTS@show@char{\the\@tempcnta}\MTS@printtext{= }}%
329 \MT@exp@cs\MT@map@tlist@c
330 {MT@inh@MT@listname @\the\@tempcnta @}%
331 \MTS@show@char@x
332 }%
333 }%
334 \MT@ifdefined@n@T{MT@inh@MT@listname @prefixes}{%
335 \par \MTS@printtext{(with prefixes:)}%
336 \@tempcntb=\z@
337 \let\MTS@show@char@pr\MTS@show@char@x
338 \MT@set@pr@prefixheirs}%
339 \ifShowMissingGlyphs\MTS@show@missing@fi
340 }%
341 \MTS@printtext{NOT DEFINED}%
342 }%
343 \par
344 }
345 </show>

```

### 1.1.3 Requirements

Back to the user packages.

\MT@plain The letterspace package works with:

0: miniltx

1: eplain

2: L<sup>A</sup>T<sub>E</sub>X

For plain usage, we have to copy some commands from latex.ltx.

```

346 <*package|letterspace>
347 <*plain>
348 \def\MT@plain{2}
349 \ifx\documentclass\undefined
350 \def\MT@plain{1}
351 \def\hmode@bgroup{\leavevmode\bgroup}
352 \def\nfss@text#1{{\mbox{#1}}}
353 \let\@typeset@protect\relax
354 \ifx\eplain\undefined
355 \def\MT@plain{0}
356 \def\PackageWarning#1#2{%
357 \begingroup
358 \newlinechar=10 %
359 \def\MessageBreak{^^J(#1)\@spaces\@spaces\@spaces\@spaces}%
360 \immediate\write16{^^JPackage #1 Warning: #2\on@line.^^J}%
361 \endgroup
362 }
363 \def\on@line{ on input line \the\inputlineno}
364 \def\@spaces{\space\space\space\space}
365 \fi
366 \fi

```

\MT@requires@latex Better use groups than plain ifs.

```

367 \def\MT@requires@latex#1{%
368 \ifnum\MT@plain<#1 \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi
369 }
370 </plain>

```

For definitions that depend on e-TeX features.

```

371 \ifcase 0%
372   \ifx\TeXversion\@undefined 1\else
373     \ifx\TeXversion\relax 1\else
374       \ifcase\TeXversion 1\fi
375     \fi
376   \fi
377 \else
378   \catcode`\^^Q=9 \catcode`\^^X=14
379 \fi
380 <letterspace>^^Q\MT@warning@n1{This package requires the etex extensions.
381 <letterspace>^^Q \MessageBreak Exiting}\MT@restore@catcodes\endinput
382 <debug>\MT@info@n1{0}{this is
383 <debug>^^Q not
384 <debug> etex}

```

We check whether we are running pdfTeX, XeTeX, or LuaTeX, and load the appropriate definition file (later in section 1.4.2).

`\MT@clear@options` If we are using neither of these engines, or a too old version, we disable everything and exit.

```

385 \def\MT@clear@options{%
386 <plain> \MT@requires@latex1{%
387   \AtEndOfPackage{\let\@unprocessedoptions\relax\MT@restore@catcodes}%
388   \let\CurrentOption\empty
389 <plain> }\relax
390 }

```

A hack circumventing the TeX Live 2004 hack which undefines the pdfTeX primitives in the format in order to hide the fact that pdfTeX is being run from the user. This has been *fixed* in TeX Live 2005.

```

391 \ifx\normalpdftexversion\@undefined \else
392   \let\pdftexversion\normalpdftexversion
393   \let\pdftexrevision\normalpdftexrevision
394   \let\pdfoutput\normalpdfoutput
395 \fi

```

`\MT@engine` Old packages might have let `\pdftexversion` to `\relax`.

```

\ifMT@engine@unfit
\MT@engine@minversion
396 \let\MT@engine\relax
397 \newif\ifMT@engine@unfit
398 \MT@engine@unfittrue
399 \ifx\pdftexversion\@undefined \else
400   \ifx\pdftexversion\relax \else
401     \def\MT@engine{pdf}
402     <package> \def\MT@engine@minversion{0.14f}
403     <letterspace> \let\MT@pdf@or@lua\@firstoftwo
404     \ifnum\pdftexversion
405     <package> > 13
406     <letterspace> > 139
407     \MT@engine@unfitfalse
408     <package> \ifnum\pdftexversion=14
409     <package> \ifnum\expandafter\pdftexrevision < ~f
410     <package> \MT@engine@unfittrue
411     <package> \fi
412     <package> \fi
413   \fi
414 \fi
415 \fi
416 \ifx\directlua\@undefined \else
417   \ifx\directlua\relax \else
418     \def\MT@engine{lua}
419     \MT@engine@unfitfalse

```

Since approx. LuaTeX 0.80, `\pdftexversion` is let to `\luatexversion`, so that we

would be fooled into thinking that pdf<sub>TEX</sub> is too old.

```

420 <math>(*letterspace)</math>
421   \let\MT@pdf@or@lua\@secondoftwo
422   \ifnum\luaTeXversion < 62 \MT@engine@unfittrue
423   \else
424     \let\MT@lua\directlua
425     \ifnum\luaTeXversion > 84
426       \let\pdfoutput\outputmode
427       \let\pdfprotrudechars\protrudechars
428       \let\pdfadjustspacing\adjustspacing
429     \fi
430   \fi
431 <math>(/letterspace)</math>
432   \fi
433 \fi
434 <math>(*package)</math>
435 \ifx\MT@engine\relax
436   \ifx\XeTeXversion\@undefined \else
437     \ifx\XeTeXversion\relax \else
438       \def\MT@engine{xe}
439       \def\MT@engine@minversion{0.9997}
440       \ifdim 0\XeTeXrevision pt > 0.9996pt
441         \MT@engine@unfitfalse
442       \fi
443     \fi
444   \fi
445 \fi
446 <math>(/package)</math>
447 <math>(/package|letterspace)</math>

```

\MT@pdfTeX@no pdf<sub>TEX</sub>'s features for which we provide an interface here haven't always been available, and some specifics have changed over time. Therefore, we have to test which pdf<sub>TEX</sub> we're using, if any. \MT@pdfTeX@no will be used throughout the package to respectively do the right thing. Currently, we have to distinguish the following cases for pdf<sub>TEX</sub>:

- 0: not running pdf<sub>TEX</sub>
- 1: pdf<sub>TEX</sub> (< 0.14f) (already checked above)
- 2: + micro-typographic extensions (0.14f,g)
- 3: + protrusion relative to 1 em ( $\geq$  0.14h)
- 4: + automatic font expansion; protrusion no longer has to be set up first; scale factor fixed to 1000; default \efcode = 1000 ( $\geq$  1.20)
- 5: + \left,right)marginkern; \pdfnoligatures; \pdfstrcmp; \pdfescapestring ( $\geq$  1.30)
- 6: + adjustment of interword spacing; extra kerning; \letterspacefont; \pdfmatch1; \pdftracingfonts; always e-<sub>TEX</sub> ( $\geq$  1.40)
- 7: + \letterspacefont doesn't disable ligatures and kerns; \pdfcopyfont ( $\geq$  1.40.4)
- 8: + \letterspacefont uses explicit \fontdimen 6 if specified ( $\geq$  1.40.23)

```

448 <math>(*pdf-</math>
449 <math>(debug)</math>\MT@info@nl{0}{this is pdfTeX \the\pdfTeXversion(\pdfTeXrevision)}
450 \def\MT@pdfTeX@no{8}
451 \ifnum\pdfTeXversion = 140
452   \ifnum\pdfTeXrevision < 23
453     \def\MT@pdfTeX@no{7}

```

---

1 This command was actually introduced in 1.30, but failed on strings longer than 1023 bytes.

```

454 \ifnum\pdfTeXrevision < 4
455 \def\MT@pdfTeX@no{6}
456 \fi
457 \fi
458 \else
459 \ifnum\pdfTeXversion < 140
460 \def\MT@pdfTeX@no{5}
461 \ifnum\pdfTeXversion < 130
462 \def\MT@pdfTeX@no{4}
463 \ifnum\pdfTeXversion < 120
464 \def\MT@pdfTeX@no{3}
465 \ifnum\pdfTeXversion = 14
466 \ifnum\expandafter\pdfTeXrevision < \h
467 \def\MT@pdfTeX@no{2}
468 \fi
469 \fi
470 \fi
471 \fi
472 \fi
473 \fi
474 <debug>\MT@info@nl{0}{pdfTeX no.: \MT@pdfTeX@no}
475 </pdf->

```

\MT@xetex@no XeTeX supports character protrusion since version 0.9997. This test is not necessary here, we just keep it for the (unlikely) case that features get added to XeTeX in the future.

```

476 <*xe->
477 <debug>\MT@info@nl{0}{this is xetex (\the\XeTeXversion\XeTeXrevision)}
478 %\ifdim 0\XeTeXrevision pt < 0.9997pt
479 % \def\MT@xetex@no{1}
480 %\else
481 % \def\MT@xetex@no{2}
482 %\fi
483 <debug>%\MT@info@nl{0}{xetex no.: \MT@xetex@no}
484 </xe->

```

\MT@luatex@no Cases for LuaTeX (\luatexversion ought to have been enabled by the format):

0: N/A

1: LuaTeX (< 0.36)

2: + \directlua without state number ( $\geq 0.36$ )

3: + \letterspacefont; non-automatic expansion doesn't work anymore, and automatic expansion in DVI mode is realised by modifying the tracking, not the glyphs<sup>2</sup> ( $\geq 0.62$ )

4: + almost all of the pdfTeX primitives have been renamed ( $\geq 0.85$ )

5: + default \efcode = 1000; \protrusionboundary [doesn't seem to work] ( $\geq 0.90$ )

6: + \glet ( $\geq 1.10$ )

Also, sometime between 1.0.4 and 1.0.7, the function font.setexpansion has been introduced (but we're not using it for now).

```

485 <*lua->
486 <debug>\MT@info@nl{0}{this is luatex (\the\luatexversion)}

```

\MT@lua Communicate with lua. Beginning with LuaTeX 0.36, \directlua no longer requires a state number.

---

2 This may have been changed earlier, but I'm no longer able to find out when (the last version that actually works for me is 0.40).

```

487 \let\MT@lua\directlua
488 \def\MT@luatex@no{6}
489 \ifnum\luatexversion<110
490   \def\MT@luatex@no{5}
491   \ifnum\luatexversion<90
492     \def\MT@luatex@no{4}
493     \ifnum\luatexversion<85
494       \def\MT@luatex@no{3}
495       \ifnum\luatexversion<62
496         \def\MT@luatex@no{2}
497         \ifnum\luatexversion<36
498           \def\MT@lua{\directlua0}
499           \def\MT@luatex@no{1}
500       \fi
501     \fi
502   \fi
503 \fi
504 \fi

505 <debug>\MT@info@nl{0}{luatex no.: \MT@luatex@no}
506 </lua->

```

Abort if no capable engine found.

```

507 <*package|letterspace>
508 \ifMT@engine@unfit
509   \MT@warning@nl{You
510     \ifx\MT@engine\relax
511       don't seem to be using pdfTeX%
512 <package>       , luatex or xetex%
513 <letterspace>    \space or luatex%
514     .\MessageBreak `\'MT@MT' only works with these engines.%
515   \else
516     are using a \MT@engine tex version older than
517 <package>       \MT@engine@minversion
518 <letterspace>    \MT@pdf@or@lua{1.40}{0.62}%
519     .\MessageBreak `\'MT@MT' does not work with this version.%
520     \MessageBreak Please install a newer version of \MT@engine tex.%
521   \fi
522   \MessageBreak I will quit now}
523   \MT@clear@options
524 \endinput\fi
525 </package|letterspace>

```

Still there? Then we can begin: We need the `keyval` package, including the ‘new’ `\KV@sp@def` implementation. For the patch option, we use `etoolbox`, which requires e-TeX.

```

526 <*package|letterspace>
527 \RequirePackage{keyval}[1997/11/10]
528 <*package>
529 ^^X\RequirePackage{etoolbox}

```

\MT@toks      We need a token register.

```
530 \newtoks\MT@toks
```

\ifMT@if@      A scratch if.

```
531 \newif\ifMT@if@
```

#### 1.1.4 Declarations

\ifMT@protrusion      These are the global switches ...

```
\ifMT@expansion 532 \newif\ifMT@protrusion
```

```
\ifMT@auto 533 \newif\ifMT@expansion
```

```
\ifMT@selected 534 \newif\ifMT@auto
```

\ifMT@oligatures

```
\ifMT@draft
```

```
\ifMT@disable
```

```
\ifMT@spacing
```

```
\ifMT@kerning
```

```
\ifMT@tracking
```

```
\ifMT@babel
```



```

535 \newif\ifMT@selected
536 \newif\ifMT@noligatures
537 \newif\ifMT@draft
538 \newif\ifMT@disable
539 \newif\ifMT@spacing
540 \newif\ifMT@kerning
541 \newif\ifMT@tracking
542 \newif\ifMT@babel

```

[This line intentionally left blank.]

\MT@pr@level ... and numbers.

```

\MT@ex@level 543 \let\MT@pr@level\tw@
\MT@pr@factor 544 \let\MT@ex@level\tw@
\MT@ex@factor 545 \let\MT@pr@factor\m@
\MT@ex@factor 546 \let\MT@ex@factor\m@
\MT@sp@factor 547 \let\MT@sp@factor\m@
\MT@kn@factor 548 \let\MT@kn@factor\m@

```

\MT@pr@unit Default unit for protrusion settings is character width, for spacing space, for kerning  
 \MT@sp@unit (and tracking) 1 em.

```

\MT@kn@unit 549 \let\MT@pr@unit\empty
550 \let\MT@sp@unit\m@ne
551 \def\MT@kn@unit{1em}

```

\MT@stretch Expansion settings.

```

\MT@shrink 552 \let\MT@stretch\m@ne
\MT@step 553 \let\MT@shrink \m@ne
554 \let\MT@step \m@ne

```

\MT@pr@min Minimum and maximum values allowed by pdfTeX.

```

\MT@pr@max 555 \def\MT@pr@min{-\m@}
\MT@ex@min 556 \let\MT@pr@max\m@
557 \let\MT@ex@min\z@
\MT@ex@max 558 \let\MT@ex@max\m@
\MT@sp@min 559 \def\MT@sp@min{-\m@}
560 \let\MT@sp@max\m@
\MT@sp@max 561 \def\MT@kn@min{-\m@}
\MT@kn@min 562 \let\MT@kn@max\m@
\MT@kn@max 563 /package
564 \def\MT@tr@min{-\m@}
\MT@tr@min 565 \let\MT@tr@max\m@
\MT@tr@max 566 *package

```

\MT@factor@default Default factor.

```
567 \def\MT@factor@default{1000 }
```

\MT@stretch@default Default values for expansion.

```

\MT@shrink@default 568 \def\MT@stretch@default{20 }
569 \def\MT@shrink@default{20 }

```

\MT@letterspace Default value for letterspacing (in thousandths of 1 em).

```

\MT@letterspace@default 570 /package
571 \let\MT@letterspace\m@ne
572 \def\MT@letterspace@default{100}
573 *package

```

\ifMT@document Our private test whether we're still in the preamble.

```

574 \newif\ifMT@document
575 /package
576 /package|letterspace

```

### 1.1.5 Auxiliary macros

`\MT@requires@pdftex` For definitions that depend on a particular pdfTeX resp. LuaTeX version.

```
\MT@requires@luatex 577 <pdf-|lua->
578 \def
579 <pdf-> \MT@requires@pdftex%
580 <lua-> \MT@requires@luatex%
581 #1{\ifnum
582 <pdf-> \MT@pdftex@no
583 <lua-> \MT@luatex@no
584 <#1 \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi}
585 <lua-&debug>\MT@requires@luatex4{\MT@lua{tex.enableprimitives('pdf',{'tracingfonts'})}}\relax
586 <pdf-&debug>\MT@requires@pdftex6{
587 <debug>\pdftracingfonts=1
588 <pdf-&debug>}\relax
589 </pdf-|lua->
```

Some functions are loaded from a dedicated lua file. This avoids character escaping problems and incompatibilities between versions of LuaTeX. Unless running a recent L<sup>A</sup>T<sub>E</sub>X, we load the luatexbase package.

```
590 <lua->\@ifl@t@r\fmtversion{2016/01/01}\relax{\RequirePackage{luatexbase}}
```

We load luaotfload, because some of its functions are required in microtype.lua. This eliminates the need for the user to load fontspec before microtype. There will hardly be any LuaTeX documents that don't load this package, anyway. Since 2017/01/01, it is already loaded in the format.

```
591 <lua->\@ifl@t@r\fmtversion{2017/01/01}\relax{\RequirePackage{luaotfload}}
592 <letterspace>\MT@pdf@or@lua\relax{
593 <letterspace>\ifx\newluafunction\undefined \input ltluatex \fi
594 <lua-|letterspace>\MT@lua{require("microtype")}
595 <letterspace>}
```

Here it begins. The module was contributed by Élie Roux.

```
596 <*luafile>
597
598 function microtype.info(...)
599   luatexbase.module_info("microtype",...)
600 end
601
602 local find      = string.find
603 local match     = string.match
604 local tex_write = tex.write
605
606 local catpackage
607 if luatexbase.registernumber then
608   catpackage = luatexbase.registernumber("catcodetable@atletter") -- LaTeX
609 else
610   catpackage = luatexbase.catcodetables.CatcodeTableLaTeXAtLetter -- luatexbase
611 end
612 function microtype.sprint (...)
613   tex.sprint(catpackage, ...)
614 end
615
```

We need the function `math.tointeger`, which is missing in older LuaTeX versions, and ConTeXt (inherited via `luaotfload`) faultily overwrites its own definition. The following is the (correct) definition from `l-math.lua`.

```
616 if not math.tointeger or not pcall(math.tointeger,0) then
617   math.mininteger=-0x4FFFFFFFFFFFFF
618   math.maxinteger=0x4FFFFFFFFFFFFF
619   local floor=math.floor
620   function math.tointeger(n)
```

```

621     local f=floor(n)
622     return f==n and f or nil
623   end
624 end
625
626 </luafile>

```

To be continued, but first back to primitives.

`\MT@glet` Here's the forgotten one (finally implemented in LuaTeX).

```

627 <lua->\MT@requires@luatex6{\let\MT@glet\glet}\relax
628 <*package|letterspace>
629 \def\MT@glet{\global\let}

```

`\MT@exp@cs` Commands to create command sequences. Those that are going to be defined globally should be created inside a group so that the save stack won't explode.

```

630 \def\MT@exp@cs#1#2{\expandafter#1\csname#2\endcsname}
631 <*package>
632 \def\MT@exp@gcs#1#2{\begingroup\expandafter\endgroup\expandafter#1\csname#2\endcsname}

```

`\MT@def@n` This is `\@namedef` and global.

```

633 \def\MT@def@n{\MT@exp@cs\def}
634 \def\MT@gdef@n{\MT@exp@gcs\gdef}

```

`\MT@edef@n` Its expanding versions.

```

635 </package>
636 \def\MT@edef@n{\MT@exp@cs\edef}
637 <*package>
638 \def\MT@xdef@n{\MT@exp@gcs\xdef}

```

`\MT@let@nc` `\let` a `\csname` sequence to a command.

```

639 \def\MT@let@nc{\MT@exp@cs\let}
640 \def\MT@glet@nc{\MT@exp@gcs\MT@glet}

```

`\MT@let@cn` `\let` a command to a `\csname` sequence.

```

641 </package>
642 \def\MT@let@cn#1#2{\expandafter\let\expandafter#1\csname #2\endcsname}
643 <*package>

```

`\MT@let@nn` `\let` a `\csname` sequence to a `\csname` sequence.

```

644 \def\MT@let@nn{\MT@exp@cs\MT@let@cn}
645 \def\MT@glet@nn{\MT@exp@gcs{\global\expandafter\MT@let@cn}}

```

`\MT@@font` Remove trailing space from the font name.

```

646 \def\MT@@font{\expandafter\string\MT@font}

```

`\MT@exp@one@n` Expand the second token once and enclose it in braces.

```

647 </package>
648 \def\MT@exp@one@n#1#2{\expandafter#1\expandafter{#2}}

```

`\MT@exp@two@c` Expand the next two tokens after `<#1>` once.

```

649 \def\MT@exp@two@c#1{\expandafter\expandafter\expandafter#1\expandafter}
650 <*package>

```

`\MT@exp@two@n` Expand the next two tokens after `<#1>` once and enclose them in braces.

```

651 \def\MT@exp@two@n#1#2#3{%
652   \expandafter\expandafter\expandafter
653   #1\expandafter\expandafter\expandafter
654   {\expandafter#2\expandafter}\expandafter{#3}}

```

You do not wonder why `\MT@exp@one@c` doesn't exist, do you?

`\MT@ifdefined@c@T` Wrapper for testing whether command resp. `\csname` sequence is defined. If we  
`\MT@ifdefined@c@TF` are running e-TeX, we will use its primitives `\ifdefined` and `\ifcsname`, which  
`\MT@ifdefined@n@T`  
`\MT@ifdefined@n@TF`

decreases memory use substantially.

```

655 \def\MT@ifdefined@c@T#1{%
656 ^^X \ifdefined#1\expandafter\@firstofone\else\expandafter\@gobble\fi
657 ^^Q \ifx#1\@undefined\expandafter\@gobble\else\expandafter\@firstofone\fi
658 }
659 \<package>
660 \def\MT@ifdefined@c@TF#1{%
661 ^^X \ifdefined#1\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
662 \<package>^^Q \ifx#1\@undefined
663 \<package>^^Q \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi
664 }
665 \def\MT@ifdefined@n@T#1{%
666 ^^X \ifcsname#1\endcsname\expandafter\@firstofone\else\expandafter\@gobble\fi
667 \<package>^^Q \begingroup\MT@exp@two@c\endgroup\ifx\csname #1\endcsname\relax
668 \<package>^^Q \expandafter\@gobble\else\expandafter\@firstofone\fi
669 }
670 \def\MT@ifdefined@n@TF#1{%
671 ^^X \ifcsname#1\endcsname\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
672 \<package>^^Q \begingroup\MT@exp@two@c\endgroup\ifx\csname #1\endcsname\relax
673 \<package>^^Q \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi
674 }
675 \<package>

```

`\MT@detokenize@n` Translate a macro into a token list. With e-TeX, we can use `\detokenize`. We also  
`\MT@detokenize@c` need to remove the last trailing space; and only the last one – therefore the fiddling  
`\MT@rem@last@space` (and the `\string` isn't perfect, of course).

```

676 \def\MT@detokenize@n#1{%
677 ^^X \expandafter\MT@rem@last@space\detokenize{#1} \@nil
678 ^^Q \string#1%
679 }
680 \def\MT@detokenize@c#1{%
681 ^^X \MT@exp@one@n\MT@detokenize@n#1%
682 ^^Q \MT@exp@two@c\MT@rem@last@space\strip@prefix\meaning#1 \@nil
683 }
684 \def\MT@rem@last@space#1 #2{#1%
685 \ifx\@nil#2\else \space
686 \expandafter\MT@rem@last@space\expandafter#2\fi
687 }

```

`\MT@ifempty` Test whether argument is empty.

```

688 \<package>
689 \begingroup
690 \catcode`\%=12
691 \catcode`\&=14
692 \gdef\MT@ifempty#1{&
693 \if %#1%&
694 \expandafter\@firstoftwo
695 \else
696 \expandafter\@secondoftwo
697 \fi
698 }
699 \endgroup
700 \<package>

```

`\MT@ifint` Test whether argument is an integer, using an old trick by Mr. Arseneau, or the latest and greatest from pdfTeX or LuaTeX (which also allows negative numbers, as required by the `letterspace` option).

```

701 \<package>
702 \<package|letterspace>
703 \<pdf->\MT@requires@pdftex{
704 \<letterspace>\MT@pdf@or@lua{
705 \<pdf-|letterspace>
706 \def\MT@ifint#1{%
707 \ifcase\pdfmatch{^-[0-9]+ *$}{#1}\relax

```

```

708     \expandafter\@secondoftwo
709     \else
710     \expandafter\@firstoftwo
711     \fi
712 }
713 }{
714 </pdf-|letterspace>
715 <*pdf-|xe-|letterspace>
716 \def\MT@ifint#1{%
717   \if!\ifnum9<1#1!\else?\fi
718   \expandafter\@firstoftwo
719   \else
720   \expandafter\@secondoftwo
721   \fi
722 }
723 </pdf-|xe-|letterspace>
724 <pdf-|letterspace>}
725 <lua->\def\MT@ifint#1{\csname\MT@lua{microtype.if_int}([#1])\endcsname}
726 <*luafile>
727 local function if_int(s)
728   if find(s,"^-[0-9]+ *$") then
729     tex_write("@firstoftwo")
730   else
731     tex_write("@secondoftwo")
732   end
733 end
734 microtype.if_int = if_int
735
736 </luafile>
\MT@ifdimen    Test whether argument is dimension (or number). (nd and nc are new Didot resp.
                Cicero, added in pdfTeX 1.30; px is a pixel.)
737 <*pdf->
738 \MT@requires@pdftex6{
739 \def\MT@ifdimen#1{%
740   \ifcase\pdfmatch{^[0-9]+([.],[0-9]+)?|([.],[0-9]+)%
741     (em|ex|cm|mm|in|pc|pt|dd|cc|bp|sp|nd|nc|px)? *$}{#1}\relax
742   \expandafter\@secondoftwo
743   \else
744   \expandafter\@firstoftwo
745   \fi
746 }
747 }{
748 </pdf->
749 <*pdf-|xe->
750 \def\MT@ifdimen#1{%
751   \setbox\z@=\hbox{%
752     \MT@count=1#1\relax
753     \ifnum\MT@count=\@ne
754       \aftergroup\@secondoftwo
755     \else
756       \aftergroup\@firstoftwo
757     \fi
758   }%
759 }
760 </pdf-|xe->
761 <pdf->}
762 <lua->\def\MT@ifdimen#1{\csname\MT@lua{microtype.if_dimen}([#1])\endcsname}
763 <*luafile>
764 local function if_dimen(s)
765   if (find(s,"^-[0-9]+(a*) *$") or
766     find(s,"^-[0-9]*([.],[0-9]+(a*) *$")) then
767     tex_write("@firstoftwo")
768   else
769     tex_write("@secondoftwo")

```

```

770 end
771 end
772 microtype.if_dimen = if_dimen
773
774 </luafile>

\MT@ifdim    Compare floating point numbers.

775 <*package>
776 \def\MT@ifdim#1#2#3{%
777   \ifdim #1\p@ #2 #3\p@
778     \expandafter\@firstoftwo
779   \else
780     \expandafter\@secondoftwo
781   \fi
782 }
783 </package>

\MT@ifstreq  Test whether two strings (fully expanded) are equal.

784 <pdf-|xe->
785 <pdf->\MT@requires@pdftex5{
786 \def\MT@ifstreq#1#2{%
787 <pdf->   \ifnum\pdfstrcmp{#1}{#2}=\z@
788 <xe->   \ifnum\strcmp{#1}{#2}=\z@
789   \expandafter\@firstoftwo
790 \else
791   \expandafter\@secondoftwo
792 \fi
793 }
794 </pdf-|xe->
795 <*pdf->
796 }{
797 \def\MT@ifstreq#1#2{%
798   \edef\MT@resa{#1}%
799   \edef\MT@resb{#2}%
800   \ifx\MT@resa\MT@resb
801     \expandafter\@firstoftwo
802   \else
803     \expandafter\@secondoftwo
804   \fi
805 }
806 }
807 </pdf->
808 <lua->\def\MT@ifstreq#1#2{\csname\MT@lua{microtype.if_str_eq([[#1]],[[#2]])}\endcsname}
809 <*luafile>
810 local function if_str_eq(s1, s2)
811   if s1 == s2 then
812     tex_write("@firstoftwo")
813   else
814     tex_write("@secondoftwo")
815   end
816 end
817 microtype.if_str_eq = if_str_eq
818
819 </luafile>

\MT@xadd    Add item to a list.

820 <*package>
821 \def\MT@xadd#1#2{%
822   \ifx#1\relax
823     \xdef#1{#2}%
824   \else
825     \xdef#1{#1#2}%
826   \fi
827 }

```

```

\MT@xaddb      Add item to the beginning.
828 \def\MT@xaddb#1#2{%
829   \ifx#1\relax
830     \xdef#1{#2}%
831   \else
832     \xdef#1{#2#1}%
833   \fi
834 }
835 \<package>

\MT@map@clist@n      Run <#2> on all elements of the comma list <#1>. This and the following is modelled
\MT@map@clist@c      after LATEX3 commands.
\MT@map@clist@      836 \<package>|letterspace>
\MT@clist@function  837 \def\MT@map@clist@n#1#2{%
\MT@clist@break      838   \ifx\@empty#1\else
839     \def\MT@clist@function##1{#2}%
840     \MT@map@clist@#1,\@nil,\@nnil
841   \fi
842 }

843 \def\MT@map@clist@c#1{\MT@exp@one@n\MT@map@clist@n#1}
844 \def\MT@map@clist@c#1,{%
845   \ifx\@nil#1%
846     \expandafter\MT@clist@break
847   \fi
848   \MT@clist@function{#1}%
849   \MT@map@clist@
850 }
851 \let\MT@clist@function\@gobble
852 \def\MT@clist@break#1\@nnil{}
853 \<package>

\MT@map@tlist@n      Execute <#2> on all elements of the token list <#1>. \MT@tlist@break can be used
\MT@map@tlist@c      to jump out of the loop.
\MT@map@tlist@      854 \def\MT@map@tlist@n#1#2{\MT@map@tlist@#2#1\@nnil}
\MT@tlist@break      855 \def\MT@map@tlist@c#1#2{\expandafter\MT@map@tlist@\expandafter#2#1\@nnil}
856 \def\MT@map@tlist@#1#2{%
857   \ifx\@nnil#2\else
858     #1{#2}%
859     \expandafter\MT@map@tlist@
860     \expandafter#1%
861   \fi
862 }
863 \def\MT@tlist@break#1\@nnil{\fi}

\ifMT@inlist@      Test whether item <#1> is in comma list <#2>. Using \pdfmatch would be slower.
\MT@in@clist      864 \newif\ifMT@inlist@
865 \def\MT@in@clist#1#2{%
866   \def\MT@res@a##1,#1,##2##3\@nnil{%
867     \ifx##2\@empty
868       \MT@inlist@false
869     \else
870       \MT@inlist@true
871     \fi
872   }%
873   \expandafter\MT@res@a\expandafter,#2,#1,\@empty\@nnil
874 }

\MT@rem@from@clist      Remove item <#1> from comma list <#2>. This is basically \@removeelement from
                        ltcntrl.dtx. Using \pdfmatch and \pdflastmatch here would be really slow!
875 \def\MT@rem@from@clist#1#2{%
876   \def\MT@res@a##1,#1,##2\MT@res@a{##1,##2\MT@res@b}%
877   \def\MT@res@b##1,\MT@res@b##2\MT@res@b{\ifx,##1\@empty\else##1\fi}%
878   \xdef#2{\MT@exp@two@c\MT@res@b\MT@res@a\expandafter,#2,\MT@res@b,#1,\MT@res@a}%

```

879 }  
`\MT@in@tlist`      Test whether item is in token list. Since this isn't too elegant, I thought that at least  
`\MT@in@tlist@`      here, `\pdfmatch` would be more efficient – however, it turned out to be even slower  
                      than this solution.

```
880 \def\MT@in@tlist#1#2{%
881   \MT@inlist@false
882   \def\MT@res@a{#1}%
883   \MT@map@tlist@c#2\MT@in@tlist@
884 }
885 \def\MT@in@tlist@#1{%
886   \edef\MT@res@b{#1}%
887   \ifx\MT@res@a\MT@res@b
888     \MT@inlist@true
889     \expandafter\MT@tlist@break
890   \fi
891 }
```

`\MT@in@rlist`      Test whether size `\MT@size` is in a list of ranges. Store the name of the list in  
`\MT@in@rlist@`      `\MT@size@name`

```
\MT@in@rlist@@ 892 \def\MT@in@rlist#1{%
\MT@size@name 893   \MT@inlist@false
894   \MT@map@tlist@c#1\MT@in@rlist@
895 }
896 \def\MT@in@rlist@#1{\expandafter\MT@in@rlist@@#1}
897 \def\MT@in@rlist@@#1#2#3{%
898   \MT@ifdim{#2}=\m@ne{%
899     \MT@ifdim{#1}=\MT@size
900     \MT@inlist@true
901     \relax
902   }%
903   \MT@ifdim\MT@size<{#1}\relax{%
904     \MT@ifdim\MT@size<{#2}%
905     \MT@inlist@true
906     \relax
907   }%
908 }%
909 \ifMT@inlist@
910   \def\MT@size@name{#3}%
911   \expandafter\MT@tlist@break
912 \fi
913 }
```

`\MT@loop`          This is the same as L<sup>A</sup>T<sub>E</sub>X's `\loop`, which we mustn't use, since this could confuse an  
`\MT@iterate`      outer `\loop` in the document.

```
\MT@repeat 914 </package>
915 \def\MT@loop#1\MT@repeat{%
916   \def\MT@iterate{#1\relax\expandafter\MT@iterate\fi}%
917   \MT@iterate \let\MT@iterate\relax
918 }
919 \let\MT@repeat\fi
```

`\MT@while@num`      Execute `<#3>` from `<#1>` up to (excluding) `<#2>` (much faster than L<sup>A</sup>T<sub>E</sub>X's `\@whilenum`).

```
920 \def\MT@while@num#1#2#3{%
921   \@tempcnta#1\relax
922   \MT@loop #3%
923   \advance\@tempcnta \@ne
924   \ifnum\@tempcnta < #2\MT@repeat
925 }
926 </package|letterspace>
```

`\MT@if@luaotf@font`      For fonts loaded by `luaotfload` we query the font's table.

```
927 <letterspace>\MT@pdf@or@lua{\let\MT@if@luaotf@font\@secondoftwo}{
928 <*lua-|letterspace>
```



```

929 \def\MT@if@luaotf@font{\csname\MT@lua{%
930   microtype.if_luaotf_font()
931   }\endcsname
932 }
933 </lua-|letterspace>
934 <letterspace>
935 <*luafile>
936 local function if_luaotf_font()
937   local thefont = font.getfont(font.current())
938   if thefont and ( thefont.format == "opentype" or thefont.format == "truetype" )
939     then tex.write("@firstoftwo")
940     else tex.write("@secondoftwo")
941   end
942 end
943 microtype.if_luaotf_font = if_luaotf_font
944
945 </luafile>

```

\MT@do@font      Execute <#1> 256 times,

```

946 <pdf-|letterspace>\def\MT@do@font{\MT@while@num\z@{\cc\vi}
    resp. for the whole font for LuaTeX, if it's a Unicode font.
947 <*lua-
948 \def\MT@do@font#1{%
949   \MT@if@luaotf@font{%
950     \def\MT@do@font@function{#1}%
951     \MT@lua{microtype.do_font()}%
952   }{\MT@while@num\z@{\cc\vi}{#1}}%
953 }
954 </lua-

```

This is the lua function, which is much faster than looping through all glyphs in T<sub>E</sub>X. Legacy fonts (which this function should never work on) don't contain a `v.index` field. Our test whether `i` is larger than 1114111 may seem strange, but with the HarfBuzz renderer, we are not guaranteed to get a number within the Unicode range.

```

955 <*luafile>
956 local function do_font()
957   local thefont = font.getfont(font.current())
958   if thefont then
959     for i,v in next,thefont.characters do
960       if v.index == nil or ( v.index > 0 and i < 1114112 ) then
961         microtype.sprint([[ \@tempcnta=]]..i..[[\relax\MT@do@font@function]])
962       end
963     end
964   end
965 end
966 microtype.do_font = do_font
967
968 </luafile>

```

The X<sub>Y</sub>T<sub>E</sub>X variant (it's slow ...!).

```

969 <*xe-
970 \def\MT@do@font#1{%
971   \@tempcnta=\z@
972   \MT@loop
973     \iffontchar\MT@font\@tempcnta #1\fi
974     \advance\@tempcnta\@ne
975     \ifnum\@tempcnta < \XeTeXlastfontchar\MT@font \MT@repeat
976   }
977 </xe-
978 <*package>

```

\MT@count      Increment macro <#1> by one. Saves using up too many counters. The e-T<sub>E</sub>X way is  
 \MT@increment

slightly faster.

```

979 \newcount\MT@count
980 \def\MT@increment#1{%
981   ^^X   \edef#1{\number\numexpr #1 + 1\relax}%
982   ^^Q   \MT@count=#1\relax
983   ^^Q   \advance\MT@count \@ne
984   ^^Q   \edef#1{\number\MT@count}%
985 }
```

`\MT@scale` Multiply and divide a counter. If we are using e-TeX, we will use its `\numexpr` primitive. This has the advantage that it is less likely to run into arithmetic overflow. The result of the division will be rounded instead of truncated. Therefore, we'll get a different (more accurate) result in about half of the cases.

```

986 \def\MT@scale#1#2#3{%
987   ^^Q   \multiply #1 #2\relax
988   \ifnum #3 = \z@
989     ^^X   #1=\numexpr #1 * #2\relax
990   \else
991     ^^X   #1=\numexpr #1 * #2 / #3\relax
992     ^^Q   \divide #1 #3\relax
993   \fi
994 }
```

`\MT@abbr@pr` Some abbreviations. Thus, we can have short command names but full-length log output.

```

\MT@abbr@ex
\MT@abbr@pr@c 995 \def\MT@abbr@pr{protrusion}
\MT@abbr@ex@c 996 \def\MT@abbr@ex{expansion}
\MT@abbr@pr@inh 997 \def\MT@abbr@pr@c{protrusion codes}
\MT@abbr@ex@inh 998 \def\MT@abbr@ex@c{expansion codes}
\MT@abbr@ex@inh 999 \def\MT@abbr@pr@inh{protrusion inheritance}
\MT@abbr@n 1000 \def\MT@abbr@ex@inh{expansion inheritance}
\MT@abbr@n 1001 \def\MT@abbr@n{noligatures}
\MT@abbr@sp 1002 \def\MT@abbr@sp{spacing}
\MT@abbr@sp@c 1003 \def\MT@abbr@sp@c{interword spacing codes}
\MT@abbr@sp@inh 1004 \def\MT@abbr@sp@inh{interword spacing inheritance}
\MT@abbr@kn 1005 \def\MT@abbr@kn{kerning}
\MT@abbr@kn@c 1006 \def\MT@abbr@kn@c{kerning codes}
\MT@abbr@kn@c 1007 \def\MT@abbr@kn@inh{kerning inheritance}
\MT@abbr@kn@c 1008 \def\MT@abbr@tr{tracking}
\MT@abbr@kn@inh 1009 \def\MT@abbr@tr@c{tracking amount}
```

`\MT@abbr@tr` These we also need the other way round.

```

\MT@rbba@protrusion
\MT@rbba@tr@c
\MT@rbba@expansion 1010 \def\MT@rbba@protrusion{pr}
\MT@rbba@spacing 1011 \def\MT@rbba@expansion{ex}
\MT@rbba@kerning 1012 \def\MT@rbba@spacing{sp}
\MT@rbba@tracking 1013 \def\MT@rbba@kerning{kn}
\MT@rbba@tracking 1014 \def\MT@rbba@tracking{tr}
```

`\MT@features` We can work on these lists to save some guards in the dtx file.

```

\MT@features@long 1015 \def\MT@features{pr,ex,sp,kn,tr}
1016 \def\MT@features@long{protrusion,expansion,spacing,kerning,tracking}
```

`\MT@is@feature` Whenever an optional argument accepts a list of features, we can use this command to check whether a feature exists in order to prevent a rather confusing 'Missing `\endcsname` inserted' error message. The feature (long form) must be in `<#1>`, the type of list to ignore in `<#2>`, then comes the action.

```

1017 \def\MT@is@feature#1#2{%
1018   \MT@in@clist{#1}\MT@features@long
1019   \ifMT@inlist@
1020     \expandafter\@firstofone
1021   \else
1022     \MT@error{`#1' is not an available micro-typographic\MessageBreak
```

```

1023     feature. Ignoring #2}{Available features are: `\'MT@features@long'.}%
1024     \expandafter\@gobble
1025     \fi
1026 }

```

### 1.1.6 Compatibility

For the record, the following L<sup>A</sup>T<sub>E</sub>X kernel commands will be modified by microtype:

- `\pickup@font`
- `\do@subst@correction`
- `\add@accent` (all in section 1.2.9)
- `\showhyphens` (in section 1.4.6)

The wordcount package redefines the font-switching commands, which will break microtype. Since microtype doesn't have an effect on the number of words in the document anyway, we will simply disable ourselves.

```

1027 \@ifl@aded{tex}{wordcount}{%
1028   \MT@warning@nl{Detected the `wordcount' utility.\MessageBreak
1029     Disabling `\'MT@MT', since it wouldn't work}%
1030   \MT@clear@options\endinput}\relax

```

The minimal class doesn't define any size commands other than `\normal size`, which will result in lots of warnings. Therefore we issue a warning about the warnings.

```

1031 \@ifclassloaded{minimal}{%
1032   \MT@warning@nl{Detected the `minimal' class.\MessageBreak
1033     Expect lots of warnings and some malfunctions.\MessageBreak
1034     You might want to use a proper class instead}%
1035 }\relax

```

`\MT@setup@` The setup is deferred until the end of the preamble. This has a couple of advantages: `\microtypesetup` can be used to change options later on in the preamble, and fonts don't have to be set up before microtype.

```

1036 </package>
1037 <*package|letterspace>
1038 <plain>\MT@requires@latex1{
1039 \let\MT@setup@\@empty

```

`\MT@addto@setup` We use our private hook to have better control over the timing. This will also work with `eplain`, but not with `miniltx` alone.

```

1040 \def\MT@addto@setup{\g@addto@macro\MT@setup@

```

Don't hesitate with `miniltx`.

```

1041 <plain>}{\let\MT@addto@setup\@firstofone}

```

`\MT@with@package@T` We almost never do anything if a package is not loaded.

```

1042 \def\MT@with@package@T#1{\@ifpackageloaded{#1}\@firstofone\@gobble}
1043 </package|letterspace>
1044 <*package>

```

`\MT@with@babel@and@T` L<sup>A</sup>T<sub>E</sub>X's `\@ifpackagewith` ignores the class options.

```

1045 \def\MT@with@babel@and@T#1{%
1046   \MT@ifdefined@n@T{opt@babel.\@pkgextension}{%
1047     \expandtwoargs\MT@in@clist{#1}
1048     {\csname opt@babel.\@pkgextension\endcsname,\@classoptionslist}%
1049     \ifMT@inlist@expandafter\@secondoftwo\else\expandafter\@firstofone\fi
1050   }\@gobble
1051 }

```

`\MT@ledmac@setup` The `ledmac` package first saves each paragraph in a box, from which it then splits off the lines one by one. This will destroy character protrusion. (There aren't any problems with the `lineno` package, since it takes a different approach.) — ... — After much to and fro, the situation has finally settled and there is a fix. Beginning with pdfTeX version 1.21b together with `ledpatch.sty` as of 2005/06/02 (v0.4), character protrusion will work at last.

*Peter Wilson* was so kind to provide the `\l@dunhbox@line` hook in `ledmac` to allow for protrusion. `\leftmarginkern` and `\rightmarginkern` are new primitives of pdfTeX 1.21b (aka. 1.30.0). They are also part of recent XeTeX. The successor packages `eledmac` and `reledmac` are also supported.

```

1052 </package>
1053 <pdf->\MT@requires@pdftex5{
1054 <*pdf-|lua-|xe-
1055 \def\MT@ledmac@setup{%
1056 \ifMT@protrusion
1057 \MT@ifdefined@c@TF\l@dunhbox@line{%

```

`\MT@led@unhbox@line` Hook.

```

1058 \MT@info@nl{Patching ((r)e)ledmac to enable character protrusion}%
1059 \let\MT@led@unhbox@line\l@dunhbox@line
1060 \renewcommand*{\l@dunhbox@line}[1]{%
1061 \ifhbox##1%
1062 \kern\leftmarginkern##1%
1063 \expandafter\MT@led@unhbox@line\expandafter##1\expandafter
1064 \kern\rightmarginkern##1%
1065 \fi
1066 }%
1067 }{%
1068 \MT@warning@nl{%
1069 Character protrusion in paragraphs with line\MessageBreak
1070 numbering will only work if you update ledmac,\MessageBreak
1071 or use one of its successors, eledmac or reledmac}%
1072 }%
1073 \fi
1074 }
1075 </pdf-|lua-|xe-
1076 <*pdf->
1077 }{
1078 \def\MT@ledmac@setup{%
1079 \ifMT@protrusion
1080 \MT@warning@nl{%
1081 The pdftex version you are using does not allow\MessageBreak
1082 character protrusion in paragraphs with line\MessageBreak
1083 numbering by the `((r)e)ledmac' package.\MessageBreak
1084 Upgrade pdftex to version 1.30 or later}%
1085 \fi
1086 }
1087 }
1088 </pdf->

```

The `shapepar` package (v2.2) fixes this in a similar manner by itself, so we don't have to bother.

`\MT@restore@p@h` Restore meaning of `\%` and `\#`.

```

1089 <*package|letterspace>
1090 <*package>
1091 \def\MT@restore@p@h{\chardef\%~\% \chardef\#~\# }

```

`\ifMT@fontspec` Two new conditionals for use with XeTeX or LuaTeX.

```

\ifMT@xunicode 1092 \newif\ifMT@fontspec
1093 \MT@with@package@T{fontspec}\MT@fontspectrue

```

```

1094 \newif\ifMT@xunicode
1095 \MT@with@package@T{xunicode}\MT@xunicodetrue

```

We need the correct value of the former for configuration commands inside the preamble (to get the default families right).

```

1096 \ifl@t@r\fmtversion{2020/10/01}
1097 {\IfFormatAtLeastTF{2021/11/15}
1098 {\AddToHook{package/fontspect/after}{\MT@fontspectrue}}
1099 {\AddToHook{package/after/fontspect}{\MT@fontspectrue}}}\relax

```

`\MT@maybe@gobble@with@tikz` If `\tikz@expandcount` is greater than zero, we're inside or at the end of a `tikz` node, where we don't want to adjust spacing after letterspacing, lest we disturb `tikz`. This is used in `\MT@afteraftergroup`, and we don't need it for `letterspace`.

```

1100 \let\MT@maybe@gobble@with@tikz@firstofone
1101 \def\MT@tikz@setup{%
1102 \def\MT@maybe@gobble@with@tikz{%
1103 \ifnum\tikz@expandcount>\z@
1104 \expandafter\@gobble
1105 \else
1106 \expandafter\@firstofone
1107 \fi}}

```

`\MT@setupfont@hook` This hook will be executed every time a font is set up (inside a group).

In the preamble, we check for the packages each time a font is set up. Thus, it will work regardless when the packages are loaded.

Even for packages that don't activate any characters in the preamble (like `babel` and `csquotes`), we have to check here, too, in case they were loaded before `microtype`, and a font is loaded `\AtBeginDocument`, before `microtype`. (This is no longer needed, since the complete setup is now deferred until the end of the preamble. However, it is still necessary for `defersetup=false`.)

```

1108 \def\MT@setupfont@hook{%
    Spanish (as well as Galician and Mexican) babel modify %, storing the original
    meaning in \percentsign.
1109 \MT@if@false
1110 \MT@with@babel@and@T{spanish} \MT@if@true
1111 \MT@with@babel@and@T{galician}\MT@if@true
1112 \MT@with@babel@and@T{mexican} \MT@if@true
1113 \ifMT@if@MT@ifdefined@c@T\percentsign{\let%\percentsign}\fi

```

Using `\@disablequotes`, we can restore the original meaning of all characters made active by `csquotes`. (It would be doable for older versions, too, but we won't bother.)

```

1114 \MT@with@package@T{csquotes}{%
1115 \ifpackage@later{csquotes}{2005/05/11}\@disablequotes\relax}%

```

`hyperref` redefines `\%` and `\#` inside a `\url`. We restore the original meanings (which we can only hope are correct). Same for `tex4ht` and `mathastext`.

```

1116 \MT@if@false
1117 \MT@with@package@T{hyperref} \MT@if@true
1118 \MT@with@package@T{tex4ht} \MT@if@true
1119 \MT@with@package@T{mathastext}\MT@if@true
1120 \ifMT@if@MT@restore@p@h\fi
1121 \MT@with@package@T{tikz}\MT@tikz@setup
1122 }

```

Check again at the end of the preamble.

```

1123 </package>
1124 \MT@addto@setup{%
1125 <*package>

```

Our competitor, the pdfcprot package, must not be tolerated!

```

1126 \MT@with@package@T{pdfcprot}{%
1127   \MT@error{Detected the `pdfcprot' package!\MessageBreak
1128     `~\MT@MT' and `pdfcprot' may not be used together}}{%
1129 The `pdfcprot' package provides an interface to character protrusion.\MessageBreak
1130 So does the `~\MT@MT' package. Using both packages at the same\MessageBreak
1131 time will almost certainly lead to undesired results. Have your choice!}%
1132 }%
1133 \MT@with@package@T {ledmac}\MT@ledmac@setup
1134 \MT@with@package@T {eledmac}\MT@ledmac@setup
1135 \MT@with@package@T{reledmac}\MT@ledmac@setup
1136 \MT@with@package@T{xunicode}\MT@xunicodetrue
1137 \MT@with@package@T{fontspec}\MT@fontspec@true

```

We can clean up \MT@setupfont@hook now.

```

1138 \MT@gl@et\MT@setupfont@hook\@empty

```

microtype is so so loquacious ... Sometimes you just want to silence it when debugging a document.

```

1139 %\gdef\MT@setupfont@hook{\tracingnone
1140 % \MT@info{Silently doing my `magic' (Mittelbach) for font\MessageBreak\MT@@font}}}%
1141 \MT@if@false
1142 \MT@with@babel@and@T{spanish} \MT@if@true
1143 \MT@with@babel@and@T{galician}\MT@if@true
1144 \MT@with@babel@and@T{mexican} \MT@if@true
1145 \ifMT@if@
1146   \g@addto@macro\MT@setupfont@hook{%
1147     \MT@ifdefined@c@T\percentsign{\let\%\percentsign}}}%
1148 \fi
1149 \MT@with@package@T{csquotes}{%
1150   \ifpackage@later{csquotes}{2005/05/11}{%
1151     \g@addto@macro\MT@setupfont@hook\@disablequotes
1152     \g@addto@macro\MT@prot@hook\@disablequotes
1153   }{%
1154     \MT@warning@n1{%
1155       Should you receive warnings about unknown slot\MessageBreak
1156       numbers, try upgrading the `csquotes' package}%
1157   }%
1158 }%

```

We disable microtype's additions inside hyperref's \pdfstringdef, which redefines lots of commands. hyperref doesn't work with plain T<sub>E</sub>X, so in that case we don't bother.

```

1159 \MT@if@false
1160 </package>
1161 <plain> \MT@requires@latex2{
1162   \MT@with@package@T{hyperref}{%
1163     \pdfstringdefDisableCommands{%
1164 <*package>
1165       \MT@ltx@pickupfont
1166       \let\textmicrotypecontext\@secondoftwo
1167       \let\microtypecontext\@gobble
1168 </package>
1169       \def\lststyle{\pdfstringdefWarn\lststyle}%
1170       \def\textls#1#{\pdfstringdefWarn\textls}%
1171     }%
1172 <package> \MT@if@true
1173 }%
1174 <plain> } \relax
1175 <*package>
1176 \MT@with@package@T{tex4ht}\MT@if@true
1177 \MT@with@package@T{mathastext}\MT@if@true
1178 \ifMT@if@\g@addto@macro\MT@setupfont@hook\MT@restore@p@h\fi

```

The listings package makes numbers and letters active,

```
1179 \MT@with@package@T{listings}{%
1180   \g@addto@macro\MT@cfg@catcodes{%
1181     \MT@while@num{"30"}{"3A"}{\catcode\@tempcnta=12\relax}%
1182     \MT@while@num{"41"}{"5B"}{\catcode\@tempcnta=11\relax}%
1183     \MT@while@num{"61"}{"7B"}{\catcode\@tempcnta=11\relax}%
1184   }%
```

... and the backslash (which would lead to problems in \MT@get@slot).

```
1185   \g@addto@macro\MT@setupfont@hook{%
1186     \catcode`\=\z@
```

Inside a listing, \space is redefined.

```
1187   \def\space{ }%
```

When loaded with the extendedchar option, listings will also redefine 8-bit active characters (inputenc). Luckily, this simple redefinition will make them expand to their original definition, so that they could be used in the configuration.

```
1188   \let\lst@ProcessLetter\@empty
1189 }%
1190 }%
```

Of course, using both soul's and microtype's letterspacing mechanisms at the same time doesn't make much sense. But soul can do more, e.g., underlining. The optional argument to \textls may not be used. Also, we have to disable expansion within soul's trial run. Under plain TeX, soul doesn't register itself the L<sup>A</sup>T<sub>E</sub>X way, so we just test for its main command.

```
1191 </package>
1192 \ifx\SOUL@undefined\else
1193   \soulregister\lsstyle 0%
1194   \soulregister\textls 1%
1195   \ifx\XeTeXrevision\undefined
1196     \let\MT@SOUL@doword\SOUL@doword
1197     \def\SOUL@doword{\pdfadjustspacing=\z@ \MT@SOUL@doword}%
1198   \fi
1199 \fi
1200 <*package>
1201 \MT@with@package@T{tikz}\MT@tikz@setup
```

Compatibility with the pinyin package (from CJK): disable microtype in \py@macron, which loads a different font for the accent. In older versions of pinyin (pre-4.6.0), \py@macron had only one argument.

```
1202 \MT@with@package@T{pinyin}{%
1203   \let\MT@orig@py@macron\py@macron
1204   \ifpackageafter{pinyin}{2005/08/11}{% 4.6.0
1205     \def\py@macron#1#2{%
1206       \MT@ltx@pickupfont
1207       \MT@orig@py@macron{#1}{#2}%
1208       \MT@MT@pickupfont}%
1209     }{%
1210       \def\py@macron#1{%
1211         \MT@ltx@pickupfont
1212         \MT@orig@py@macron{#1}%
1213         \MT@MT@pickupfont}%
1214       }%
1215     }%
```

The luainputenc package makes all characters active, which can lead into problems when the unicode-math package is loaded, as the latter doesn't always define characters in LICR-conforming ways. By disabling the following command, we prevent errors; warnings about unknown slots, however, may still occur – but that's

one of the unavoidable downsides of using `luainputenc`.

```

1216 \MT@with@package@T{unicode-math}{%
1217 \MT@let@nc{__um_sub_or_super:n}\relax
1218 }%
1219 </package>
1220 }
1221 <*package>

```

### 1.1.7 Protrusion patches

`\ifMT@patch@ok` We have to patch some macros to get protrusion right.

```

\MT@patch@info 1222 \newif\ifMT@patch@ok
\MT@patch@warn 1223 \def\MT@patch@info#1{\MT@info{Applying patch `#1'}}
1224 \def\MT@patch@warn#1{\MT@warning{Unable to apply patch `#1'}}
\MT@patch@undef 1225 \def\MT@patch@undef#1{\MT@warning{Patch `#1' undefined. Cannot apply it}}
\MT@patch@info@undo 1226 \def\MT@patch@info@undo#1{\MT@info{Reverting patch `#1'}}

```

`\MT@patches@def` Define a patch and add it to the list of patches. The third argument may contain more revert commands, but will mostly be empty.

```

\MT@define@patch
1227 \let\MT@patches@def@gobble
1228 \def\MT@define@patch#1#2#3{%
1229 \g@addto@macro\MT@patches@def{,#1}%
1230 \MT@def@n{MT@patch@#1}{#2}%
1231 \MT@def@n{MT@patch@undo@#1}{#3}%
1232 }

```

`\MT@redefined@patches` We also provide an easier way of redefining patches, which would otherwise be a bit tricky because of the timing (patches are defined *and* executed ABD).

```

\MT@redefine@patch
1233 \let\MT@redefined@patches@empty
1234 \def\MT@redefine@patch#1#2#3{%
1235 \g@addto@macro\MT@redefined@patches{%
1236 \MT@def@n{MT@patch@#1}{#2}%
1237 \MT@def@n{MT@patch@undo@#1}{#3}%
1238 }%
1239 }

```

Both macros are only allowed in the preamble.

```

1240 \@onlypreamble\MT@define@patch
1241 \@onlypreamble\MT@redefine@patch

```

`\MT@append@patch` Wrappers around `etoolbox` commands. We also remember the original command to allow unpatching.

```

\MT@patch@patch
1242 \def\MT@append@patch#1#2{%
1243 \MT@remember@patch{#1}%
1244 \apptocmd#1{#2}\relax\MT@patch@okfalse
1245 }
1246 \def\MT@patch@patch#1#2#3{%
1247 \MT@remember@patch{#1}%
1248 \patchcmd#1{#2}{#3}\relax\MT@patch@okfalse
1249 }

```

`\MT@remember@patch` Remember the original definition and add to undo command.

```

1250 \def\MT@remember@patch#1{%
1251 \MT@ifdefined@n@TF{MT@patch@saved@}\string#1}\relax
1252 {\MT@let@nc{MT@patch@saved@}\string#1}{#1}
1253 \MT@exp@cs\g@addto@macro{MT@patch@undo@@\MT@patch@name}%
1254 {\MT@let@cn#1{MT@patch@saved@}\string#1}}%
1255 }

```

`\MT@patches@applied` Apply a previously defined patch. With some packages, we have to reset catcodes (e.g., for the ‘item’ patch with Spanish `babel`, which makes ‘>’ active).

```

\MT@apply@patch
1256 \let\MT@patches@applied@gobble

```



```

1257 \def\MT@apply@patch#1{%
1258   \MT@patch@oktrue
1259   \MT@ifdefined@n@TF{MT@patch@#1}
1260   {\MT@in@clist{#1}\MT@patches@applied
1261    \ifMT@inlist@
1262     \MT@warning{Patch `#1' has already been applied,\MessageBreak
1263               cannot reapply it}%
1264   \else
1265     \let\MT@restore@catcodes\@empty
1266     \MT@with@babel@and@T{spanish} {\MT@fix@catcode{62}{12}}% >
1267     \MT@with@babel@and@T{galician} {\MT@fix@catcode{62}{12}}% >
1268     \def\MT@patch@name{#1}%
1269     \g@addto@macro\MT@patches@applied{,#1}%
1270     \@nameuse{MT@patch@#1}%
1271     \@nameuse{MT@patch@ifMT@patch@ok info\else warn\fi}{#1}%
1272     \MT@restore@catcodes
1273   \fi}
1274   {\MT@patch@undef{#1}}%
1275 }

```

`\MT@undo@patch` Undo a patch (if indeed previously applied).

```

1276 \def\MT@undo@patch#1{%
1277   \MT@in@clist{#1}\MT@patches@applied
1278   \ifMT@inlist@
1279     \MT@rem@from@clist{#1}\MT@patches@applied
1280     \@nameuse{MT@patch@undo@#1}%
1281     \MT@patch@info@undo{#1}%
1282   \else
1283     \MT@warning{Patch `#1' hasn't been applied,\MessageBreak cannot revert it}%
1284   \fi
1285 }

```

Unfortunately, `etoolbox` is a bit bitchy with hashes in arguments (but who would blame it), so I currently see no other solution than to temporarily reset the catcode of the `#` character.

```

1286 {\catcode`\#=12
1287 \MT@addto@setup{%

```

Now for the actual patches:

item: `\@item`, which is a kind of catch-all, as it's internally used for most basic environments (e.g., `itemize`, `enumerate`, but also `quote`, `flushleft` etc.). For verse (and probably other environments), we also have to patch `\everypar` ...

- for the base classes

```

1288 \MT@define@patch{item}{%
1289   \MT@append@patch\@item\leftprotrusion
1290   \MT@patch@patch\@item{\everypar{}}{\everypar{\leftprotrusion}}%

```

- beamer patches it too

```

1291 \ifclassloaded{beamer}
1292 {\MT@append@patch\beamer@callorigitem\leftprotrusion
1293   \MT@patch@patch\beamer@callorigitem{\ignorespaces}{\ignorespaces\leftprotrusion}}

```

- the `simplecv` class

```

1294 {\ifclassloaded{simplecv}
1295   {\MT@append@patch\@topic@item\leftprotrusion}
1296   {}}%
1297 }{}%

```

`toc`: TOC and friends

```

1298 \MT@define@patch{toc}{%
1299   \MT@append@patch\numberline\leftprotrusion

```

- for the memoir class we also fix the extra leader problem ...

```

1300 \ifclassloaded{memoir}
1301 { \MT@append@patch\booknumberline\leftprotrusion
1302 \MT@append@patch\partnumberline\leftprotrusion
1303 \MT@append@patch\chapternumberline\leftprotrusion
1304 \MT@append@patch\cftbookafterpnum\noprotrusion
1305 \MT@append@patch\cftpartafterpnum\noprotrusion
1306 \MT@append@patch\cftchapterafterpnum\noprotrusion
1307 \MT@append@patch\cftsectionafterpnum\noprotrusion
1308 \MT@append@patch\cftsubsectionafterpnum\noprotrusion
1309 \MT@append@patch\cftsubsubsectionafterpnum\noprotrusion
1310 \MT@append@patch\cftparagraphafterpnum\noprotrusion
1311 \MT@append@patch\cftsubparagraphafterpnum\noprotrusion
1312 \MT@append@patch\cftfigureafterpnum\noprotrusion
1313 \MT@append@patch\cfttableafterpnum\noprotrusion}
1314 {}%
1315 }{}%
```

- for the KOMA classes (which load the tocbasic package) we additionally have to switch protrusion back on; this will re-introduce the risk of getting an extra leader dot, but I currently don't see how to easily add \noprotusion. Therefore, I'll skip this patch for now, saving the joy of wading through scr files for later, all the while waiting for somebody who would understand KOMA better than me.

```

1316 % \ifpackageloaded{tocbasic}
1317 % { \MT@define@patch{toc}
1318 % { \MT@append@patch\numberline\leftprotrusion
1319 % \setuptoc{toc}{noprotusion}%
1320 % \setuptoc{lof}{noprotusion}%
1321 % \setuptoc{lot}{noprotusion}}
1322 % { \unsettoc{toc}{noprotusion}%
1323 % \unsettoc{lof}{noprotusion}%
1324 % \unsettoc{lot}{noprotusion}}{}%
```

- (a patch for titletoc would also be worthwhile ...)

eqnum: equation numbers (with or without amsmath). \eqref relies on \tagform@, so we have to make it use the original definition.

```

1325 \MT@define@patch{eqnum}{%
1326 \ifclassloaded{IEEEtran}
1327 { \MT@patch@patch\theequationdis{({}\leftprotrusion{({})}%
1328 \MT@patch@patch\theequationdis{({}\rightprotrusion{({})}%
1329 \MT@patch@patch\theIEEEsubequationdis{({}\leftprotrusion{({})}%
1330 \MT@patch@patch\theIEEEsubequationdis{({}\rightprotrusion{({})}%
1331 {}%
1332 \ifpackageloaded{amsmath}
1333 { \MT@patch@patch\tagform@{({}\leftprotrusion{({})}%
1334 \MT@patch@patch\tagform@{({}\rightprotrusion{({})}%
1335 \MT@patch@patch\eqref{\tagform@}{\nameuse{MT@patch@savd}\string\tagform@}}
1336 { \MT@patch@patch\eqnnum{({}\leftprotrusion{({})}%
1337 \MT@patch@patch\eqnnum{({}\rightprotrusion{({})}%
1338 }{}%
```

footnote: footnote text (only visible with block paragraphs)

- hyperref also patches this command (but only if hyperfootnotes=true)

```

1339 \MT@define@patch{footnote}{%
1340 \ifpackageloaded{hyperref}
1341 { \ifHy@hyperfootnotes\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
1342 \@secondoftwo
1343 { \MT@patch@patch\@footnotetext{\ignorespaces}\ignorespaces\leftprotrusion}%

```

```

1344      \MT@patch@patch\@footnotetext{\@empty\ignorespaces}{\@empty\ignorespaces\leftprotrusion}}
    • so do the KOMA classes (which load scrkbase)
1345      {\ifpackageloaded{scrkbase}
1346       \MT@patch@patch\scr@saved@footnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}}

    • base classes
1347      {\MT@patch@patch\@footnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}%

    • memoir additionally allows footnotes in the margins
1348      \ifclassloaded{memoir}
1349      {\MT@patch@patch\@footnotetext{\foottextfont #1}{\foottextfont\leftprotrusion #1}}
1350      {}}}%
1351  {}}%

    Finally, execute any redefinitions.

1352      \MT@redefined@patches
1353  {}

1354  </package>
1355  </package|letterspace>

```

## 1.2 Font setup

We need a font (the minimal class doesn't load one).

```

1356  <package>\expandafter\ifx\the\font\nullfont\normalfont\fi

\MT@setupfont  Setting up a font entails checking for each feature whether it should be applied to
                the current font (\MT@font).

1357  <*pdf-|lua-|xe-
1358  \def\MT@setupfont{%

```

With X<sub>Y</sub>TeX and LuaTeX the font may not be actually loaded, hence we might see a wrong font (in \MT@get@slot). Therefore, we first load the current font.

```

1359  <xe-|lua- \MT@font

```

We might have to disable stuff when used together with adventurous packages.

```

1360  \MT@setupfont@hook}

```

This will use a copy of the font (allowing for expansion parameter variation and the use of more than one set of protrusion factors for a font within one paragraph).

```

1361  <pdf- \MT@requires@pdfTeX{
1362  <pdf-|lua- \g@addto@macro\MT@setupfont\MT@copy@font
1363  <pdf- \relax

```

The font properties must be extracted from \MT@font, since the current value of \f@encoding and friends may be wrong!

```

1364  \g@addto@macro\MT@setupfont{%
1365  \MT@exp@two@c\MT@split@name\string\MT@font/\@nil

```

Try to find a configuration file for the current font family.

```

1366  \MT@exp@one@n\MT@find@file\MT@family
1367  \ifx\MT@familyalias\@empty \else
1368  \MT@exp@one@n\MT@find@file\MT@familyalias\fi

```

We have to make sure that \cf@encoding expands to the correct value (for later, in \MT@get@slot), which isn't the case when \selectfont chooses a new encoding (this would be done a second later in \selectfont, anyway – three lines, to be exact). (I think, I do not need this anymore – however, I'm too afraid to remove it. ... Oops, I did it. Let's see whether anybody complains.)

```

1369 % \ifx\fontencoding\cfontencoding\else\@enc@update\fi
1370 }

```

Tracking has to come first, since it means actually loading a different font.

```

1371 <pdf->\MT@requires@pdftex6
1372 <lua->\MT@requires@luatex3
1373 <pdf-|lua-> {\g@addto@macro\MT@setupfont\MT@tracking}\relax
1374 \g@addto@macro\MT@setupfont{%
1375   \MT@check@font
1376   \ifMT@inlist@
1377 <debug>\MT@show@pdfannot2%
1378   \else
1379     \MT@info{Setting up font `MT@font'\on@line}%
1380     \MT@info@nottracking

```

Now we can begin setting up the font for all features that the current pdfTeX provides. The following commands are `\let` to `\relax` if the respective feature is disabled via package options.

For versions older than 1.20, protrusion has to be set up first, beginning with 1.20, the order doesn't matter.

```

1381   \MT@protrusion
1382 <pdf-|lua-> \MT@expansion
1383 }

```

Interword spacing and kerning (pdfTeX 1.40).

```

1384 <*pdf->
1385 \MT@requires@pdftex6{
1386 \g@addto@macro\MT@setupfont{\MT@spacing\MT@kerning}
1387 }\relax
1388 </pdf->

```

Disable ligatures (pdfTeX 1.30).

```

1389 <pdf->\MT@requires@pdftex5{
1390 <pdf-|lua->\g@addto@macro\MT@setupfont\MT@noligatures
1391 <pdf->}\relax
1392 \g@addto@macro\MT@setupfont{%

```

Debugging.

```

1393 <debug>\MT@show@pdfannot1%

```

Finally, register the font so that we don't set it up anew each time.

```

1394   \MT@register@font
1395   \fi
1396 }
1397 </pdf-|lua-|xe->

```

`\MT@copy@font`      The new (1.40.4) `\pdfcopyfont` command allows expanding a font with different parameters, or to use more than one set of protrusion factors for a given font within one paragraph. It will be used when we find a context for `\SetProtrusion` or `\SetExpansion` in the preamble, or when the package has been loaded with the `copyfonts` option.

```

1398 <*pdf-|lua->
1399 \let\MT@copy@font\relax
1400 <pdf->\MT@requires@pdftex7{
1401 \def\MT@copy@font{%

```

`\MT@font@copy`      For every new protrusion and expansion context, we create a new copy.

```

1402 \xdef\MT@font@copy{\csname\MT@font/\MT@pr@context/\MT@ex@context\endcsname}%
1403 \expandafter\ifx\MT@font@copy\relax

```

`\MT@font@orig`      pdfTeX doesn't allow copying a font that has already been copied and expanded/letterspaced. Hence, we have to get the original.

```

1404 \edef\MT@font@orig{\csname\expandafter\string\font@name @orig\endcsname}%
1405 \expandafter\ifx\MT@font@orig\relax
1406 \MT@exp@two@c\MT@glet\MT@font@orig\font@name
1407 \else
1408 \MT@exp@two@c\let\font@name\MT@font@orig
1409 \fi
1410 (pdf-) \global\MT@exp@two@c\pdfcopyfont\MT@font@copy\font@name

```

Even though LuaTeX also provides the primitive from pdfTeX (even renamed to `\copyfont`, that is, ‘promoted’ as per the LuaTeX manual), it is seriously crippled in that OpenType features will be lost. Therefore, we do not copy the font but load it anew.

```

1411 (lua-) \MT@exp@two@c\MT@lua@copyfont\meaning\font@name\@nil
1412 (debug) \MT@dinfol{creating new copy: \MT@font@copy}%

```

Since it’s a new font, we have to remove it from the context lists.

```

1413 \MT@map@clist@c\MT@active@features{%
1414 \MT@exp@cs\ifx\MT@%nameuse\MT@abbr@#1}\relax\else
1415 \def\@tempa{#1}%
1416 \MT@exp@cs\MT@map@tlist@c\MT@##1@doc@contexts\MT@rem@from@list
1417 \fi
1418 }%
1419 \fi
1420 \MT@exp@two@c\let\MT@font\MT@font@copy

```

We only need the font identifier for letterspacing.

```

1421 \let\font@name\MT@font@copy

```

But we have to properly substitute the font after we’re done.

```

1422 \aftergroup\let\aftergroup\font@name\aftergroup\MT@font@copy
1423 }

```

`\MT@rem@from@list`

```

1424 \def\MT@rem@from@list#1{%
1425 \MT@exp@cs\ifx\MT@%tempa @#1font@list}\relax\else
1426 \expandafter\MT@exp@one@n\expandafter\MT@rem@from@clist\expandafter
1427 \MT@font \csname \MT@%tempa @#1font@list\endcsname
1428 \fi
1429 }
1430 (pdf-) \relax

```

`\MT@lua@copy@font` `<#1>` and `<#2>` are ‘select’ and ‘font’, respectively, `<#3>` is the font spec.

```

1431 (lua-) \def\MT@lua@copyfont #1 #2 #3\@nil{%
1432 (lua-) \global\expandafter\font\MT@font@copy=#3\relax
1433 (pdf-lua-)

```

*Here’s the promised dirty trick* for users of older pdfTeX versions, which works around the problem that the use of the same font with different expansion parameters is prohibited. If you do not want to create a clone of the font setup (this would require duplicating the `tfm/vf` files under a new name, and writing new `fd` files and map entries), you can load a minimally larger font for the paragraph in question. E.g., for a document typeset in 10 pt:

```

\SetExpansion
[ stretch = 30,
  shrink = 60,
  step = 5 ]
{ encoding = *,
  size = 10.001 }
{ }
\newcommand{\expandpar}[1]{\{%
\fontsize{10.001}{\baselineskip}\selectfont #1\par}}

```

```
% ...
\expandpar{This paragraph contains an `unnecessary' widow.}
```

Note that the `\expandpar` command can only be applied to complete paragraphs. If you are using Computer Modern Roman, you have to load the `fix-cm` package to be able to select fonts in arbitrary sizes. Finally, the reason I suggest to use a larger font, and not a smaller one, is to prevent a different design size being selected.

`\MT@fix@fontdimen@six`      If `\fontdimen 6` is zero, character protrusion, spacing, kerning and tracking won't work, and we could skip the settings (for example, the `dsfont` fonts don't specify this dimension; this is probably a bug – the `fourier` and `newpx/newtx` packages have been fixed in the meantime). However, we can fix it ourselves – only tracking still doesn't work (it seems that `\letterspacefont` uses the `\fontdimen 6` from the original font).  $\TeX$  doesn't provide an equivalent to `\pdffontsize`, so we use the nominal size instead.

```
1434 <pdf-|lua-|xe-
1435 \def\MT@fix@fontdimen@six{%
1436   \ifnum\fontdimen6\MT@font=\z@
1437     \fontdimen6\MT@font=%
1438   <pdf-      \pdffontsize\MT@font
1439   <lua-      \MT@requires@luatex4{\pdffeedback fontsize}{\pdffontsize}\MT@font
1440   <xe-      \MT@size pt
1441     \MT@info{Fixing zero \string\fontdimen 6 for font `'\MT@font'\MessageBreak
1442       (new value: \the\fontdimen6\MT@font)}%
1443   <pdf-      \MT@requires@pdftex8\relax{\MT@glet@nc{\MT@@font-fake6}\@empty}%
1444   \fi
1445   \edef\MT@dimen@six{\number\fontdimen6\MT@font}%
1446 }
1447 </pdf-|lua-|xe-
```

`\MT@split@name`      Split up the font name (`(#6)` may be a protrusion/expansion context and/or a letterspacing amount). With `fontspec` we also need to remove its internal instance counter.

```
\MT@encoding
\MT@family
\MT@series 1448 <package>
1449 \def\MT@split@name#1/#2/#3/#4/#5/#6\@nil{%
\MT@shape 1450   \def\MT@encoding{#1}%
1451   \ifMT@fontspec
\MT@size 1452     \edef\MT@family{\MT@scrubfeature#2()\relax}%
1453   \else
1454     \def\MT@family{#2}%
1455   \fi
1456   \def\MT@series {#3}%
1457   \def\MT@shape {#4}%
1458   \def\MT@size {#5}%
1459   \MT@fix@fontdimen@six
```

`\MT@familyalias`      Alias family?

```
1460 \MT@ifdefined@n@TF{MT@\MT@family @alias}%
1461 { \MT@let@cn\MT@familyalias{MT@\MT@family @alias}}%
1462 { \let\MT@familyalias\@empty}%
1463 }
```

`\MT@scrubfeature`      Remove one resp. all feature counters (`fontspec`).

```
\MT@scrubfeatures 1464 \def\MT@scrubfeature#1(#2)#3\relax{#1}
1465 \def\MT@scrubfeatures#1(#2)#3\relax{%
1466   #1%
1467   \ifx\relax#3\relax\else
1468     \MT@scrubfeatures#3\relax
1469   \fi
1470 }
```

`\ifMT@do` We check all features of the current font against the lists of the currently active font set, and set `\ifMT@do` accordingly.

`\MT@maybe@do` 1471 `\newif\ifMT@do`  
1472 `\def\MT@maybe@do#1{%`

(but only if the feature isn't globally set to false)

1473 `\csname ifMT@\csname MT@abbr@#1\endcsname\endcsname`

Begin with setting micro-typography to true for this font. The `\MT@checklist@...` tests will set it to false if the property is not in the list. The first non-empty list that does not contain a match will stop us (except for font).

```
1474 \MT@dotrue
1475 \edef\@tempa{\csname MT@#1\setname\endcsname}%
1476 \MT@map@clist@{font,encoding,family,series,shape,size}%
1477 \MT@ifdefined@n@TF{MT@checklist@#1}%
1478 {\csname MT@checklist@#1\endcsname}%
1479 {\MT@checklist@{#1}}%
1480 {#1}%
1481 }%
1482 \else
1483 \MT@dofalse
1484 \fi
1485 \ifMT@do
```

`\MT@feat` stores the current feature.

```
1486 \def\MT@feat{#1}%
1487 \csname MT@set@#1@codes\endcsname
1488 \else
1489 \MT@ifstreq{#1}{tr}%
1490 {\let\MT@info@nottracking\MT@info@nottracking}%
1491 {\MT@vinfo{... No \@nameuse{MT@abbr@#1}}}%
1492 \fi
1493 }
```

`\MT@info@nottracking` To defer the message to after the font has actually been logged.

`\MT@info@nottracking@` 1494 `\let\MT@info@nottracking\relax`  
1495 `\def\MT@info@nottracking@{\MT@vinfo{... No tracking}}`

`\MT@dinfo@list`

```
1496 <debug>\def\MT@dinfo@list#1#2#3{\MT@dinfo@n1{1}{\@nameuse{MT@abbr@#1}: #2
1497 <debug> \ifx\#3\list empty\else \@nameuse{MT@#2}' #3 list\fi}}
```

`\MT@checklist@` The generic test (`<#1>` is the axis, `<#2>` the feature, `\@tempa` contains the set name).

```
1498 \def\MT@checklist@#1#2{%
1499 <!debug> \MT@ifdefined@n@T
1500 <debug> \MT@ifdefined@n@TF
1501 {MT@#2list@#1@\@tempa}%
```

Begin a (neatly masqueraded) `\expandafter` orgy to test whether the font attribute is in the list.

```
1502 \expandafter\MT@exp@one@n\expandafter\MT@in@clist
1503 \csname MT@#1\expandafter\endcsname
1504 \csname MT@#2list@#1@\@tempa\endcsname
1505 \ifMT@inlist@
1506 <debug>\MT@dinfo@list{#2}{#1}{in}%
1507 \MT@dotrue
1508 \else
1509 <debug>\MT@dinfo@list{#2}{#1}{not in}%
1510 \MT@dofalse
1511 \expandafter\MT@clist@break
1512 \fi
1513 }%
```

If no limitations have been specified, i.e., the list for a font attribute has not been defined at all, the font should be set up.

```
1514 <debug> {\MT@info@list{#2}{#1}{}}%
1515 }
```

`\MT@checklist@family` Also test for the alias font, if the original font is not in the list.

```
1516 \def\MT@checklist@family#1{%
1517 <!debug> \MT@ifdefined@n@T
1518 <debug> \MT@ifdefined@n@TF
1519 {MT@#1list@family@%tempa}%
1520 \MT@exp@two@n\MT@in@clist
1521 \MT@family{\csname MT@#1list@family@%tempa\endcsname}%
1522 \ifMT@inlist@
1523 <debug>\MT@info@list{#1}{family}{in}%
1524 \MT@dotrue
1525 \else
1526 <debug>\MT@info@list{#1}{family}{not in}%
1527 \MT@dofalse
1528 \ifx\MT@familyalias\empty \else
1529 \MT@exp@two@n\MT@in@clist
1530 \MT@familyalias{\csname MT@#1list@family@%tempa\endcsname}%
1531 \ifMT@inlist@
1532 <debug> \MT@info@list{#1}{family alias}{in}%
1533 \MT@dotrue
1534 <debug>\else\MT@info@list{#1}{family alias}{not in}%
1535 \fi
1536 \fi
1537 \fi
1538 \ifMT@do \else
1539 \expandafter\MT@clist@break
1540 \fi
1541 }%
1542 <debug> {\MT@info@list{#1}{family}{}}%
1543 }
```

`\MT@checklist@size` Test whether font size is in list of size ranges.

```
1544 \def\MT@checklist@size#1{%
1545 <!debug> \MT@ifdefined@n@T
1546 <debug> \MT@ifdefined@n@TF
1547 {MT@#1list@size@%tempa}%
1548 \MT@exp@cs\MT@in@rlist{MT@#1list@size@%tempa}%
1549 \ifMT@inlist@
1550 <debug>\MT@info@list{#1}{size}{in}%
1551 \MT@dotrue
1552 \else
1553 <debug>\MT@info@list{#1}{size}{not in}%
1554 \MT@dofalse
1555 \expandafter\MT@clist@break
1556 \fi
1557 }%
1558 <debug> {\MT@info@list{#1}{size}{}}%
1559 }
```

`\MT@checklist@font` If the font matches, we skip the rest of the test.

```
1560 \def\MT@checklist@font#1{%
1561 <!debug> \MT@ifdefined@n@T
1562 <debug> \MT@ifdefined@n@TF
1563 {MT@#1list@font@%tempa}%

```

Since `\MT@font` may be appended with context and/or letterspacing specs, we construct the name from the font characteristics.

```
1564 \edef@tempb{\MT@encoding/\MT@family/\MT@series/\MT@shape/\MT@size}%
1565 \expandafter\MT@exp@one@n\expandafter\MT@in@clist\expandafter
1566 \@tempb \csname MT@#1list@font@%tempa\endcsname
```



```

1567 \ifMT@inlist@
1568 <debug>\MT@info@list{#1}{font}{in}%
1569 \expandafter\MT@clist@break
1570 \else
1571 <debug>\MT@info@list{#1}{font}{not in}%
1572 \MT@dofalse
1573 \fi
1574 }%
1575 <debug> {\MT@info@list{#1}{font}}}%
1576 }

```

### 1.2.1 Protrusion

`\ifMT@nofamily` Info for settings that are not family-specific. (Warnings seem to be too irritating.)  
The switch is set in `\MT@next@listname`.

```
1577 \newif\ifMT@nofamily
```

`\MT@protrusion` Set up for protrusion?

```

1578 \def\MT@protrusion{\MT@maybe@do{pr}}
1579 </package>

```

`\MT@set@pr@codes` This macro is called by `\MT@setupfont`, and does all the work for setting up a font for protrusion.

```

1580 <*pdf-|lua-|xe-|show>
1581 <show>\def\MTS@show@pr
1582 <pdf-|lua-|xe-|\def\MT@set@pr@codes
1583 {%
1584 <pdf-|lua-|xe-| \MT@nofamilyfalse

```

Check whether and if, which list should be applied to the current font. If family-specific settings don't exist, we write it to the log (for each encoding).

```

1585 <show> \MTS@printtext{Protrusion settings for font '\texttt{\MT@font}':}\
1586 \MT@if@list@exists{%
1587 <*pdf-|lua-|xe-|
1588 \ifMT@nofamily
1589 \MT@ifdefined@n@TF{\MT@encoding-\MT@family-settings}\relax{%
1590 \MT@info@n{Loading generic protrusion settings for font family\MessageBreak
1591 \MT@family' (encoding: \MT@encoding).\MessageBreak
1592 For optimal results, create family-specific settings.\MessageBreak
1593 See the microtype manual for details}%
1594 \MT@gl@et@nc{\MT@encoding-\MT@family-settings}\empty
1595 }%
1596 \fi
1597 </pdf-|lua-|xe-|
1598 <show> \MTS@printtext{First matching list is for '\texttt{\@tempa}':\texttt{\MT@pr@c@name}}%
1599 \MT@get@opt
1600 \MT@reset@pr@codes

```

Get the name of the inheritance list and parse it.

```
1601 \MT@get@inh@list
```

Set an input encoding?

```
1602 \MT@set@inputenc{c}%
```

Load additional lists?

```

1603 \MT@load@list\MT@pr@c@name
1604 \MT@set@listname

```

Load the main list.

```

1605 \MT@let@cn\@tempc{\MT@pr@c@\MT@pr@c@name}%
1606 \expandafter\MT@set@codes\@tempc,\relax,%
1607 <show> \vrule width 4cm height .5pt \
1608 <show> \MTS@printtext{End of list '\texttt{\MT@pr@c@name}'}\[\.5em]

```

```

1609 <show> \MT@ifdefined@c@T\MT@pr@inh@name{%
1610 <show> \MT@ifdefined@n@T{MT@inh@MT@pr@inh@name @prefixes}{%
1611 <show> \par \MTS@printtext{(with prefixes:)}%
1612 <show> \@tempcntb=\z@

```

Set unconditional heirs.

```

1613 \MT@set@pr@prefixheirs
1614 <show> }}%
1615 <show> \ifShowMissingGlyphs\MTS@show@missing\fi
1616 }%
1617 <show> {\MTS@printtext{NOT DEFINED}}%
1618 \MT@reset@pr@codes
1619 <show> }\par
1620 }

```

\MT@set@all@pr Set all protrusion codes of the font.

```

1621 <*pdf-|lua-|xe-|
1622 \def\MT@set@all@pr#1#2{%
1623 <debug>\MT@info{n1}{3}{-- lp/rp: setting all to #1/#2}%
1624 \let\MT@temp\@empty
1625 \MT@ifempty{#1}\relax{\g@addto@macro\MT@temp{\lcode\MT@font\@tempcnta=#1}}%
1626 \MT@ifempty{#2}\relax{\g@addto@macro\MT@temp{\rcode\MT@font\@tempcnta=#2}}%
1627 \MT@do@font\MT@temp
1628 }

```

\MT@reset@pr@codes@ All protrusion codes are zero for new fonts. However, if we have to reload the font due to different contexts, we have to reset them. This command will be changed by \microtypecontext if necessary.

```

1629 \def\MT@reset@pr@codes@{\MT@set@all@pr\z@\z@}
1630 \let\MT@reset@pr@codes\relax

```

\MT@the@pr@code If the font is letterspaced, we have to add half the letterspacing amount to the margin kerns. This will be activated in \MT@set@tr@codes.

```

1631 \def\MT@the@pr@code{\@tempcntb}
1632 <*pdf-|lua-|
1633 <pdf-|>\MT@requires@pdftex6
1634 <lua-|>\MT@requires@luatex3
1635 {\def\MT@the@pr@code@tr{%
1636 \numexpr\@tempcntb+\MT@letterspace@/2\relax
1637 }
1638 }\relax
1639 </pdf-|lua-|

```

\MT@set@codes Split up the values and set the codes.

```

1640 \def\MT@set@codes#1,{%
1641 \ifx\relax#1\@empty\else
1642 \MT@split@codes #1==\relax
1643 \expandafter\MT@set@codes
1644 \fi
1645 }

```

\MT@split@codes The keyval package would remove spaces here, which we needn't do since \SetProtrusion ignores spaces in the protrusion list anyway. \MT@get@char@unit may mean different things.

```

1646 \def\MT@split@codes#1=#2=#3\relax{%
1647 \def\@tempa{#1}%
1648 \ifx\@tempa\@empty \else
1649 \MT@get@slot
1650 <pdf-|lua-| \ifnum\MT@char > \m@ne
1651 <xe-|> \ifx\MT@char\@empty \else
1652 \MT@get@char@unit
1653 \csname MT@\MT@feat @split@val\endcsname#2\relax
1654 \fi

```

```

1655 \fi
1656 }

\MT@pr@split@val

1657 \def\MT@pr@split@val#1,#2\relax
1658 <pdf-|lua-|xe-
1659 <show>\def\MT@pr@split@val#1,#2\relax
1660 {\def\@tempb{#1}%
1661 \MT@ifempty\@tempb
1662 <pdf-|lua-|xe- \relax
1663 <show> {\MT@lp@=\z@ \let\MT@lpcode\@empty}%
1664 {\MT@scale@to@em
1665 <pdf-|lua-|xe- \lcode\MT@font\MT@char=\MT@the@pr@code
1666 <show> \MT@lp@=\dimexpr\@tempcntb em/1000\relax\relax
1667 <show> \edef\MT@lpcode{[\@tempb] \the\@tempcntb/\the\MT@lp@}%
1668 <debug>\MT@info{n1}{4}{;;; lp (\MT@char): \number\lcode\MT@font\MT@char: [#1]}%
1669 }%
1670 \def\@tempb{#2}%
1671 \MT@ifempty\@tempb
1672 <pdf-|lua-|xe- \relax
1673 <show> {\MT@rp@=\z@ \let\MT@rpcode\@empty}%
1674 {\MT@scale@to@em
1675 <pdf-|lua-|xe- \rcode\MT@font\MT@char=\MT@the@pr@code
1676 <show> \MT@rp@=\dimexpr\@tempcntb em/1000\relax\relax
1677 <show> \edef\MT@rpcode{[\@tempb] \the\@tempcntb/\the\MT@rp@}%
1678 <debug>\MT@info{n1}{4}{;;; rp (\MT@char): \number\rcode\MT@font\MT@char: [#2]}%
1679 }%
1680 <show> \llap{\MT@show@char@pr\MT@char\quad}%
1681 <show> \parbox[b]{}[b]{3.5cm}{\MT@printtext}%
1682 <show> \footnotesize\makebox[.4cm][L:]{\MT@ifempty{\MT@lpcode}{---}{\MT@lpcode}}\
1683 <show> \makebox[.4cm][R:]{\MT@ifempty{\MT@rpcode}{---}{\MT@rpcode}}}%
1684 <show> \parbox[t]{}[t]{\dimexpr\textwidth-3.5cm}%

```

Now we can set the values for the inheriting characters. Their slot numbers are saved in the macro `\MT@inh@<list name>@<slot number>@`.

```

1685 \MT@ifdefined@c@T\MT@pr@inh@name{%
1686 \MT@ifdefined@n@T\MT@inh@MT@pr@inh@name @\MT@char @}%
1687 \MT@exp@cs\MT@map@tlist@c
1688 {\MT@inh@MT@pr@inh@name @\MT@char @}%
1689 <pdf-|lua-|xe- \MT@set@pr@heirs
1690 <show> \MT@show@char@pr
1691 }%
1692 }%
1693 <show> }\newline
1694 }
1695 <*pdf-|lua-|xe-

```

`\MT@scale@to@em` Since pdfTeX version 0.14h, we have to adjust the protrusion factors (i.e., convert numbers from thousandths of character width to thousandths of an em of the font). We have to do this *before* setting the inheriting characters, so that the latter inherit the absolute value, not the relative one if they have a differing width (e.g., the ‘ff’ ligature). Unlike `protcode.tex` and `pdfcprot`, we do not calculate with `\lcode` resp. `\rcode`, since this would disallow protrusion factors larger than the character width (since `\lcode`’s limit is 1000). Now, the maximum protrusion is 1 em of the font.

The unit is in `\MT@count`, the desired factor in `\@tempb`, and the result will be returned in `\@tempcntb`.

```

1696 <pdf-|lua-|xe- \MT@requires@pdfTeX3{
1697 \def\MT@scale@to@em{%
1698 \@tempcntb=\MT@count\relax

```

For really huge fonts (100 pt or so), an arithmetic overflow could occur with vanilla

T<sub>E</sub>X. Using e-T<sub>E</sub>X, this can't happen, since the intermediate value is 64 bit, which could only be reached with a character width larger than \maxdimen.

```
1699 \MT@scale\@tempcntb \@tempb \MT@dimen@six
1700 \ifnum\@tempcntb=\z@ \else
1701 \MT@scale@factor
1702 \fi
1703 }
```

\MT@get@charwd Get the width of the character. When using e-T<sub>E</sub>X, we can employ \fontcharwd instead of building scratch boxes.

```
1704 \def\MT@get@charwd{%
1705 \pdf-
1706 ^^X \MT@count=\fontcharwd\MT@font\MT@char\relax
1707 ^^Q \setbox\z@=\hbox{\MT@font \char\MT@char}%
1708 ^^Q \MT@count=\wd\z@
1709 \pdf-
1710 \lua- \MT@count=\fontcharwd\MT@font\MT@char\relax
```

\MT@char contains a slot number (legacy fonts), a Unicode number, or a glyph name (if \MT@char@ is negative).

```
1711 \xe-
1712 \ifnum\MT@char@<\z@
1713 \setbox\z@=\hbox{\MT@font \XeTeXglyph-\MT@char@}%
1714 \MT@count=\wd\z@
1715 \else
1716 \MT@count=\fontcharwd\MT@font\MT@char@\relax
1717 \fi
1718 \xe-
1719 \ifnum\MT@count=\z@ \MT@info@missing@char \fi
1720 }
```

For letterspaced fonts, we have to subtract the letterspacing amount from the characters' widths. The protrusion amounts will be adjusted in \MT@set@pr@codes. The letterspaced font is already loaded so that 1 em = \fontdimen 6.

```
1721 \pdf-
1722 \MT@requires@pdftex6{
1723 \g@addto@macro\MT@get@charwd{%
1724 \MT@ifdefined@cT\MT@letterspace@
1725 {\advance\MT@count-\dimexpr\MT@letterspace@ sp *\dimexpr 1em/1000\relax}%
1726 }
1727 }\relax
1728 }}
```

No adjustment with versions 0.14f and 0.14g.

```
1729 \def\MT@scale@to@em{%
1730 \MT@count=\@tempb\relax
1731 \ifnum\MT@count=\z@ \else
1732 \MT@scale@factor
1733 \fi
1734 }
```

We need this in \MT@warn@code@too@large (neutralised).

```
1735 \def\MT@get@charwd{\MT@count=\MT@dimen@six}
1736 }
1737 \pdf-
1738 \pdf-|lua-|xe-
1739 \pdf-|lua-|xe-|show
```

\MT@get@font@dimen For the space unit.

```
1740 \package
1741 \def\MT@get@font@dimen#1{%
1742 \ifnum\fontdimen#1\MT@font=\z@
1743 \MT@warning@n1{Font '\MT@font' does not specify its\MessageBreak
```

```

1744     \@backslashchar fontdimen #1 (it's zero)! \MessageBreak
1745     You should use a different `unit' for \MT@curr@list@name}%
1746   \else
1747     \MT@count=\fontdimen#1\MT@font
1748   \fi
1749 }

```

\MT@info@missing@char Info about missing characters, or characters with zero width.

```

1750 \def\MT@info@missing@char{%
1751   \MT@info@n1{Character `\'the\MT@toks'
1752   ^^X   \ifnum\MT@char@<\z@ is missing\else
1753   ^^X     \iffontchar\MT@font\MT@char@
1754           has a width of 0pt
1755   ^^X     \else is missing\fi\fi
1756   ^^Q   \MessageBreak (it's probably missing)
1757   \MessageBreak in font `\'MT@@font'. \MessageBreak
1758   Ignoring protrusion settings for this character}%
1759 }

```

\MT@scale@factor Furthermore, we might have to multiply with a factor.

```

1760 \def\MT@scale@factor{%
1761   \ifnum\csname MT@\MT@feat @factor@\endcsname=\@m \else
1762     \expandafter\MT@scale\expandafter \@tempcntb
1763     \csname MT@\MT@feat @factor@\endcsname \@m
1764   \fi
1765   \ifnum\@tempcntb>\csname MT@\MT@feat @max\endcsname\relax
1766     \MT@exp@cs\MT@warn@code@too@large{MT@\MT@feat @max}%
1767   \else
1768     \ifnum\@tempcntb<\csname MT@\MT@feat @min\endcsname\relax
1769       \MT@exp@cs\MT@warn@code@too@large{MT@\MT@feat @min}%
1770     \fi
1771   \fi
1772 }

```

\MT@warn@code@too@large Type out a warning if a chosen protrusion factor is too large after the conversion. As a special service, we also type out the maximum amount that may be specified in the configuration.

```

1773 \def\MT@warn@code@too@large#1{%
1774   \@tempcnta=#1\relax
1775   \ifnum\csname MT@\MT@feat @factor@\endcsname=\@m \else
1776     \expandafter\MT@scale\expandafter \@tempcnta\expandafter
1777     \@m \csname MT@\MT@feat @factor@\endcsname
1778   \fi
1779   \MT@scale\@tempcnta \MT@dimen@six \MT@count
1780   \MT@warning@n1{The \@nameuse{MT@abbr@\MT@feat} code \@tempb\space
1781     is too large for character \MessageBreak
1782     `\'the\MT@toks' in \MT@curr@list@name. \MessageBreak
1783     Setting it to the maximum of \number\@tempcnta}%
1784   \@tempcntb=#1\relax
1785 }

```

\MT@get@opt The optional argument to the configuration commands (except for \SetExpansion and \SetTracking, which are being dealt with in \MT@get@ex@opt and \MT@get@tr@opt, resp.).

```

1786 \def\MT@get@opt{%
1787   \MT@set@listname

```

\MT@pr@factor@ Apply a factor?

```

\MT@sp@factor@ 1788 \MT@ifdefined@n@TF{MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @factor}{%
\MT@kn@factor@ 1789 \MT@let@nn{MT@\MT@feat @factor@}
1790 {MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @factor}%
1791 \MT@vinfo{... : Multiplying \@nameuse{MT@abbr@\MT@feat} codes by
1792 \number\csname MT@\MT@feat @factor@\endcsname/1000}%
1793 }{%

```

```

1794 \MT@let@nn{MT@MT@feat @factor@}{MT@MT@feat @factor}%
1795 }%

\MT@pr@unit@ The unit can only be evaluated here, since it might be font-specific. If it's \@empty,
\MT@sp@unit@ it's relative to character widths, if it's -1, relative to space dimensions.
\MT@kn@unit@ 1796 \MT@ifdefined@n@TF{MT@MT@feat @c@csname MT@MT@feat @c@name\endcsname @unit}{%
1797 \MT@let@nn{MT@MT@feat @unit@}%
1798 {MT@MT@feat @c@csname MT@MT@feat @c@name\endcsname @unit}%
1799 \MT@exp@cs@ifx{MT@MT@feat @unit@}\@empty
1800 \MT@vinfo{... : Setting \@nameuse{MT@abbr@MT@feat} codes
1801 relative to character widths}%
1802 \else
1803 \MT@exp@cs@ifx{MT@MT@feat @unit@}\m@ne
1804 \MT@vinfo{... : Setting \@nameuse{MT@abbr@MT@feat} codes
1805 relative to width of space}%
1806 \fi
1807 \fi
1808 }{%
1809 \MT@let@nn{MT@MT@feat @unit@}{MT@MT@feat @unit}%
1810 }%

\MT@get@space@unit The codes are either relative to character widths, or to a fixed width. For spacing
\MT@get@char@unit and kerning lists, they may also be relative to the width of the interword glue. Only
the setting from the top list will be taken into account.

1811 \let\MT@get@char@unit\relax
1812 \let\MT@get@space@unit\@gobble
1813 \MT@exp@cs@ifx{MT@MT@feat @unit@}\@empty
1814 \let\MT@get@char@unit\MT@get@charwd
1815 \else
1816 \MT@exp@cs@ifx{MT@MT@feat @unit@}\m@ne
1817 \let\MT@get@space@unit\MT@get@font@dimen
1818 \else
1819 \MT@exp@cs\MT@get@unit{MT@MT@feat @unit}%
1820 \fi
1821 \fi

Preset all characters? If so, we surely don't need to reset, too.

1822 \MT@ifdefined@n@T{MT@MT@feat @c@csname MT@MT@feat @c@name\endcsname @preset}{%
1823 \csname MT@preset@MT@feat\endcsname
1824 \MT@let@nc{MT@reset@MT@feat @codes}\relax
1825 }%
1826 }

\MT@get@unit If unit contains an em or ex, we use the corresponding \fontdimen to obtain the
\MT@get@unit@ real size. Simply converting the em into points might give a wrong result, since
the font probably isn't set up yet, so that these dimensions haven't been updated,
either.

1827 \def\MT@get@unit#1{%
1828 \expandafter\MT@get@unit@#1 e!\@nil
1829 \ifx\x\@empty\else\let#1\x\fi
1830 \@defaultunits\@tempdima#1 pt\relax\@nnil
1831 \ifdim\@tempdima=\z@
1832 \MT@warning@n1{%
1833 Cannot set \@nameuse{MT@abbr@MT@feat} factors relative to zero\MessageBreak
1834 width. Setting factors of list \@nameuse{MT@MT@feat @c@name}'\MessageBreak
1835 relative to character widths instead}%
1836 \let#1\@empty
1837 \let\MT@get@char@unit\MT@get@charwd
1838 \else
1839 \MT@vinfo{... : Setting \@nameuse{MT@abbr@MT@feat} factors relative
1840 to \the\@tempdima}%
1841 \MT@count=\@tempdima\relax
1842 \fi

```

```

1843 }
1844 \def\MT@get@unit@#1e#2#3\@nil{%
1845   \ifx\#3\\\let\x\@empty \else
1846     \if m#2%
1847       \edef\x{#1\fontdimen6\MT@font}%
1848     \else
1849       \if x#2%
1850         \edef\x{#1\fontdimen5\MT@font}%
1851       \fi
1852     \fi
1853   \fi
1854 }

```

\MT@set@inputenc     The configurations may be under the regime of an input encoding.

```
1855 \def\MT@set@inputenc#1{%
```

\MT@cat     We remember the current category (c or inh), in case of warnings later.

```

1856   \def\MT@cat{#1}%
1857   \edef\@tempa{\MT@MT@feat @#1@\csname MT@\MT@feat @#1\name\endcsname @inputenc}%
1858   \MT@ifdefined@n@T\@tempa\MT@set@inputenc@
1859 }

```

\MT@set@inputenc@     More recent versions of inputenc remember the current encoding, so that we can test whether we really have to load the encoding file.

```

1860 \MT@addto@setup{%
1861   \ifpackageloaded{inputenc}{%
1862     \ifpackageafter{inputenc}{2006/02/22}{%
1863       \def\MT@set@inputenc@{%
1864         \MT@ifstreq\inputencodingname{\csname\@tempa\endcsname}\relax
1865         \MT@load@inputenc
1866       }%
1867     }%
1868     \let\MT@set@inputenc@\MT@load@inputenc
1869   }%
1870 }%
1871 \def\MT@set@inputenc@{%
1872   \MT@warning@n{Key `inputenc' used in \MT@curr@list@name, but the `inputenc'
1873     \MessageBreak package isn't loaded. Ignoring input encoding}%
1874 }%
1875 }%
1876 }

```

\MT@load@inputenc     Set up normal catcodes, since, e.g., listings would otherwise want to actually typeset the inputenc file when it is being loaded inside a listing.

```

1877 \def\MT@load@inputenc{%
1878   \MT@cfg@catcodes
1879   <debug>\MT@edinfo@n{1}{loading input encoding: \@nameuse{\@tempa}}%
1880   \inputencoding{\@nameuse{\@tempa}}%
1881 }

```

\MT@set@pr@heirs     Set the inheriting characters.

```

1882 \def\MT@set@pr@heirs#1{%
1883   \lcode\MT@font #1=\lcode\MT@font\MT@char\relax
1884   \rcode\MT@font #1=\rcode\MT@font\MT@char\relax
1885   <debug>\MT@edinfo@n{2}{-- heir of \MT@char: #1}%
1886   <debug>\MT@edinfo@n{4}{;;; lp/rp (#1): \number\lcode\MT@font\MT@char/%
1887     <debug> \number\rcode\MT@font\MT@char}%
1888 }

```

\MT@set@pr@prefixheirs     Inheriting characters that have been specified in a prefixed list.

```

1889 \def\MT@set@pr@prefixheirs{%
1890   \MT@ifdefined@c@T\MT@pr@inh@name{%
1891     \MT@ifdefined@n@T{\MT@inh@MT@pr@inh@name @prefixes}{%
1892       \MT@exp@cs\MT@map@tlist@c

```

```

1893      {MT@inh@MT@pr@inh@name @prefixes}%
1894      \MT@set@pr@prefixes
1895    }%
1896  }%
1897 }
1898 </package>

```

\MT@set@pr@prefixes      Add charwidth(inheriting char)-charwidth(base char) to either left or right side or half the amount to both sides. For X<sub>Y</sub>TEX, we may have to translate to glyph numbers because \fontcharwd doesn't have the nice feature of understanding the 'U' or '/' prefixes.

```

1899 <pdf-|lua-|xe-|show>
1900 <pdf-|lua-|xe-|show>\def\MT@set@pr@prefixes#1{\MT@set@pr@prefixes@#1}
1901 <pdf-|lua-|xe-|show>\def\MT@set@pr@prefixes@#1#2#3#4%
1902 <show>\def\MT@set@pr@prefixes@#1#2#3#4%
1903 {%
1904   <show> \MTS@lp@=\z@ \MTS@rp@=\z@
1905   <show> \ifnum#1=\@tempcntb \else
1906   <show> \par\leavevmode
1907   <show> \llap{\MTS@show@char@pr{#1} \MTS@printtext{=} }%
1908   <show> \fi
1909   <xe-|
1910   \edef\@tempa{\expandafter\ifx\@car#1\@nil U\@gobble#1\else\number\XeTeXglyphindex"#1" \fi}%
1911   \edef\@tempb{\expandafter\ifx\@car#2\@nil U\@gobble#2\else\number\XeTeXglyphindex"#2" \fi}%
1912   </xe-|
1913   \@tempcnta=\z@
1914   \ifnum#3>\z@
1915     \@tempcnta=\numexpr
1916     <pdf-|lua-|show> (\fontcharwd\MT@font#2-\fontcharwd\MT@font#1)%
1917     <xe-| (\fontcharwd\MT@font\@tempb-\fontcharwd\MT@font\@tempa)%
1918     *#3/\MT@dimen@six\relax
1919     \fi
1920     <pdf-|lua-|xe-| \lcode\MT@font #2=\numexpr\lcode\MT@font#1+\@tempcnta\relax
1921     <show> \MTS@lp@=\dimexpr\numexpr\lcode\MT@font#1+\@tempcnta\relax em/1000\relax
1922     \@tempcnta=\z@
1923     \ifnum#4>\z@
1924       \@tempcnta=\numexpr
1925       <pdf-|lua-|show> (\fontcharwd\MT@font#2-\fontcharwd\MT@font#1)%
1926       <xe-| (\fontcharwd\MT@font\@tempb-\fontcharwd\MT@font\@tempa)%
1927       *#4/\MT@dimen@six\relax
1928       \fi
1929       <pdf-|lua-|xe-| \rcode\MT@font #2=\numexpr\rcode\MT@font#1+\@tempcnta\relax
1930       <show> \MTS@rp@=\dimexpr\numexpr\rcode\MT@font#1+\@tempcnta\relax em/1000\relax
1931       <debug>\MT@diminfo@n1{2}{-- (prefix) heir of #1: #2}%
1932       <debug>\MT@diminfo@n1{4}{;;; lp/rp (#2): \number\lcode\MT@font#2/%
1933       <debug> \number\rcode\MT@font#2}%
1934       <show> \MTS@show@char@pr{#2}%
1935       <show> \@tempcntb=#1\relax
1936     }
1937   </pdf-|lua-|xe-|show>

```

\MT@preset@pr      Preset characters. Presetting them relative to their widths is not allowed.

```

\MT@preset@pr@ 1938 <package>
1939 \def\MT@preset@pr{%
1940   \expandafter\expandafter\expandafter\MT@preset@pr@
1941   \csname MT@pr@c@MT@pr@c@name @preset\endcsname\@nil
1942 }
1943 \def\MT@preset@pr@#1,#2\@nil{%
1944   \ifx\MT@pr@unit@empty
1945     \MT@warn@preset@twidth{pr}%
1946     \let\MT@preset@aux\MT@preset@aux@factor
1947   \else
1948     \def\MT@preset@aux{\MT@preset@aux@space2}%
1949   \fi

```



```

1950 \MT@ifempty{#1}{\let\@tempa\@empty}{\MT@preset@aux{#1}\@tempa}%
1951 \MT@ifempty{#2}{\let\@tempb\@empty}{\MT@preset@aux{#2}\@tempb}%
1952 \MT@set@all@pr\@tempa\@tempb
1953 }

\MT@preset@aux      Auxiliary macro for presetting. Store value <#1> in macro <#2>.
\MT@preset@aux@factor 1954 \def\MT@preset@aux@factor#1#2{%
\MT@preset@aux@space 1955 \@tempcntb=#1\relax
1956 \MT@scale@factor
1957 \edef#2{\number\@tempcntb}%
1958 }
1959 \def\MT@preset@aux@space#1#2#3{%
1960 \def\@tempb{#2}%
1961 \MT@get@space@unit#1%
1962 \MT@scale@to@em
1963 \edef#3{\number\@tempcntb}%
1964 }

\MT@warn@preset@tewidth
1965 \def\MT@warn@preset@tewidth#1{%
1966 \MT@warning@nl{%
1967 Cannot preset characters relative to their widths\MessageBreak
1968 for \@nameuse{MT@abbr#1} list \@nameuse{MT@#1@c@name}'.
1969 Presetting them\MessageBreak relative to lem instead}%
1970 }

\noprotrusion      This command may be used to inhibit protrusion on either side. It's part of LATEX
since 2018-12-01. We provide it for older releases.
1971 \MT@ifdefined@c@TF\noprotrusion\relax{
1972 \DeclareRobustCommand\noprotrusion{\leavevmode\kern-\p@\kern\p@}
1973 }

\MT@tempbox
1974 \newbox\MT@tempbox

\leftprotrusion     This command may be used to add protrusion on the left hand side. We try to
reconstruct the next glyph (possibly a ligature).3
1975 \DeclareRobustCommand\leftprotrusion{%
1976 \MT@toks{}%
1977 \MT@prot@get@firstchar
1978 }

\MT@prot@l          This macro no longer needs to be \long as we're providing the argument wrapped
in a rescanned toks.
1979 \def\MT@prot@l#1{%
1980 \MT@get@prot{#1}{left}%
1981 #1%
1982 }

\rightprotrusion     But \rightprotrusion must be \long. Unfortunately, there's no way to retrieve
anything that's already been typeset, so the counterpart cannot be defined symmet-
rically.
1983 \DeclareRobustCommand\rightprotrusion{\MT@prot@r}

\MT@prot@r
1984 \long\def\MT@prot@r#1{%
1985 {#1}%
1986 \MT@get@prot{#1}{right}%
1987 }

```

<sup>3</sup> Lua<sub>T</sub><sub>E</sub><sub>X</sub> offers the command `\protrusionboundary`, which could potentially be very helpful here, but it doesn't seem to do what it promises (not even the example from the manual works as advertised).

`\MT@get@prot` Typeset the text inside a box and get the left and right margin kerns. We add an extra `\vbox` in case we're inside a tabular. `\@newlistfalse` is meant to make `\` work in centering etc. We set various penalties to zero to allow linebreaking, and don't bother if the split box is overfull (but shouldn't we? – after all, that's how the penalties bug was discovered ...).

`\MT@ckpt` We also reset the counters and disable writing to auxiliary files.

`\MT@prot@hook` Furthermore, we have a hook for compatibility fixes.

```

1988 \let\MT@prot@hook\empty
1989 \long\def\MT@get@prot#1#2{%
1990   \begingroup
1991     \def\@elt##1{\global\value{##1}\the\value{##1}\relax}%
1992     \edef\MT@ckpt{\cl@ckpt}%
1993     \let\@elt\relax
1994     \@filesfalse
1995     \setbox\MT@tempbox\vbox{%
1996       \everypar{}%
1997       \parfillskip=\z@skip
1998       \hbadness\@M
1999       \clubpenalty\z@
2000       \widowpenalty\z@
2001       \interlinepenalty\z@
2002       \@newlistfalse
2003       \MT@prot@hook
2004       \noindent #1}%
2005     \vbadness=\@M
2006     \splittopskip=\z@
2007     \vfuzz=\maxdimen
2008     \setbox\MT@tempbox\vbox{%
2009       \ifvbox\MT@tempbox
2010         \global\setbox\MT@tempbox=\vsplit\MT@tempbox to \normalbaselineskip
2011         \unvbox\MT@tempbox
2012         \global\setbox\MT@tempbox=\lastbox
2013       \fi
2014     }%
2015     \MT@ckpt
2016   \endgroup
2017   \ifhbox\MT@tempbox
2018 %     \def\@tempa{#1}%
2019     \@tempdima=\@nameuse{#2marginkern}\MT@tempbox\relax
2020     \expandafter\ifdim\@tempdima=\z@ \else
2021       \leavevmode
2022       \MT@vinfo{<< adding #2 margin kern% for '\@tempa' % FIXME
2023       : \MessageBreak
2024       \the\@tempdima \oneline}%
2025       \kern\@tempdima
2026     \fi
2027   \fi
2028 }
```

`\MT@prot@ifx` Test next token.

```

2029 \def\MT@prot@ifx#1{%
2030   \ifx\MT@prot@next#1\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
2031 }
```

`\MT@prot@ifcat` Test catcode of next token.

```

2032 \def\MT@prot@ifcat#1{%
2033   \ifcat#1\noexpand\MT@prot@next\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
2034 }
```

`\MT@prot@ifmacro` Test whether `<#1>` is a macro or an active character that does not take an argument. (inspired by Joseph Wright). Only works with e-TeX.

`\MT@prot@ifmacro@` `\MT@prot@ifmacro@@` `2035 ^X\def\MT@prot@ifmacro{%`

```

2036 ^^X \expandafter\MT@prot@ifmacro@\meaning\MT@prot@next\@nil
2037 ^^X}
2038 ^^X\edef\MT@prot@ifmacro@#1\@nil{%
2039 ^^X \noexpand\MT@prot@ifmacro@#1{}}\detokenize{macro:->}\noexpand\@nil
2040 ^^X}
2041 ^^X\edef\MT@temp{%
2042 ^^X \def\noexpand\MT@prot@ifmacro@#1\detokenize{macro:->}#2\noexpand\@nil{%
2043 ^^X \noexpand\ifx\relax#1\relax
2044 ^^X \unexpanded{\expandafter\@firstofone\else\expandafter\@gobble\fi}%
2045 ^^X }%
2046 ^^X}
2047 ^^X\MT@temp
2048 ^^Q\let\MT@prot@ifmacro\@gobble

```

\MT@prot@iffirstcmd Test for the first command.

```

2049 \def\MT@prot@iffirstcmd#1{%
2050 \ifx\relax#1\relax\expandafter\@secondoftwo\else
2051 \MT@exp@two@c\ifx\@car\MT@prot@next\relax\@empty\@nil#1%
2052 \expandafter\expandafter\expandafter\@firstoftwo
2053 \else
2054 \expandafter\expandafter\expandafter\@secondoftwo
2055 \fi
2056 \fi
2057 }

```

\MT@prot@iflicrcmd Fun with LICR: Test if the first command of the third command of the first command is \text@composite, in which case also grab the next token, otherwise it should be a text command.

```

2058 \def\MT@getthird#1#2#3#4\@nil{#3}
2059 \def\MT@prot@iflicrcmd#1{%
2060 \MT@exp@cs\MT@prot@iffirstcmd{#1-cmd}{%
2061 \expandafter\expandafter\expandafter\let
2062 \expandafter\expandafter\expandafter\@tempa
2063 \expandafter\MT@getthird\MT@prot@next\relax\@nil
2064 \MT@exp@two@c\ifx\@car\@tempa\relax\@nil\text@composite
2065 \def\MT@temp*##1##2{\MT@prot@l{##1##2}}%
2066 \else
2067 \def\MT@temp*##1{\MT@prot@l{##1}}%
2068 \fi
2069 \@gobble
2070 }\@firstofone
2071 }

```

\MT@prot@group If we have a group, we need to rescan in order to allow, e.g., \verb, verbatim or listings material: before reading the argument, make the backslash a letter to prevent spaces from being inserted after commands, and have line breaks preserved. The  $\epsilon$ -TeX version will fail in lots of cases.

```

2072 \def\MT@prot@group{%
2073 \begingroup
2074 \catcode`\=11
2075 \obeylines
2076 \MT@prot@group@}
2077 \def\MT@prot@group@{\afterassignment\MT@prot@group@@ \MT@toks}
2078 \def\MT@prot@group@@{%
2079 \catcode`\=0
2080 \catcode`\^M=10
2081 {\expandafter\MT@prot@l\expandafter
2082 {\expandafter\scantokens\expandafter{\the\MT@toks\noexpand}}}%
2083 \endgroup}
2084 ^^Q\def\MT@prot@group#1{\MT@prot@l{#1}}

```

\MT@prot@get@firstchar Scan token by token.

\MT@prot@get@nextchar 2085 \def\MT@prot@get@firstchar{\futurelet\MT@prot@next\MT@prot@get@first@char}

2086 \def\MT@prot@get@nextchar{\futurelet\MT@prot@next\MT@prot@get@next@char}  
 \MT@prot@get@first@char If next char is {, treat what follows as an argument, else continue until we find a beginning char.

```

2087 \def\MT@prot@get@first@char{%
2088   \MT@prot@ifcat\bgroup{%
2089     \def\MT@temp*{\MT@prot@group}%
2090   }{%
2091     \MT@prot@ifx\ignorespaces{%
2092       \def\MT@temp*##1{\MT@prot@get@firstchar}%
2093     }{%
2094       \MT@prot@ifx\relax{%
2095         \def\MT@temp*##1{\MT@prot@get@firstchar}%
2096       }{%
2097         \MT@prot@ifx\sptoken{%
2098           \def\MT@temp* {\MT@prot@get@firstchar}%
2099         }{%

```

But only add it if it's a letter or a character, ...

```

2100   \MT@prot@ifcat{a}{%
2101     \def\MT@temp*{\MT@prot@addtoken@first}%
2102   }{%
2103     \MT@prot@ifcat{!}{%
2104       \def\MT@temp*{\MT@prot@addtoken@first}%
2105     }{%

```

... or a command/active char whose first command is one of the below.

```

2106   \def\MT@temp*{%
2107     \MT@prot@ifmacro{%
2108       \MT@prot@iffirstcmd\UTFviii@two@octets{%
2109         \def\MT@temp*##1##2{\MT@prot@l{##1##2}}%
2110       }{%
2111         \MT@prot@iffirstcmd\UTFviii@three@octets{%
2112           \def\MT@temp*##1##2##3{\MT@prot@l{##1##2##3}}%
2113         }{%
2114           \MT@prot@iffirstcmd\UTFviii@four@octets{%
2115             \def\MT@temp*##1##2##3##4{\MT@prot@l{##1##2##3##4}}%
2116           }{%
2117             \MT@prot@iflicrcmd{T1}{%
2118               \MT@prot@iflicrcmd{TU}{%
2119                 \MT@prot@iflicrcmd{LY1}{%
2120                   \MT@prot@iflicrcmd{OT1}{%
2121                     \MT@prot@iflicrcmd{T2A}\relax % should we add more encodings?
2122                   }%
2123                 }%
2124               }%
2125             }%
2126           }%
2127         }%
2128       }%
2129     }%
2130   }%
2131 }%
2132 }%
2133 }%
2134 }%
2135 }%
2136 \MT@temp*%
2137 }

```

\MT@prot@ifx Continue if letter or other.

```

2138 \def\MT@prot@get@next@char{%
2139   \def\MT@temp*{\MT@prot@addtoken@next}%
2140   \MT@prot@ifcat{a}\relax{%
2141     \MT@prot@ifcat{!}\relax{%

```

```

2142 \def\MT@temp*{\MT@prot@l{\the\MT@toks}}%
2143 }%
2144 }%
2145 \MT@temp*%
2146 }

```

\MT@prot@addtoken@first      Begin filling toks.

```

2147 \def\MT@prot@addtoken@first#1{%
2148 \edef\MT@temp{\MT@toks={\the\MT@toks\noexpand#1}}\MT@temp
2149 \MT@prot@get@nextchar
2150 }
2151 \<pdf-|lua-|xe-|>/package>

```

\MT@prot@addtoken@next      Add token to our toks and test whether we've seen enough (ligature completed). For luatex, we have to jump through another hoop (i.e., box), because, contrary to the manual, \lastnodetype isn't really compatible.

```

2152 \<pdf-|lua-|xe-|>
2153 \def\MT@prot@addtoken@next#1{%
2154 \edef\MT@temp{\MT@toks={\the\MT@toks\noexpand#1}}\MT@temp
2155 \setbox\MT@tempbox\hbox{\the\MT@toks
2156 \<pdf-|xe-|>\relax
2157 \<lua-|>}\setbox\MT@tempbox\hbox{\unhbox\MT@tempbox
2158 \ifnum\lastnodetype=7 \aftergroup\@firstoftwo\else\aftergroup\@secondoftwo\fi}%
2159 \MT@prot@get@nextchar
2160 {\MT@prot@l{\the\MT@toks}}%
2161 }
2162 \<pdf-|lua-|xe-|>

```

### 1.2.2 Expansion

\MT@expansion      Set up for expansion?

```

2163 \<pdf-|lua-|>
2164 \def\MT@expansion{\MT@maybe@do{ex}}

```

\MT@set@ex@codes@      Setting up font expansion is a bit different because of the selected option. There are two versions of this macro.

If selected=true, we only apply font expansion to those fonts for which a list has been declared (i.e., like for protrusion).

```

2165 \def\MT@set@ex@codes@{%
2166 \MT@if@list@exists{%
2167 \MT@get@ex@opt
2168 \let\MT@get@char@unit\relax
2169 \MT@reset@ef@codes
2170 \MT@get@inh@list
2171 \MT@set@inputenc{c}%
2172 \MT@load@list\MT@ex@cc@name
2173 \MT@set@listname
2174 \MT@let@cn\@tempc{\MT@ex@cc@\MT@ex@cc@name}%
2175 \expandafter\MT@set@codes\@tempc,\relax,%
2176 \MT@expandfont
2177 }\relax
2178 }
2179 \<pdf-|lua-|>

```

\MT@set@ex@codes@n      If, on the other hand, all characters should be expanded by the same amount, we only take the first optional argument to \SetExpansion into account.

\ifMT@nonselected      We need this boolean in \MT@if@list@exists so that no warning for missing lists will be issued.

```

2180 \<package>\newif\ifMT@nonselected
2181 \<pdf-|lua-|>
2182 \def\MT@set@ex@codes@n{%

```

```

2183 \MT@nonselectedtrue
2184 \MT@if@list@exists
2185 \MT@get@ex@opt
2186 {%
2187 \let\MT@stretch@ \MT@stretch
2188 \let\MT@shrink@ \MT@shrink
2189 \let\MT@step@ \MT@step
2190 \let\MT@auto@ \MT@auto
2191 \let\MT@ex@factor@ \MT@ex@factor
2192}%
2193 \MT@reset@ef@codes
2194 \MT@expandfont
2195 \MT@nonselectedfalse
2196 }

```

`\MT@set@ex@codes` Default is non-selected. It can be changed in the package options.

```
2197 \let\MT@set@ex@codes\MT@set@ex@codes@n
```

`\MT@expandfont` Expand the font. For some reason, older LuaTeX versions freeze if the `autoexpand` modifier is missing. Can't be bothered to find out why. For newer versions, we could also use the function `font.setexpansion`, or, in the future, `luaotfload's` expansion font feature.

```

2198 <lua-
2199 \MT@requires@luatex3{
2200 \MT@requires@luatex4{\let\pdfontexpand\expandglyphsinfont}\relax
2201 \ifnum\luatexversion<79
2202 \def\MT@expandfont{%
2203 \pdfontexpand\MT@font \MT@stretch@ \MT@shrink@ \MT@step@ autoexpand\relax
2204 }
2205 \else
2206 \def\MT@expandfont{%
2207 \pdfontexpand\MT@font \MT@stretch@ \MT@shrink@ \MT@step@\relax
2208 }
2209 \fi
2210 }{
2211 </lua-
2212 \def\MT@expandfont{%
2213 \pdfontexpand\MT@font \MT@stretch@ \MT@shrink@ \MT@step@ \MT@auto@\relax
2214 }
2215 <lua-}}

```

`\MT@set@all@ex` At first, all expansion factors for the characters will be set to 1000 (respectively the factor of this font).

```

2216 \def\MT@set@all@ex#1{%
2217 <debug>\MT@edinfo@n1{3}{-- ex: setting all to \number#1}%
2218 \MT@do@font{\efcode\MT@font\@tempcnta=#1\relax}%
2219 }
2220 \def\MT@reset@ef@codes@{\MT@set@all@ex\MT@ex@factor@}

```

`\MT@reset@ef@codes` However, this is only necessary for pdfTeX versions prior to 1.20, or LuaTeX < 0.90 (actually, I think, 0.87).

```

2221 <pdf-)\MT@requires@pdftex4
2222 <lua-)\MT@requires@luatex5
2223 {
2224 \def\MT@reset@ef@codes{%
2225 \ifnum\MT@ex@factor@=\@m \else
2226 \MT@reset@ef@codes@
2227 \fi
2228 }
2229 }{
2230 \let\MT@reset@ef@codes\MT@reset@ef@codes@
2231 }

```

`\MT@ex@split@val`      There's only one number per character.

```
2232 \def\MT@ex@split@val#1\relax{%
2233   \@tempcntb=#1\relax
```

Take an optional factor into account.

```
2234   \ifnum\MT@ex@factor@=\@m \else
2235     \MT@scale\@tempcntb \MT@ex@factor@ \@m
2236   \fi
2237   \ifnum\@tempcntb > \MT@ex@max
2238     \MT@warn@ex@too@large\MT@ex@max
2239   \else
2240     \ifnum\@tempcntb < \MT@ex@min
2241       \MT@warn@ex@too@large\MT@ex@min
2242     \fi
2243   \fi
2244   \efcode\MT@font\MT@char=\@tempcntb
2245   <debug>\MT@edinfo@n1{4}{::: ef (\MT@char): \number\efcode\MT@font\MT@char: [#1]}%
```

Heirs, heirs, I love thy heirs.

```
2246   \MT@ifdefined@c@T\MT@ex@inh@name{%
2247     \MT@ifdefined@n@T{\MT@inh@\MT@ex@inh@name @\MT@char @}{%
2248       \MT@exp@cs\MT@map@tlist@c{\MT@inh@\MT@ex@inh@name @\MT@char @}\MT@set@ex@heirs
2249     }%
2250   }%
2251 }
```

`\MT@warn@ex@too@large`

```
2252 \def\MT@warn@ex@too@large#1{%
2253   \MT@warning@n1{Expansion factor \number\@tempcntb\space too large for
2254     character\MessageBreak `the\MT@toks' in \MT@curr@list@name.\MessageBreak
2255     Setting it to the maximum of \number#1}%
2256   \@tempcntb=#1\relax
2257 }
```

`\MT@get@ex@opt`      Apply different values to this font?

```
\MT@ex@factor@ 2258 \def\MT@get@ex@opt{%
\MT@stretch@ 2259   \MT@set@listname
2260   \MT@ifdefined@n@TF{\MT@ex@c@\MT@ex@c@name @factor}{%
\MT@shrink@ 2261     \MT@let@c@n\MT@ex@factor@\MT@ex@c@\MT@ex@c@name @factor}%
\MT@step@ 2262     \MT@vinfo{... : Multiplying expansion factors by \number\MT@ex@factor@/1000}%
\MT@auto@ 2263   }%
2264   \let\MT@ex@factor@\MT@ex@factor
2265   }%
2266   \MT@get@ex@opt@{stretch}{Setting stretch limit to \number\MT@stretch@}%
2267   \MT@get@ex@opt@{shrink} {Setting shrink limit to \number\MT@shrink@}%
2268   \MT@get@ex@opt@{step} {Setting expansion step to \number\MT@step@}%
2269   <lua- > \MT@requires@luatex3\relax%
2270   \MT@get@ex@opt@{auto}{\MT@ifstreql{\MT@auto@}{autoexpand}{En}{Dis}abling automatic expansion}%
2271   <lua- > }%
2272   \MT@ifdefined@n@T{\MT@ex@c@\MT@ex@c@name @preset}{%
2273     \MT@preset@ex
2274     \let\MT@reset@ef@codes\relax
2275   }%
2276 }
```

`\MT@get@ex@opt@`

```
2277 \def\MT@get@ex@opt@#1#2{%
2278   \MT@ifdefined@n@TF{\MT@ex@c@\MT@ex@c@name @#1}{%
2279     \MT@let@nn{\MT@#1@}{\MT@ex@c@\MT@ex@c@name @#1}%
2280     \MT@vinfo{... : #2}%
2281   }%
2282   \MT@let@nn{\MT@#1@}{\MT@#1}%
2283   }%
2284 }
```

\MT@set@ex@heirs

```
2285 \def\MT@set@ex@heirs#1{%
2286   \efcode\MT@font#1=\efcode\MT@font\MT@char
2287   <debug>\MT@info@n1{2}{-- heir of \MT@char: #1}%
2288   <debug>\MT@info@n1{4}{::: ef (#1) \number\efcode\MT@font\MT@char}%
2289 }
```

\MT@preset@ex

```
2290 \def\MT@preset@ex{%
2291   \@tempcntb=\csname MT@ex@cc\MT@ex@ccname @preset\endcsname\relax
2292   \MT@scale@factor
2293   \MT@set@all@ex@\@tempcntb
2294 }
2295 </pdf-|lua->
```

### 1.2.3 Interword spacing (glue)

\MT@spacing Adjustment of interword spacing? Only works with pdfTeX.

```
2296 <*pdf->
2297 \MT@requires@pdftex6{
2298 \def\MT@spacing{\MT@maybe@do{sp}}
```

\MT@set@sp@codes This is all the same.

```
2299 \def\MT@set@sp@codes{%
2300   \MT@if@list@exists{%
2301     \MT@get@opt
2302     \MT@reset@sp@codes
2303     \MT@get@inh@list
2304     \MT@set@inputenc{c}%
2305     \MT@load@list\MT@sp@cc@name
2306     \MT@set@listname
2307     \MT@let@cn\@tempc{\MT@sp@cc@\MT@sp@cc@name}%
2308     \expandafter\MT@set@codes\@tempc,\relax,%
2309   }\MT@reset@sp@codes
2310 }
```

\MT@sp@split@val If unit=space, \MT@get@space@unit will be defined to fetch the corresponding fontdimen (2 for the first, 3 for the second and 4 for the third argument).

```
2311 \def\MT@sp@split@val#1,#2,#3\relax{%
2312   \def\@tempb{#1}%
2313   \MT@ifempty\@tempb\relax{%
2314     \MT@get@space@unit2%
2315     \MT@scale@to@em
2316     \knbscode\MT@font\MT@char=\@tempcntb
2317   <debug>\MT@info@n1{4}{;;; knbs (\MT@char): \number\knbscode\MT@font\MT@char: [#1]}%
2318   }%
2319   \def\@tempb{#2}%
2320   \MT@ifempty\@tempb\relax{%
2321     \MT@get@space@unit3%
2322     \MT@scale@to@em
2323     \stbscode\MT@font\MT@char=\@tempcntb
2324   <debug>\MT@info@n1{4}{;;; stbs (\MT@char): \number\stbscode\MT@font\MT@char: [#2]}%
2325   }%
2326   \def\@tempb{#3}%
2327   \MT@ifempty\@tempb\relax{%
2328     \MT@get@space@unit4%
2329     \MT@scale@to@em
2330     \shbscode\MT@font\MT@char=\@tempcntb
2331   <debug>\MT@info@n1{4}{;;; shbs (\MT@char): \number\shbscode\MT@font\MT@char: [#3]}%
2332   }%
2333   \MT@ifdefined@c@T\MT@sp@inh@name{%
2334     \MT@ifdefined@nT{\MT@inh@\MT@sp@inh@name @\MT@char @}{%
2335       \MT@exp@cs\MT@map@tlist@c{\MT@inh@\MT@sp@inh@name @\MT@char @}\MT@set@sp@heirs
```



```

2336 }%
2337 }%
2338 }

\MT@set@sp@heirs
2339 \def\MT@set@sp@heirs#1{%
2340 \knbscode\MT@font#1=\knbscode\MT@font\MT@char
2341 \stbscode\MT@font#1=\stbscode\MT@font\MT@char
2342 \shbscode\MT@font#1=\shbscode\MT@font\MT@char
2343 <debug>\MT@info{n}{2}{-- heir of \MT@char: #1}%
2344 <debug>\MT@info{n}{4}{;;; knbs/stbs/shbs (#1): \number\knbscode\MT@font\MT@char/%
2345 <debug> \number\stbscode\MT@font\MT@char/\number\shbscode\MT@font\MT@char}%
2346 }

\MT@set@all@sp
\MT@reset@sp@codes 2347 \def\MT@set@all@sp#1#2#3{%
\MT@reset@sp@codes@ 2348 <debug>\MT@info{n}{3}{-- knbs/stbs/shbs: setting all to #1/#2/#3}%
2349 \let\MT@temp\@empty
2350 \MT@ifempty{#1}\relax{\g@addto@macro\MT@temp{\knbscode\MT@font\@tempcnta=#1\relax}}%
2351 \MT@ifempty{#2}\relax{\g@addto@macro\MT@temp{\stbscode\MT@font\@tempcnta=#2\relax}}%
2352 \MT@ifempty{#3}\relax{\g@addto@macro\MT@temp{\shbscode\MT@font\@tempcnta=#3\relax}}%
2353 \MT@do@font\MT@temp
2354 }
2355 \def\MT@reset@sp@codes@{\MT@set@all@sp\z@\z@\z@}
2356 \let\MT@reset@sp@codes\relax

\MT@preset@sp
\MT@preset@sp@ 2357 \def\MT@preset@sp{%
2358 \expandafter\expandafter\expandafter\MT@preset@sp@
2359 \csname MT@sp@cc\MT@sp@cc@name @preset\endcsname\@nil
2360 }
2361 \def\MT@preset@sp@#1,#2,#3\@nil{%
2362 \ifx\MT@sp@unit\@empty
2363 \MT@warn@preset@twidth{sp}%
2364 \MT@ifempty{#1}{\let\@tempa\@empty}{\MT@preset@aux@factor{#1}\@tempa}%
2365 \MT@ifempty{#2}{\let\@tempc\@empty}{\MT@preset@aux@factor{#2}\@tempc}%
2366 \MT@ifempty{#3}{\let\@tempb\@empty}{\MT@preset@aux@factor{#3}\@tempb}%
2367 \else
2368 \MT@ifempty{#1}{\let\@tempa\@empty}{\MT@preset@aux@space2{#1}\@tempa}%
2369 \MT@ifempty{#2}{\let\@tempc\@empty}{\MT@preset@aux@space3{#2}\@tempc}%
2370 \MT@ifempty{#3}{\let\@tempb\@empty}{\MT@preset@aux@space4{#3}\@tempb}%
2371 \fi
2372 \MT@set@all@sp\@tempa\@tempc\@tempb
2373 }
2374 }\relax

```

### 1.2.4 Additional kerning

\MT@kerning Again, only check for additional kerning for new versions of pdfTeX.

```

2375 \MT@requires@pdftex6{
2376 \def\MT@kerning{\MT@maybe@do{kn}}

```

\MT@set@kn@codes It's getting boring, I know.

```

2377 \def\MT@set@kn@codes{%
2378 \MT@if@list@exists{%
2379 \MT@get@opt
2380 \MT@reset@kn@codes
2381 \MT@get@inh@list
2382 \MT@set@inputenc{c}%
2383 \MT@load@list\MT@kn@cc@name
2384 \MT@set@listname
2385 \MT@let@cn\@tempc{MT@kn@cc\MT@kn@cc@name}%
2386 \expandafter\MT@set@codes\@tempc,\relax,%

```

```

2387 } \MT@reset@kn@codes
2388 }

```

\MT@kn@split@val Again, the unit may be measured in the space dimension; this time only \fontdimen 2.

```

2389 \def\MT@kn@split@val#1,#2\relax{%
2390   \def\@tempb{#1}%
2391   \MT@ifempty\@tempb\relax{%
2392     \MT@get@space@unit2%
2393     \MT@scale@to@em
2394     \knbccode\MT@font\MT@char=\@tempcntb
2395   } \MT@debug\MT@infoenl{4}{;;; knbc (\MT@char): \number\knbccode\MT@font\MT@char: [#1]}%
2396   }%
2397   \def\@tempb{#2}%
2398   \MT@ifempty\@tempb\relax{%
2399     \MT@get@space@unit2%
2400     \MT@scale@to@em
2401     \knaccode\MT@font\MT@char=\@tempcntb
2402   } \MT@debug\MT@infoenl{4}{;;; knac (\MT@char): \number\knaccode\MT@font\MT@char: [#2]}%
2403   }%
2404   \MT@ifdefined@c@T\MT@kn@inh@name{%
2405     \MT@ifdefined@n@T\MT@inh@\MT@kn@inh@name @\MT@char @{%
2406       \MT@exp@cs\MT@map@etlist@c{\MT@inh@\MT@kn@inh@name @\MT@char @}\MT@set@kn@heirs
2407     }%
2408   }%
2409 }

```

\MT@set@kn@heirs

```

2410 \def\MT@set@kn@heirs#1{%
2411   \knbccode\MT@font#1=\knbccode\MT@font\MT@char
2412   \knaccode\MT@font#1=\knaccode\MT@font\MT@char
2413   \MT@debug\MT@infoenl{2}{-- heir of \MT@char: #1}%
2414   \MT@debug\MT@infoenl{4}{;;; knbc (#1): \number\knbccode\MT@font\MT@char/%
2415   \MT@debug\MT@infoenl{4}{;;; knac (#1): \number\knaccode\MT@font\MT@char}%
2416 }

```

\MT@set@all@kn

```

\MT@reset@kn@codes 2417 \def\MT@set@all@kn#1#2{%
\MT@reset@kn@codes@ 2418 \MT@debug\MT@infoenl{3}{-- knac/knbc: setting all to #1/#2}%
2419   \let\MT@temp@empty
2420   \MT@ifempty{#1}\relax{\g@addto@macro\MT@temp{\knbccode\MT@font\@tempcnta=#1\relax}}%
2421   \MT@ifempty{#2}\relax{\g@addto@macro\MT@temp{\knaccode\MT@font\@tempcnta=#2\relax}}%
2422   \MT@do@font\MT@temp
2423 }
2424 \def\MT@reset@kn@codes@{\MT@set@all@kn\z@\z@}
2425 \let\MT@reset@kn@codes\relax

```

\MT@preset@kn

```

\MT@preset@kn@ 2426 \def\MT@preset@kn{%
2427   \expandafter\expandafter\expandafter\MT@preset@kn@
2428   \csname MT@kn@c@\MT@kn@c@name @preset\endcsname\@nil
2429 }
2430 \def\MT@preset@kn@#1,#2\@nil{%
2431   \ifx\MT@kn@unit@\@empty
2432     \MT@warn@preset@twidth{kn}%
2433     \let\MT@preset@aux\MT@preset@aux@factor
2434   \else
2435     \def\MT@preset@aux{\MT@preset@aux@space2}%
2436   \fi
2437   \MT@ifempty{#1}\let\@tempa\@empty{\MT@preset@aux{#1}\@tempa}%
2438   \MT@ifempty{#2}\let\@tempb\@empty{\MT@preset@aux{#2}\@tempb}%
2439   \MT@set@all@kn\@tempa\@tempb
2440 }
2441 } \relax
2442 \pdf-

```

### 1.2.5 Tracking

This only works with pdfTeX 1.40 or LuaTeX 0.62.

```
2443 <pdf-|lua-|
2444 <pdf-|lua-|MT@requires@pdftex6
2445 <lua-|lua-|MT@requires@luatex3
2446 {
```

\MT@tracking We only check whether a font should not be letterspaced at all, not whether we've already done that (because we have to do it again).

```
\MT@tr@font@list 2447 \let\MT@tr@font@list\empty
2448 \def\MT@tracking@{%
2449   \MT@exp@one@n\MT@in@cl@list\MT@font\MT@tr@font@list
2450   \ifMT@in@list\else
2451     \MT@maybe@do{tr}%
2452     \ifMT@do\else
2453       \xdef\MT@tr@font@list{\MT@tr@font@list\MT@font,}%
2454     \fi
2455   \fi
2456 }
2457 </pdf-|lua-|
2458 <pdf-|lua-|letterspace>\let\MT@tracking
2459 <pdf-|lua-| \MT@tracking@
2460 <letterspace> \relax
```

\MT@set@tr@codes The tracking amount is determined by the optional argument to \textls, settings from \SetTracking, or the global letterspace option, in this order.

Tracking won't work with older pdfTeX versions (< 1.40.23) if the original font's \fontdimen 6 is zero, in which case we issue a warning (once for every font).

```
2461 <pdf-|lua-|letterspace>
2462 \def\MT@set@tr@codes{%
2463   <pdf-|lua-|
2464   \MT@vinfo{Tracking font '\MT@font'\on@line}%
2465   <pdf-|
2466   \MT@requires@pdftex8\@firstofone{%
2467     \MT@ifdefined@n@TF{\MT@font-fake6}{%
2468       \expandafter\ifx\csname\MT@font-fake6\endcsname\empty
2469       \MT@warning@nl{%
2470         Font '\MT@font' does not specify its\MessageBreak
2471         \@backslashchar fontdimen 6 (width of an `em')! Therefore,\MessageBreak
2472         tracking will not work with this font}%
2473       \MT@gl@et@nc{\MT@font-fake6}\relax
2474     \fi
2475   }%
2476 }%
2477 </pdf-|
2478 \MT@if@list@exists
2479 \MT@get@tr@opt
2480 \relax
2481 </pdf-|lua-|
2482 \MT@ifdefined@c@TF\MT@letterspace@relax{\let\MT@letterspace@MT@letterspace}%
2483 \ifnum\MT@letterspace@=z@
```

Zero tracking requires special treatment.

```
2484 \MT@set@tr@zero
2485 \else
2486 <pdf-|lua-| \MT@vinfo{... Tracking by \number\MT@letterspace@}%
```

Letterspacing only works in PDF mode.

```
2487 \MT@warn@tracking@DVI
```

\MT@lsfont The letterspaced font instances are saved in macros \fontname/letterspacing amount)ls.

In contrast to `\MT@font`, which may reflect the font characteristics more accurately (taking substitutions into account), `\font@name` is guaranteed to correspond to an actual font identifier.

```
2488 \xdef\MT@lsfont{\csname\expandafter\string\font@name
2489 \number\MT@letterspace@ls\endcsname}%
2490 \expandafter\ifx\MT@lsfont\relax
2491 <debug>\MT@info@n1{1}{... new letterspacing instance}%
```

In case of nested letterspacing with different amounts, we have to extract the base font again.

```
2492 \MT@get@ls@basefont
```

`luaotfload` provides the faux font feature `kernfactor`, which we will use when dealing with non-legacy fonts, as it is less problematic and faster than the pdfTeX primitive `\letterspacefont`.

```
2493 <lua-|letterspace>
2494 \MT@if@luaotf@font{%
2495 <lua-&debug>\MT@info@n1{1}{... luaotf font: \MessageBreak
2496 <lua-&debug> \expandafter\fontname\font@name}%
2497 \global\expandafter\font\MT@lsfont=\MT@ls@fontspec@font
2498 }{%
2499 </lua-|letterspace>
2500 <lua-&debug>\MT@info@n1{1}{... legacy font}%
2501 \global\expandafter\letterspacefont\MT@lsfont\font@name\MT@letterspace@
2502 <lua-|letterspace> }%
```

Scale interword spacing (not configurable in letterspace).

```
2503 <pdf-|lua->
2504 \MT@ifdefined@c@TF\MT@tr@ispace
2505 {\let\@tempa\MT@tr@ispace}%
2506 {\edef\@tempa{\MT@letterspace@*,,}}%
2507 \MT@ifdefined@c@TF\MT@tr@ospace
2508 {\edef\@tempa{\@tempa,\MT@tr@ospace}}%
2509 {\edef\@tempa{\@tempa,,,}}%
2510 \expandafter\MT@tr@set@space\@tempa,%
2511 </pdf-|lua->
2512 <*letterspace>
2513 % spacing = <{letterspace amount}>*,,}
2514 \fontdimen2\MT@lsfont=\dimexpr\numexpr 1000+\MT@letterspace@\relax sp
2515 * \fontdimen2\MT@lsfont/1000\relax
2516 </letterspace>
```

Adjust outer kerning (microtype only).

```
2517 <pdf-|lua->
2518 \MT@ifdefined@c@TF\MT@tr@okern{\let\@tempa\MT@tr@okern}{\def\@tempa{*,,}}%
2519 \expandafter\MT@tr@set@okern\@tempa,%
```

Disable ligatures (not configurable in letterspace).

```
2520 \MT@ifdefined@c@TF\MT@tr@ligatures\MT@tr@noligatures
2521 </pdf-|lua->
2522 <*letterspace>
2523 % no ligatures = {f}
2524 \tagcode\MT@lsfont`f=\m@ne
2525 </letterspace>
```

Adjust protrusion values now, and maybe later (in `\MT@pr@split@val`) (not for LuaTeX, though, where letterspacing does not interfere with protrusion).

```
2526 <lua-|letterspace> \MT@if@luaotf@font\relax{%
2527 <debug>\MT@info@n1{2}{... compensating for tracking (\number\MT@letterspace@)}%
2528 \MT@do@font{\lcode\MT@lsfont\@tempcnta=\numexpr\MT@letterspace@/2\relax
2529 \rcode\MT@lsfont\@tempcnta=\numexpr\MT@letterspace@/2\relax}%
2530 \let\MT@the@pr@code\MT@the@pr@code@tr
2531 <lua-|letterspace> }%
```

2532     \fi

Finally, let the letterspaced font propagate. With LuaTeX, we also need to load.

```
2533     \aftergroup\MT@set@lsfont
2534     <pdf-|lua->     \let\MT@font\MT@lsfont
2535     <lua->     \MT@if@luaotf@font\MT@font\relax
```

\MT@set@curr@ls     We need to remember the current letterspacing amount (for \slig).

```
\MT@curr@ls 2536     \xdef\MT@set@curr@ls{\def\noexpand\MT@curr@ls{\MT@letterspace@}}%
2537     \aftergroup\MT@set@curr@ls
```

Adjust surrounding spacing and kerning.

\MT@set@curr@os     We get the current outer spacing and adjust it, then, after the end of the current outer group, set the current outer spacing, again, and adjust.

```
2538     <*pdf-|lua->
2539     \MT@outer@space=\csname MT@outer@space\expandafter\string\font@name\endcsname\relax
2540     \xdef\MT@set@curr@os{\MT@outer@space=\the\MT@outer@space\relax}%
2541     \MT@tr@outer@l
2542     </pdf-|lua->
```

If \MT@ls@adjust is empty, it's the starred version of \textls. Use scaling to avoid a 'Dimension too large'.

```
2543     \ifx\MT@ls@adjust\@empty
2544     <letterspace>     % \textls : outer kerning = {*,*} ; \textls* : outer kerning = {0,0}
2545     \MT@outer@kern=-\dimexpr\MT@letterspace@ sp * \fontdimen6\font@name/2000\relax
2546     \MT@ls@outer@k
```

Otherwise, get the current outer kerning and adjust it, for left and right side (microtype only).

```
2547     <*pdf-|lua->
2548     \else
2549     \MT@outer@kern=\expandafter\expandafter\expandafter\@firstoftwo
2550     \csname MT@outer@kern\expandafter\string\font@name\endcsname\relax
2551     \ifdim\MT@outer@kern=z@\else \MT@ls@outer@k \fi
2552     \MT@outer@kern=\expandafter\expandafter\expandafter\@secondoftwo
2553     \csname MT@outer@kern\expandafter\string\font@name\endcsname\relax
2554     </pdf-|lua->
2555     <*letterspace>
2556     \xdef\MT@set@curr@ok{\MT@outer@kern=\the\MT@outer@kern\relax}%
2557     \MT@afteraftergroup{%
2558     \MT@set@curr@ok
2559     \noexpand\MT@ls@outer@k
2560     }%
2561     </letterspace>
2562     \fi
2563     <*pdf-|lua->
```

\MT@set@curr@ok     Carry the outer kerning amount to outside the next group, then set outer spacing (which will set kerning, if no space follows).

```
2564     \xdef\MT@set@curr@ok{\MT@outer@kern=\the\MT@outer@kern\relax}%
```

Stuff to be done after the letterspace group. The letterspace package only adjusts the kerning.

```
2565     \MT@afteraftergroup{%
2566     \MT@set@curr@os
2567     \MT@set@curr@ok
2568     \noexpand\MT@tr@outer@r
2569     }%
2570     </pdf-|lua->
2571     \fi
2572     <pdf->     }%
2573     }
```

`\MT@afteraftergroup` This helper macro carries stuff outside of the current group to the end of the next group, but will then respect grouping, which is crucial for nested letterspacing. (Following an idea of Will Robertson.)

```

2574 \def\MT@afteraftergroup#1{%
2575   \MT@maybe@gobble@with@tikz{%
2576     \MT@ifdefined@n@TF{MT@aftergroup@number\currentgrouplevel}\relax{%
2577       \MT@exp@cs\xdef{MT@aftergroup@number\currentgrouplevel}%
2578       {\MT@exp@cs\MT@glet{MT@aftergroup@number\currentgrouplevel}\noexpand\@undefined#1}%
2579       \expandafter\aftergroup\expandafter\aftergroup\MT@exp@cs\aftergroup
2580       {MT@aftergroup@number\currentgrouplevel}%
2581     }%
2582   \!letterspace }%
2583 }
2584 \!pdf-|lua-|letterspace

```

`\MT@ls@fontspec@font` Add the kernfactor feature to a font loaded by fontspec.

```

2585 \!lua-|letterspace
2586 \def\MT@ls@fontspec@font{%
2587   \MT@lua{microtype.add_ls([[ \MT@letterspace@]])}%
2588 }
2589 \!lua-|letterspace
2590 \!luafile
2591 local function add_ls(k)
2592   local f = tex.fontname(font.current())
2593   local spec,size = match(f,'^(.+)( at .+)$')
2594   if not spec then spec = f end
2595   local a,b,c = match(spec,'^([^\:]+):?([^\:]*):?(.*)$')
2596   local ls = "kernfactor=" .. k/1000 .. ';'
2597   microtype.sprint(a..'':')
2598   if (a == "name" or a == "file") then
2599     microtype.sprint(b..'':..ls..c)
2600   else
2601     microtype.sprint(ls..b)
2602   end
2603   if size then
2604     microtype.sprint(size)
2605   end
2606 end
2607 microtype.add_ls = add_ls
2608
2609 \!luafile

```

`\MT@get@tr@opt` Various settings (only for the microtype version).

```

2610 \!pdf-|lua-
2611 \def\MT@get@tr@opt{%
2612   \MT@set@listname
2613   \let\MT@tr@factor@\@m

```

`\MT@tr@unit@` Different unit (for letterspace and/or (outer)spacing)?

```

2614 \MT@ifdefined@n@T{MT@tr@c@\MT@tr@c@name @unit}{%
2615   \MT@let@cn\MT@tr@unit@{MT@tr@c@\MT@tr@c@name @unit}%
2616   \ifdim\MT@tr@unit@=1em
2617     \let\MT@tr@unit@\@undefined
2618   \else
2619     \MT@get@unit\MT@tr@unit@
2620   \fi
2621 }%
2622 \MT@ifdefined@n@T{MT@tr@c@\MT@tr@c@name}{%
2623   \MT@let@cn\MT@letterspace{MT@tr@c@\MT@tr@c@name}%
2624   \MT@ifdefined@c@T\MT@tr@unit@{%
2625     \let\@tempb\MT@letterspace
2626     \MT@scale@to@em
2627     \edef\MT@letterspace{\number\@tempcntb}%
2628   }%

```

```

2629 }%

\MT@tr@ispace    Adjust interword spacing.
\MT@tr@ospace 2630 \MT@get@tr@opt@{spacing} {ispace}%
2631 \MT@get@tr@opt@{outerspacing}{ospace}%

\MT@tr@okern    Adjust outer kerning.
2632 \MT@get@tr@opt@{outerkerning}{okern}%

\MT@tr@ligatures    Which ligatures should we disable (empty means all, undefined none)?
2633 \MT@get@tr@opt@{noligatures} {ligatures}%
2634 }

\MT@get@tr@opt@
2635 \def\MT@get@tr@opt@#1#2{%
2636 \MT@ifdefined@n@T{MT@tr@c@{MT@tr@c@name @#1}}%
2637 { \MT@let@nn{MT@tr@#2}{MT@tr@c@{MT@tr@c@name @#1}}}%
2638 }
2639 (pdf-|lua-)

\MT@set@lsfont    Redefine \font@name, which will be called a second later (in \selectfont).
2640 (pdf-|lua-|letterspace)
2641 (plain)\MT@requires@l@tex2{
2642 \def\MT@set@lsfont{\MT@exp@two@c\let\font@name\MT@lsfont}

\lsstyle    Disable the tests whether the font should be letterspaced, then trigger the setup.
Only \textls can be used in math mode (\lsstyle may be used inside another
text switch, of course). Still, we have to ensure that math fonts are set up again.
Setting \glb@currsz globally to \empty (our previous solution) could throw us
into an infinite loop (e.g., with the psnfss packages, via \every@math@size), so
we issue \glb@settings instead. However, in certain situations, we may still miss
some math fonts, so let's try to also enforce it by emptying \glb@currsz, fingers
crossed. The overhead seems small.

2643 \DeclareRobustCommand\lsstyle{%
2644 \not@math@alphabet\lsstyle\textls
2645 \let\glb@currsz\empty
2646 (pdf-|lua-) \MT@maybe@gobble@with@tikz{\aftergroup\glb@settings}%
2647 (pdf-|lua-) \def\MT@feat{tr}%
2648 \let\MT@tracking\MT@set@tr@codes
2649 \selectfont
2650 }

Now the definitions for the letterspace package with plain TEX.

2651 (plain)
2652 }{
2653 \def\MT@set@lsfont{\MT@lsfont}
2654 \def\lsstyle{%
2655 \begingroup
2656 \escapechar\m@ne
2657 \xdef\font@name{\c@name\expandafter\string\the\font\endcsname}%
2658 \MT@set@tr@codes
2659 \endgroup
2660 }
2661 \let\textls\undefined
2662 \let\lslig\undefined
2663 }
2664 (plain)

\lslig    For Fraktur fonts, some ligatures shouldn't be broken up. This command will
temporarily select the base font and insert the correct kerning.

2665 \DeclareRobustCommand\lslig[1]{%
2666 {\MT@ifdefined@c@TF\MT@curr@ls{%
```

```

2667 \escapechar\m@ne
2668 \MT@get@ls@basefont
2669 \MT@outer@kern=\dimexpr\MT@curr@ls sp * \fontdimen6\font@name/2000\relax
2670 \kern\MT@outer@kern
2671 \font@name #1%
2672 \kern\MT@outer@kern
2673 }{#1}}%
2674 }

```

`\MT@ls@basefont` pdfTeX cannot letterspace fonts that already are letterspaced. Therefore, we have to save the base font in `\font@name`@base.

The previous solution (checking the macro's meaning with `\pdfmatch`), where we were loading the base font via the `\font` primitive again, would destroy all previously set up micro-typographic features of the font.

```

2675 \def\MT@get@ls@basefont{%
2676 \xdef\MT@ls@basefont{\csname\expandafter\string\font@name @base\endcsname}%
2677 \expandafter\ifx\MT@ls@basefont\relax
2678 \MT@exp@two@c\MT@gl@et\MT@ls@basefont\font@name
2679 \else
2680 <debug>\MT@info@n1{1}{... fixing base font}%
2681 \MT@exp@two@c\let\font@name\MT@ls@basefont
2682 \fi
2683 }

```

`\MT@set@ls@basefont` If tracking is switched off in the middle of the document, or if `\textls` is called with a zero letterspacing amount, we have to retrieve the base font and select it.

`\MT@set@tr@zero`

```

2684 \def\MT@set@ls@basefont{\MT@exp@two@c\let\font@name\MT@ls@basefont}
2685 \def\MT@set@tr@zero{%
2686 <debug>\MT@info@n1{1}{... zero tracking}%
2687 \xdef\MT@ls@basefont{\csname\expandafter\string\font@name @base\endcsname}%
2688 \expandafter\ifx\MT@ls@basefont\relax \else
2689 <debug>\MT@info@n1{1}{... fixing base font}%
2690 \aftergroup\MT@set@ls@basefont
2691 \fi
2692 }
2693 </pdf-|lua-|letterspace>

```

`\MT@tr@noligatures` pdfTeX 1.40.0–1.40.3 disabled all ligatures in letterspaced fonts.

```

2694 <*pdf-|lua-|
2695 <pdf->\MT@requires@pdftex7{
2696 \def\MT@tr@noligatures{%
2697 \ifx\MT@tr@ligatures@empty
2698 \MT@noligatures@\MT@lsfont\@undefined
2699 \else
2700 \MT@noligatures@\MT@lsfont\MT@tr@ligatures
2701 \fi
2702 }
2703 <*pdf->
2704 }{
2705 \def\MT@tr@noligatures{%
2706 \MT@warning@n1{%
2707 Disabling selected ligatures is only possible since\MessageBreak
2708 pdftex 1.40.4. Disabling all ligatures instead}%
2709 \MT@gl@et\MT@tr@noligatures\relax
2710 }
2711 }
2712 </pdf->

```

`\MT@outer@space` A new skip for outer spacing.

```

2713 \newskip\MT@outer@space

```

`\MT@tr@set@space` Adjust interword spacing (`\fontdimen 2,3,4`) for inner and outer space. For inner spacing, the font dimensions will be adjusted, the settings for outer spacing will be



remembered in a macro.

```

2714 \def\MT@tr@set@space#1,#2,#3,#4,#5,#6,{%
2715 <debug>\MT@info{n12{... orig. space: \the\fontdimen2\MT@lsfont,
2716 <debug> \the\fontdimen3\MT@lsfont, \the\fontdimen4\MT@lsfont
2717 <debug> \MessageBreak... (#1,#2,#3) (#4,#5,#6)}%
2718 \let\MT@temp\empty
2719 \MT@tr@set@space@{#1}{#4}{2}\empty
2720 \MT@tr@set@space@{#2}{#5}{3}\plus
2721 \MT@tr@set@space@{#3}{#6}{4}\minus
2722 \MT@gl@et@c{MT@outer@space\expandafter\string\font@name}\MT@temp
2723 <debug>\MT@info{n12{... inner space: \the\fontdimen2\MT@lsfont,
2724 <debug> \the\fontdimen3\MT@lsfont, \the\fontdimen4\MT@lsfont}%
2725 <debug>\MT@info{n12{... outer space: \MT@temp}%
2726 }

```

`\MT@tr@set@space@` If settings for outer spacing (#2) don't exist, they will be inherited from the inner spacing settings (#1).

```

2727 \def\MT@tr@set@space@#1#2#3#4{%
2728 \MT@ifempty{#2}{%
2729 \MT@ifempty{#1}\relax{%
2730 \MT@tr@set@space@@{#1}{#3}{1000}%
2731 \fontdimen#3\MT@lsfont=\@tempdima
2732 }%
2733 \edef\MT@temp{\MT@temp#4\the\fontdimen#3\MT@lsfont}%
2734 }%
2735 \MT@tr@set@space@@{#2}{#3}{2000}%
2736 \edef\MT@temp{\MT@temp#4\the\@tempdima}%
2737 \MT@ifempty{#1}\relax{%
2738 \MT@tr@set@space@@{#1}{#3}{1000}%
2739 \fontdimen#3\MT@lsfont=\@tempdima
2740 }%
2741 }%
2742 }

```

`\MT@tr@set@space@@` If the value is followed by an asterisk, the fontdimen will be scaled by the respective amount, otherwise the value denotes the desired dimension in the respective unit.

```

2743 \def\MT@tr@set@space@@#1#2#3{%
2744 \MT@test@ast#1*\@nil{%
2745 \MT@ifdefined@cTF\MT@tr@unit@
2746 {\edef\@tempb{#1}\MT@scale@to@em}
2747 {\@tempcntb=#1\relax}%
2748 \@tempdima=\dimexpr\@tempcntb sp*\MT@dimen@six/1000\relax

```

For `\fontdimen 2`, we also have to subtract the kerning that letterspacing adds to each side of the characters (only half if it's for outer spacing).

```

2749 \ifnum#2=\tw@
2750 \advance\@tempdima -\dimexpr\MT@letterspace@ sp*\MT@dimen@six/#3\relax
2751 \fi
2752 }%
2753 \MT@ifempty\@tempa{\let\@tempa\MT@letterspace@}\relax
2754 \@tempdima=\dimexpr \numexpr1000+\@tempa sp *\fontdimen#2\MT@lsfont/1000\relax
2755 }%
2756 <debug>\MT@info{n13{... : font dimen #2 (#1): \the\@tempdima}%
2757 }

```

`\MT@tr@outer@` Recall the last skip (must really be an interword space, not just a marker, nor a 'hard' space, i.e., one that doesn't contain stretch or shrink parts).

```

2758 \def\MT@tr@outer@l{%
2759 \ifhmode
2760 \ifdim\lastskip>5sp
2761 \edef\x{\the\lastskip minus 0pt}%
2762 \setbox\z@\hbox{\MT@outer@space=\x}%
2763 \ifdim\wd\z@>\z@
2764 <debug>\MT@info2{[[[ adjusting pre space: \the\MT@outer@space}%

```

```
2765      \unskip \hskip\MT@outer@space\relax
```

Disable left outer kerning.

```
2766      \let\MT@ls@outer@k\relax
```

```
2767      \else
```

The ragged2e package sets \spaceskip without glue.

```
2768      \ifdim\lastskip=%
```

```
2769      \ifnum\spacefactor<2000
```

```
2770      \spaceskip
```

```
2771      \else
```

```
2772      \ifdim\xspaceskip=\z@
```

```
2773      \dimexpr\spaceskip+\fontdimen7\font@name\relax
```

```
2774      \else
```

```
2775      \xspaceskip
```

```
2776      \fi
```

```
2777      \fi
```

```
2778 (debug)\MT@info2{[[[ adjusting pre space (skip): \the\MT@outer@space}%
```

```
2779      \unskip \hskip\MT@outer@space\relax
```

```
2780      \let\MT@ls@outer@k\relax
```

```
2781      \fi
```

```
2782      \fi
```

```
2783      \fi
```

```
2784      \fi
```

```
2785 }
```

\MT@tr@outer@next microtype also adjusts spacing. The following is borrowed from soul. I've added the cases for italic correction, since tracking may also be triggered by text commands (e.g., \textsc).

```
2786 \def\MT@tr@outer@r{%
```

```
2787   \futurelet\MT@tr@outer@next\MT@tr@outer@r@
```

```
2788 }
```

\MT@if@outer@next We avoid using \ifx tests, in case \MT@tr@outer@next is \let to \fi etc.

```
2789 \def\MT@if@outer@next#1{%
```

```
2790   \ifx\MT@tr@outer@next#1\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
```

```
2791 }
```

\MT@tr@outer@r@

```
2792 \def\MT@tr@outer@r@{%
```

```
2793   \def\MT@temp*{%
```

Don't adjust in math mode. There was a tricky bug when \textls was the last command in a \mathchoice group.

```
2794   \ifmmode \else
```

A similar bug occurred when adjustment would happen inside a discretionary group, which we prevent here. This only works with e-TeX (which we know is available).

```
2795     \ifnum\currentgrouptype=10 \else
```

```
2796     \def\MT@temp*##1{\ifhmode\hskip\MT@outer@space
```

```
2797 (debug)\MT@info2{[[[ adjusting post space (1): \the\MT@outer@space}%
```

```
2798     \fi}%
```

```
2799     \expandafter\ifcat\expandafter\noexpand\csname MT@tr@outer@next\endcsname\egroup
```

```
2800     \ifhmode\unskip\fi\egroup
```

```
2801     \MT@set@curr@ok \MT@set@curr@os
```

```
2802     \def\MT@temp*{\afterassignment\MT@tr@outer@r@\let\MT@temp*}%
```

```
2803     \else
```

If the next token is \maybe@ic (from an enclosing text command), we gobble it, read the next one, feed it to \maybe@ic@ (via \MT@tr@outer@icr) and then call ourselves again.

If the next token is `\check@icr` (from an inner text command), we insert ourselves just before it. This will then call `\maybe@ic` again the next round (which however will always insert an italic correction, since it doesn't read beyond our group).

xspace requires special treatment.

If there's no outer spacing, there may be outer kerning.

Helper macros for the italic correction mess.

If the group is followed by `\xspace`, we first feed `\xspace` with the next token, then check whether it has inserted a space. `\@let@token` might be something evil, so it should be encapsulated here.

For older pdfTeX versions and LuaTeX, throw an error.

```

2848 }{
2849   \DeclareRobustCommand\lsstyle{%
2850     \MT@error{Letterspacing only works with \MT@engine tex version
2851 pdf-      1.40%

```

```

2852 <lua->      0.62%
2853      \MessageBreak or newer}
2854      {Upgrade \MT@engine tex, or try the `soul' package instead.}%
2855      \MT@glet\lsstyle\relax
2856    }
2857  }

```

And for X<sub>Y</sub>T<sub>E</sub>X, too.

```

2858 </pdf-|lua->
2859 <*xe->
2860 \DeclareRobustCommand\lsstyle{%
2861   \MT@error{Letterspacing currently doesn't work with xetex}
2862   {Run pdftex or luatex, or use the `soul' package instead.}%
2863   \MT@glet\lsstyle\relax
2864 }
2865 </xe->

```

`\textls` This command may be used like the other text commands. The starred version removes kerning on the sides. The optional argument changes the letterspacing factor.

```

2866 <*package|letterspace>
2867 \DeclareRobustCommand\textls{%
2868   \ifstar{\let\MT@ls@adjust@empty\MT@textls}%
2869   {\let\MT@ls@adjust@empty\MT@ls@adjust@relax\MT@textls}%
2870 }

```

`\MT@textls` This is now almost L<sup>A</sup>T<sub>E</sub>X's `\DeclareTextFontCommand`, with the difference that we adjust the outer spacing and kerning also for `\lsstyle`, while L<sup>A</sup>T<sub>E</sub>X's text *switches* don't bother about italic correction.

```

2871 \newcommand\MT@textls[2][{}]{%
2872   \ifmode
2873     \nfss@text{\MT@ls@set@ls{#1}\lsstyle#2}%
2874   \else
2875     \hmode@bgroup
2876     \MT@ls@set@ls{#1}%
2877     \lsstyle #2%
2878     \expandafter
2879     \egroup
2880   \fi
2881 }

```

`\MT@ls@adjust` Set current letterspacing amount and outer kerning. This has to be done inside the same group as the letterspacing command.

```

\MT@ls@adjust@empty
\MT@ls@adjust@relax
\MT@ls@set@ls
2882 \def\MT@ls@adjust@empty{\let\MT@ls@adjust@empty}
2883 \def\MT@ls@adjust@relax{\let\MT@ls@adjust@relax}
2884 \def\MT@ls@set@ls#1{%
2885   \MT@ifempty{#1}%
2886   {\let\MT@letterspace@\undefined}%
2887   {\KV@sp@def\MT@letterspace@{#1}%
2888     \edef\MT@letterspace@{\number\MT@letterspace@}%
2889     \MT@ls@too@large\MT@letterspace@}%
2890   \MT@ls@adjust@
2891 }

```

`\MT@ls@too@large` Test whether letterspacing amount is too large.

```

2892 \def\MT@ls@too@large#1{%
2893   \ifnum#1>\MT@tr@max
2894     \MT@warning{Maximum for option `letterspace' is \number\MT@tr@max}%
2895     \edef#1{\number\MT@tr@max}%
2896   \else
2897     \ifnum#1<\MT@tr@min
2898       \MT@warning{Minimum for option `letterspace' is \number\MT@tr@min}%
2899       \edef#1{\number\MT@tr@min}%
2900   \fi

```

```

2901 \fi
2902 }

\MT@outer@kern    This dimen is used for the starred version of \textls, for \lslig and for adjusted
\MT@tr@set@okern  outer kerning.
2903 \newdimen\MT@outer@kern
2904 </package|letterspace>
2905 <*pdf-|lua->
2906 \def\MT@tr@set@okern#1,#2,{%
2907   \let\MT@temp@empty
2908   \MT@ifempty{#1}{\MT@tr@set@okern@{*}}{\MT@tr@set@okern@{#1}}%
2909   \MT@ifempty{#2}{\MT@tr@set@okern@{*}}{\MT@tr@set@okern@{#2}}%
2910   \MT@gl@et@nc{\MT@outer@kern\expandafter\string\font@name}\MT@temp
2911   <debug>\MT@dinfo@n12{... outer kerning: (#1,#2)
2912   <debug>           = \nameuse{\MT@outer@kern\expandafter\string\font@name}}%
2913 }

\MT@tr@set@okern@
2914 \def\MT@tr@set@okern@#1{%
2915   \MT@test@ast#1*\@nil{%
2916     \MT@ifdefined@c@TF\MT@tr@unit@
2917     {\edef\@tempb{#1}\MT@scale@to@em}
2918     {\@tempcntb=#1\relax}%
2919     \@tempdima=\dimexpr \@tempcntb sp * \MT@dimen@six/1000\relax
2920   }%
2921   \MT@ifempty\@tempa{\let\@tempa\@m}\relax
2922   \@tempdima=\dimexpr \numexpr\@tempa*\MT@letterspace@/1000\relax sp
2923   * \fontdimen6\MT@lsfont/2000\relax
2924 }%
2925 \advance\@tempdima -\dimexpr \MT@letterspace@ sp
2926   * \fontdimen6\MT@lsfont/2000\relax
2927 \edef\MT@temp{\MT@temp{\the\@tempdima}}%
2928 }
2929 </pdf-|lua->

\MT@ls@outer@k    Adjust outer kerning. We additionally add a marker (\kern3sp\kern-3sp) for cases
                   of nested letterspacing without anything actually printed.
2930 <*pdf-|lua-|letterspace>
2931 \def\MT@ls@outer@k{%
2932   \ifhmode
2933     \ifdim\lastkern=-3sp \unkern
2934     \ifdim\lastkern=3sp \kern-3sp
2935       \expandafter\expandafter\expandafter\@gobble
2936     \else \unkern
2937       \expandafter\expandafter\expandafter\@firstofone
2938     \fi
2939   \else
2940     \expandafter\@firstofone
2941   \fi
2942   {\kern\MT@outer@kern\kern3sp\kern-3sp\relax}%
2943   \fi
2944 }
2945 </pdf-|lua-|letterspace>

```

### 1.2.6 Disabling ligatures

\MT@noligatures The possibility to disable ligatures is a new features of pdfT<sub>E</sub>X 1.30, and also works with LuaT<sub>E</sub>X.

```

2946 <*pdf-|lua->
2947 <pdf-|>\MT@requires@pdftex5{
2948 \def\MT@noligatures{%
2949   \MT@dotrue
2950   \let\@tempa\MT@n1@setname

```

```

2951 \MT@map@clist@n{font,encoding,family,series,shape,size}{%
2952 \MT@ifdefined@n@TF{MT@checklist@##1}%
2953 {\csname MT@checklist@##1\endcsname}%
2954 {\MT@checklist@{##1}}%
2955 {nl}}%
2956 }%
2957 \ifMT@do
2958 \MT@noligatures@MT@font\MT@n@ligatures
2959 \fi
2960 }

```

\MT@noligatures@ This is also used by \MT@set@tr@codes.

```

2961 <lua->\MT@requires@luatex4{\let\pdfnoligatures\ignoreligaturesinfont}\relax
2962 \def\MT@noligatures@#1#2{%
2963 \MT@ifdefined@c@TF#2{%

```

Early MiKTeX versions (before 2.5.2579) didn't know \tagcode.

```

2964 \MT@ifdefined@c@TF\tagcode{%

```

No 'inputenc' key.

```

2965 \let\MT@warn@maybe@inputenc\empty
2966 \def\MT@curr@list@name{\@backslashchar DisableLigatures}%
2967 \MT@map@clist@c#2{%
2968 \KV@sp@def\@tempa{##1}\MT@get@slot
2969 \ifnum\MT@char>\m@ne
2970 \tagcode#1\MT@char=\m@ne

```

With LuaTeX, we additionally register the ligatures that should be inhibited in a table (used by the luaotfload function keepligature).

```

2971 <lua->\MT@if@luaotf@font
2972 <lua->\MT@lua{microtype.noligatures([[#1]],[[\MT@char]])}\relax
2973 \fi
2974 }%
2975 \MT@vinfo{... Disabling ligatures for characters: #2}%
2976 }{%
2977 \pdfnoligatures#1%
2978 \MT@warning{Cannot disable selected ligatures (pdfTeX doesn't\MessageBreak
2979 know \@backslashchar tagcode). Disabling all ligatures of\MessageBreak
2980 the font instead}%
2981 }%
2982 }%
2983 \pdfnoligatures#1%
2984 <lua->\MT@if@luaotf@font
2985 <lua->\MT@lua{microtype.noligatures([[#1]],"_all_")}\relax
2986 \MT@vinfo{... Disabling all ligatures}%
2987 }%
2988 }
2989 <pdf->\relax
2990 </pdf-|lua->

```

For each potential ligature, luaotfload will call the keepligature function, which expects the first node of the ligature, to check whether they should be kept or inhibited. Here's our concoction of this function. The table microtype.ligs will be populated in \MT@noligatures@.

```

2991 <*luafile>
2992 microtype.ligs = microtype.ligs or { }
2993
2994 local function noligatures(fontcs,liga)
2995 local fontcs = match(fontcs,"([^\ ]+)"
2996 microtype.ligs[fontcs] = microtype.ligs[fontcs] or { }
2997 table.insert(microtype.ligs[fontcs],liga)
2998 end
2999 microtype.noligatures = noligatures
3000

```

```

3001 local function keepligature(c)
3002   local nodedirect = node.direct
3003   local getfield   = nodedirect.getfield
3004   local getfont    = nodedirect.getfont
3005   local f,ch
3006   if type(c) == "userdata" then -- in older luaotfload versions, c was a node
3007     f = c.font
3008     ch = c.components.char
3009   else -- since 2.6, c is a (direct node) number
3010     f = getfont(c)
3011     ch = getfield(getfield(c,"components"),"char")
3012   end
3013   -- if ch then -- should always be true
3014   local lig = microtype.ligs[match(tex.fontidentifier(f),"\\([^\ ]+)")]
3015   if lig then
3016     for _,lig in pairs(lig) do
3017       if lig == "_all_" or tonumber(lig) == ch then
3018         return false
3019       end
3020     end
3021   end
3022   return true
3023 -- end
3024 end
3025
3026 if luaotfload and luaotfload.letterspace then
3027   if luaotfload.letterspace.keepligature then
3028     microtype.info("overwriting function `keepligature'")
3029   end
3030   luaotfload.letterspace.keepligature = keepligature
3031 end
3032
3033 /luafile

```

### 1.2.7 Loading the configuration

`\MT@load@list` Recurse through the lists to be loaded.

```

3034 <package> show
3035 <package> \def\MT@load@list#1%
3036 <show> \def\MTS@load@list#1%
3037   {\edef\@tempa{#1}%
3038    \MT@let@cn\@tempb{\MT@MT@feat @c\@tempa @load}%
3039    \MT@ifstreq\@tempa\@tempb{%
3040      \MT@error{\@nameuse{\MT@abbr@MT@feat} list `~\@tempa' cannot load itself}{}%
3041    }%
3042    \ifx\@tempb\relax
3043 <show>      : \par\medskip\leavevmode
3044    \else
3045      \MT@ifdefined@n@TF{\MT@MT@feat @c\@tempb}{%
3046 <show>        \MTS@printtext{, loading \texttt{\@tempb}}%
3047        \MT@vinfo{... : First loading \@nameuse{\MT@abbr@MT@feat} list `~\@tempb'}%
3048        \begingroup
3049          \MT@load@list\@tempb
3050        \endgroup
3051        \edef\MT@curr@list@name{%
3052 <package>          \@nameuse{\MT@abbr@MT@feat} list \noexpand\MessageBreak
3053                    ~\@tempb'}%
3054        \MT@let@cn\@tempc{\MT@MT@feat @c\@tempb}%
3055        \expandafter\MT@set@codes\@tempc,\relax,%
3056 <show>          \vrule width 4cm height .5pt \\\
3057 <show>          \MTS@printtext{End of list \texttt{\MT@curr@list@name}}%
3058 <show>          \par\medskip\leavevmode
3059      }%
3060      \MT@error{\@nameuse{\MT@abbr@MT@feat} list `~\@tempb' undefined.\MessageBreak

```

```

3061             Cannot load it from list \@tempa'{}\}%
3062         }%
3063     \fi
3064 }%
3065 }
3066 </package>|show)

```

\MT@find@file      Micro-typographic settings may be written into a file *mt-⟨font family⟩.cfg*.  
 \MT@file@list      We must also record whether we've already loaded the file.

```

3067 <*package>
3068 \let\MT@file@list\empty
3069 \def\MT@find@file#1{%

```

Check for existence of the file only once.

```

3070 \MT@in@clist{#1}\MT@file@list
3071 \ifMT@inlist@ \else

```

Don't forget that because reading the files takes place inside a group, all commands that may be used there have to be defined globally.

```

3072 \MT@begin@catcodes
3073 \let\MT@begin@catcodes\relax
3074 \let\MT@end@catcodes\relax
3075 \InputIfFileExists{mt-#1.cfg}{%
3076 \edef\MT@curr@file{mt-#1.cfg}%
3077 \MT@vinfo{... Loading configuration file \MT@curr@file}%
3078 \MT@xadd\MT@file@list{#1,}%
3079 }{%
3080 \MT@get@basefamily#1\empty\empty\empty\empty
3081 \MT@exp@one@n\MT@in@clist\@tempa\MT@file@list
3082 \ifMT@inlist@
3083 \MT@xadd\MT@file@list{#1,}%
3084 \else
3085 \InputIfFileExists{mt-\@tempa.cfg}{%
3086 \edef\MT@curr@file{mt-\@tempa.cfg}%
3087 \MT@vinfo{... Loading configuration file \MT@curr@file}%
3088 \MT@xadd\MT@file@list{\@tempa,#1,}%
3089 }{%
3090 \MT@vinfo{... No configuration file mt-#1.cfg}%
3091 \MT@xadd\MT@file@list{#1,}%
3092 }%
3093 \fi
3094 }%
3095 \endgroup
3096 \fi
3097 }

```

\MT@cfg@catcodes      We have to make sure that all characters have the correct category code. Especially, new lines and spaces should be ignored, since files might be loaded in the middle of the document. This is basically \nfss@catcodes (from the L<sup>A</sup>T<sub>E</sub>X kernel). I've added: & (in tabulars), !, ?, , , : (french), , , \$, -, ~, and = (Turkish babel).

OK, now all printable characters up to 127 are 'other'. We hope that letters are always letters and numbers other. (listings makes them active, see section 1.1.6.)

We leave ^ at catcode 7, so that stuff like '^ff' remains possible.

```

3098 \def\MT@cfg@catcodes{%
3099 \makeatletter
3100 \catcode`\^7%
3101 \catcode`\_9%
3102 \catcode`\^^I9%
3103 \catcode`\^^M9%
3104 \catcode`\z@
3105 \catcode`\{\@ne
3106 \catcode`\}\tw@

```



```

3107 \catcode~\#6%
3108 \catcode~\%14%
3109 \MT@map@tlist@n
3110 {!\\"$&'(\)\*+,\-\.\/\:\;\<=\>?[\]\_~\|}%
3111 \makeother
3112 }

\MT@begin@catcodes This will be used before reading the files as well as in all configuration commands,
                    so that catcodes are also harmless when these commands are used outside the
                    configuration files.
3113 \def\MT@begin@catcodes{%
3114 \begingroup
3115 \MT@cfg@catcodes
3116 }

\MT@end@catcodes End group if outside configuration file (otherwise relax).
3117 \let\MT@end@catcodes\endgroup

\MT@get@basefamily The family name might have a suffix e.g., for expert set (x), old style numbers (j)
                    swash capitals (w) etc. We mustn't simply remove the last letter, as this would make
                    for instance cms out of cmss and cmsy (OK, cmex will still become cme ...).
                    We only work on the font name if it is longer than three characters.
3118 \def\MT@get@basefamily#1#2#3#4\@nil{%
3119 \ifx\@empty#4%
3120 \def\@tempa{#1#2#3}%
3121 \else
3122 \let\@tempa\@empty
3123 \edef\@tempb{#1#2#3#4}%
3124 \expandafter\MT@get@basefamily@\@tempb\@nil
3125 \fi
3126 }

\MT@get@basefamily@ This will only remove one suffix (the longest match), so that combinations of suffixes
                    would have be to added manually (e.g., \DeclareMicrotypeVariants*{aw}). But
                    otherwise, something like 'pplx' would be truncated to 'p'.
3127 \def\MT@get@basefamily@#1#2\@nil{%
3128 \edef\@tempa{\@tempa#1}%
3129 \ifx\#2\@expandafter\@gobble\else\expandafter\@firstofone\fi
3130 {\MT@in@tlist{#2}\MT@variants
3131 \ifMT@in@list\else\MT@get@basefamily@#2\@nil\fi}%
3132 }

\MT@listname Try all combinations of font family, series, shape and size to get a list for the current
\MT@get@listname font.
\MT@get@listname@ 3133 \def\MT@get@listname#1{%
3134 debug\MT@edinfo{n}{1}{trying to find \@nameuse{MT@abbr@#1} list for font ~\MT@font'}%
3135 \let\MT@listname\@undefined
3136 \def\@tempb{#1}%
3137 \MT@map@tlist@c\MT@try@order\MT@get@listname@
3138 }
3139 \def\MT@get@listname@#1{%
3140 \expandafter\MT@next@listname#1%
3141 \ifx\MT@listname\@undefined \else
3142 \expandafter\MT@tlist@break
3143 \fi
3144 }

\MT@try@order Beginning with version 1.7, we always check for the font size. Since the matching
                    order has become more logical now, it can be described in words, so that we don't
                    need table 1 in the documentation part any longer and can cast it off here.
3145 \def\MT@try@order{%
3146 {1111}{1110}{1101}{1100}{1011}{1010}{1001}{1000}%

```

Table 1:

Order for matching font attributes

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Encoding	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Family	•	•	•	•	•	•	•	•	-	-	-	-	-	-	-	-
Series	•	•	•	•	-	-	-	-	•	•	•	•	-	-	-	-
Shape	•	•	-	-	•	•	-	-	•	•	-	-	•	•	-	-
Size	•	-	•	-	•	-	•	-	•	-	•	-	•	-	•	-

```

3147 {0111}{0110}{0101}{0100}{0011}{0010}{0001}{0000}%
3148 }

```

\MT@next@listname The current context is added to the font attributes. That is, the context must match.

```

3149 \def\MT@next@listname#1#2#3#4{%
3150 \ifnum#1=\z@\MT@nofamilytrue\fi
3151 \edef\@tempa{\MT@encoding
3152 /\ifnum#1=\@ne \MT@family \fi
3153 /\ifnum#2=\@ne \MT@series \fi
3154 /\ifnum#3=\@ne \MT@shape \fi
3155 /\ifnum#4=\@ne *\fi
3156 \MT@context}%
3157 <debug>\MT@info@n1{1}{trying \@tempa}%
3158 \MT@ifdefined@n@TF{MT@\@tempb @\@tempa}{%
3159 \MT@next@listname@#4%
3160 }{%

```

Also try with an alias family.

```

3161 \ifnum#1=\@ne
3162 \ifx\MT@familyalias\@empty \else
3163 \edef\@tempa{\MT@encoding
3164 /\MT@familyalias
3165 /\ifnum#2=\@ne \MT@series\fi
3166 /\ifnum#3=\@ne \MT@shape\fi
3167 /\ifnum#4=\@ne *\fi
3168 \MT@context}%
3169 <debug>\MT@info@n1{1}{(alias) \@tempa}%
3170 \MT@ifdefined@n@T{MT@\@tempb @\@tempa}{%
3171 \MT@next@listname@#4%
3172 }%
3173 \fi
3174 \fi
3175 }%
3176 }

```

\MT@next@listname@ If size is to be evaluated, do that, otherwise use the current list.

```

3177 \def\MT@next@listname@#1{%
3178 \ifnum#1=\@ne
3179 \MT@exp@cs\MT@in@rlist{MT@\@tempb @\@tempa @size}%
3180 \ifMT@inlist@
3181 \let\MT@listname\MT@size@name
3182 \fi
3183 \else
3184 \MT@let@cn\MT@listname{MT@\@tempb @\@tempa}%
3185 \fi
3186 }

```

\MT@if@list@exists

```

\MT@context 3187 \def\MT@if@list@exists{%
3188 \MT@let@cn\MT@context{MT@\MT@feat @context}%
3189 \MT@ifstreq{0}\MT@context{\let\MT@context\@empty}\relax
3190 \MT@get@listname{\MT@feat @c}%
3191 \MT@ifdefined@c@TF\MT@listname{%

```

```

3192 \MT@edef\MT@feat @c@name{\MT@listname}%
3193 \ifMT@nonselected
3194 \MT@vinfo{... Applying non-selected expansion (list '\MT@listname')}%
3195 \else
3196 \MT@vinfo{... Loading \@nameuse{MT@abbr@MT@feat} list '\MT@listname'}%
3197 \fi
3198 \@firstoftwo
3199 }%

```

Since the name cannot be \@empty, this is a sound proof that no matching list exists.

```

3200 \MT@let\enc{MT@MT@feat @c@name}\@empty

```

Don't warn if selected=false.

```

3201 \ifMT@nonselected
3202 \MT@vinfo{... Applying non-selected expansion (no list)}%
3203 \else

```

Tracking doesn't require a list, either.

```

3204 \MT@ifstreq\MT@feat{tr}\relax{%
3205 \MT@warning{I cannot find a \@nameuse{MT@abbr@MT@feat} list
3206 for font\MessageBreak'\MT@font'%
3207 \ifx\MT@context\@empty\else\space(context: '\MT@context')\fi.
3208 Switching off\MessageBreak\@nameuse{MT@abbr@MT@feat} for this font}%
3209 }%
3210 \fi
3211 \@secondoftwo
3212 }%
3213 }

```

\MT@get@inh@list The inheritance lists are global (no context).

```

\MT@context 3214 \def\MT@get@inh@list{%
3215 \let\MT@context\@empty
3216 \MT@get@listname{\MT@feat @inh}%
3217 \MT@ifdefined\c@TF\MT@listname{%
3218 \MT@edef\MT@MT@feat @inh@name{\MT@listname}%
3219 <debug>\MT@dinfo@n1{1}{... Using \@nameuse{MT@abbr@MT@feat} inheritance list
3220 <debug> '\MT@listname'}%
3221 \MT@let\cn\@tempc{MT@MT@feat @inh@MT@listname}%

```

If the list is \@empty, it has already been parsed.

```

3222 \ifx\@tempc\@empty \else
3223 <debug>\MT@dinfo@n1{1}{parsing inheritance list ...}%

```

The group is only required in case an input encoding is given.

```

3224 \begingroup
3225 \edef\MT@curr@list@name{inheritance list\noexpand\MessageBreak'\MT@listname'}%
3226 \MT@set@inputenc{inh}%
3227 \expandafter\MT@inh@do\@tempc,\relax,%
3228 \MT@gl@et\enc{MT@MT@feat @inh@MT@listname}\@empty
3229 \endgroup
3230 \fi
3231 }%
3232 \MT@let\enc{MT@MT@feat @inh@name}\@undefined
3233 }%
3234 }

```

## 1.2.8 Translating characters into slots

Get the slot number of the character in the current encoding.

\MT@get@slot There are lots of possibilities how a character may be specified in the configuration files, which makes translating them into slot numbers quite expensive. Also, we

want to have this as robust as possible, so that the user does not have to solve a sphinx’s riddle if anything goes wrong.

`\MT@char` The character is in `\@tempa`, we want its slot number in `\MT@char`.

```
\MT@char@ 3235 \def\MT@get@slot{%
3236   \escapechar~\
3237   \let\MT@char@m@ne
3238   \MT@noesttrue
```

Save unexpanded string in case we need to issue a warning message.

```
3239   \MT@toks=\expandafter{\@tempa}%
```

It might be an active character, i.e., an 8-bit character defined by `inputenc`. If so, we will expand it here to its LICR form.

```
3240   \MT@exp@two@c\MT@is@active\string\@tempa\@nil
```

Now, let’s walk through (hopefully) all possible cases.

- It’s a letter, a character or a number.

```
3241   \expandafter\MT@is@letter\@tempa\relax\relax
3242   \ifnum\MT@char@ < \z@
```

- OK, so it must be a macro. We do not allow random commands but only those defined in L<sup>A</sup>T<sub>E</sub>X’s idiosyncratic font encoding scheme:

If `\<encoding>\<command>` (that’s *one* command) is defined, we try to extract the slot number.

We must be cautious not to stumble over accented characters consisting of two commands, like `\'i` or `\U\CYRI`, hence, `\string` wouldn’t be safe enough.

```
3243   \MT@ifdefined@nTF{\MT@encoding\MT@detokenize@c\@tempa}%
3244   \MT@is@symbol
```

- Now, we’ll catch the rest, which hopefully is an accented character (e.g. `\"a`).

```
3245   {\expandafter\MT@is@composite\@tempa\relax\relax}%
3246   \ifnum\MT@char@ < \z@
```

- It could also be a `\chardef` command (e.g., the percent character). This seems the least likely case, so it’s last.

```
3247   \expandafter\MT@exp@two@c\expandafter\MT@is@char\expandafter
3248   \meaning\expandafter\@tempa\MT@charstring\relax\relax\relax
3249   \fi
3250   \fi

3251   \let\MT@char\MT@char@
3252   \MT@get@slot@
3253   \escapechar@m@ne
3254   }
3255   /package
```

`\MT@get@slot@`

```
3256   <pdf-|lua-|xe->
3257   \def\MT@get@slot@{%
```

If it’s a legacy (i.e., TFM) font, proceed as usual.

```
3258   <xe-> \ifnum\XeTeXfonttype\MT@font=\z@
3259   \ifnum\MT@char@ > \m@ne
```

In Lua<sub>T</sub>E<sub>X</sub>, it may also be a glyph name, prefixed with `’/`.

```
3260   <lua->
```

```

3261 \ifnum\MT@char=47\relax
3262 \ifMT@noreset \else
3263   \@tempcnta=\MT@lua{
3264     local glyph = microtype.name_to_slot([[ \expandafter \@gobble \@tempa ]],true)
3265     if glyph then tex.write(glyph)
3266     else tex.write(-1)
3267     end
3268   }\relax
3269   \ifnum\@tempcnta<\z@
3270     \MT@warn@unknown
3271     \let\MT@char\m@ne
3272   \else
3273     \edef\MT@char{\the\@tempcnta}%
3274 <debug>\MT@info@n1{3}{> ` \the\MT@toks' is a glyph name (\the\@tempcnta)}%
3275     \fi
3276   \fi
3277 \else
3278 </lua->

```

If the user has specified something like ‘fi’, or wanted to define a number but forgot to use three digits, we’ll have something left of the string. In this case, we issue a warning and forget the complete string.

```

3279 \ifMT@noreset \else
3280 \MT@warn@rest
3281 <pdf-|lua-> \let\MT@char\m@ne
3282 <xe-> \let\MT@char\@empty
3283 \fi
3284 <lua-> \fi
3285 \else
3286 \MT@warn@unknown
3287 <xe-> \let\MT@char\@empty
3288 \fi
3289 <*xe->
3290 \else

```

There are more possibilities for X<sub>Y</sub>TEX: It may be a Unicode codepoint (prefixed with ‘U’) or a glyph name (prefixed with ‘/’).<sup>4</sup> We indicate glyph names to \MT@get@charwd by reversing the sign of \MT@char@.

```

3291 \ifnum\MT@char=47\relax
3292 \ifMT@noreset \edef\MT@char{U47}%
3293 \else
3294   \@tempcnta=\XeTeXglyphindex"\expandafter \@gobble \@tempa"\relax
3295   \ifnum\@tempcnta=\z@
3296     \MT@warn@unknown
3297     \let\MT@char\@empty
3298   \else
3299     \edef\MT@char{\@tempa\space}%
3300     \edef\MT@char@{-\the\@tempcnta}%
3301 <debug>\MT@info@n1{3}{> ` \the\MT@toks' is a glyph name (\the\@tempcnta)}%
3302     \fi
3303   \fi
3304 \else
3305   \ifnum\MT@char > \m@ne
3306     \ifMT@noreset

```

Or, it’s a Unicode number, which we mustn’t translate into a glyph number, since the latter is font-specific. But we add the ‘U’ prefix.

```

3307   \@tempcnta=\XeTeXcharglyph\MT@char\relax
3308   \ifnum\@tempcnta=\z@
3309     \MT@info@missing@char
3310     \let\MT@char\@empty

```

4 This doesn’t seem to be documented anywhere, but it has been announced here: <https://tug.org/pipermail/xetex/2010-May/016531.html>

```

3311         \else
3312 <debug> \MT@info{n}{3}{> (glyph number: \the\@tempcnta,
3313 <debug>         glyph name: \XeTeXglyphname\MT@font\@tempcnta)}%
3314         \edef\MT@char{U\MT@char}%
3315         \fi
3316     \else
3317         \MT@warn@rest
3318         \let\MT@char\@empty
3319     \fi
3320 \else
3321     \MT@warn@unknown
3322     \let\MT@char\@empty
3323 \fi
3324 \fi
3325 \fi
3326 </xe->
3327 }
3328 </pdf-|lua-|xe->

```

This is the lua function to translate glyph name into slot number. Beginning with v2.2, luaotfload provides this function in its API, which we use if available, but (for now, at least) keep the old code for backward compatibility. With HarfBuzz, the return value is not guaranteed to be inside the Unicode range, so we have to guard against this case as well (same as in `do_font`). Also, older versions of luaotfload (until v3.18) returned the numbers as floats.

```

3329 <*luafile>
3330 if luaotfload and luaotfload.aux and luaotfload.aux.slot_of_name then
3331     local slot_of_name = luaotfload.aux.slot_of_name
3332     microtype.name_to_slot = function(name, unsafe)
3333         local n = slot_of_name(font.current(), name, unsafe)
3334         if not n then return -1 end
3335         if n > 1114111 then return -1 end
3336         return math.tointeger(n)
3337     end
3338 else
3339     -- we dig into internal structure (should be avoided)
3340     local function name_to_slot(name, unsafe)
3341         if fonts then
3342             local unicodes
3343             if fonts.ids then -- legacy luaotfload
3344                 local tfmdata = fonts.ids[font.current()]
3345                 if not tfmdata then return end
3346                 unicodes = tfmdata.shared.otfdata.luaotex.unicodes
3347             else -- new location
3348                 local tfmdata = fonts.hashes.identifiers[font.current()]
3349                 if not tfmdata then return end
3350                 unicodes = tfmdata.resources.unicodes
3351             end
3352             local unicode = unicodes[name]
3353             if unicode then -- does the 'or' branch actually exist?
3354                 return type(unicode) == "number" and unicode or unicode[1]
3355             end
3356         end
3357     end
3358     microtype.name_to_slot = name_to_slot
3359 end
3360
3361 </luafile>

```

`\MT@is@letter` Input is a letter, a character or a number.

`\MT@max@char` Warning if resulting character or slot number is too large.

`\MT@max@slot` *<\*pdf-|lua-|xe->*  
*<def>* `\MT@max@char`

```

3364 <pdf- > {127 }
3365 <lua-|xe- > {1114111 }
3366 \def\MT@max@slot
3367 <pdf- > {255 }
3368 <lua-|xe- > {1114111 }
3369 </pdf-|lua-|xe- >

```

\ifMT@noreset      Test whether all of the string has been used up.

```

3370 <*package>
3371 \newif\ifMT@noreset
3372 \def\MT@is@letter#1#2\relax{%
3373   \ifcat a\noexpand#1\relax
3374     \edef\MT@char@{\number`#1}%
3375     \ifx\#2\%
3376 <debug>\MT@info@n1{3}{> `the\MT@toks' is a letter (\MT@char@)}%
3377     \else
3378       \MT@noresetfalse
3379     \fi
3380   \else
3381     \ifcat !\noexpand#1\relax
3382       \edef\MT@char@{\number`#1}%
3383 <debug>\MT@info@n1{3}{> `the\MT@toks' is a character (\MT@char@)}%
3384       \ifx\#2\%
3385         \ifnum\MT@char@ > \MT@max@char \MT@warn@ascii \fi
3386       \else
3387         \MT@noresetfalse
3388         \expandafter\MT@is@number#1#2\relax\relax
3389       \fi
3390     \fi
3391   \fi
3392 }

```

\MT@is@number      Numbers may be specified as a three-digit decimal number (029), as a hexadecimal number (prefixed with ": "1D) or as a octal number (prefixed with ': '35). They must consist of at least three characters (including the prefix), that is, "F is not permitted.

```

3393 \def\MT@is@number#1#2#3\relax{%
3394   \ifx\relax#3\relax \else
3395     \ifx\relax#2\relax \else
3396       \MT@noresettrue
3397       \if#1"\relax
3398         \def\x{\uppercase{\edef\MT@char@{\number#1#2#3}}}\x
3399 <debug>\MT@info@n1{3}{> ... a hexadecimal number: \MT@char@}%
3400       \else
3401         \if#1'\relax
3402         \def\MT@char@{\number#1#2#3}%
3403 <debug>\MT@info@n1{3}{> ... an octal number: \MT@char@}%
3404       \else
3405         \MT@ifint{#1#2#3}%
3406         \def\MT@char@{\number#1#2#3}%
3407 <debug>\MT@info@n1{3}{> ... a decimal number: \MT@char@}%
3408       }\MT@noresetfalse
3409     \fi
3410   \fi
3411   \ifnum\MT@char@ > \MT@max@slot
3412     \MT@warn@number@too@large{\noexpand#1\noexpand#2\noexpand#3}%
3413     \let\MT@char@\m@ne
3414   \fi
3415 \fi
3416 \fi
3417 }

```

\MT@is@active      Expand an active character. (This was completely broken in v1.7, and only worked by chance before.) We \set@display@protect to translate, e.g., Ä into \"A, that is

to whatever it is defined in the inputenc encoding file.

Unfortunately, the (older) inputenc definitions prefer the protected/generic variants (e.g., `\copyright` instead of `\textcopyright`), which our parser won't be able to understand. (I'm fed up now, so you have to complain if you really, really want to be able to write '©' instead of `\textcopyright`, thus rendering your configuration files unportable.)

Unicode characters (inputenc/utf8,utf8x) are also supported.

```
3418 \def\MT@is@active#1#2\@nil{%
3419   \ifnum\catcode`#1 = \active
3420     \begingroup
3421     \set@display@protect
3422     \let\IeC\@firstofone
3423     \let\@inpenc@undefined\MT@undefined@char
```

Unicode handling has changed again with L<sup>A</sup>T<sub>E</sub>X 2019/10/01.

```
3424   \let\UTF@two@octets@noexpand\@empty
3425   \let\UTF@three@octets@noexpand\@empty
3426   \let\UTF@four@octets@noexpand\@empty
```

We refrain from checking whether there is a sufficient number of octets.

```
3427   \def\UTFviii@defined##1{\ifx ##1\relax
3428     \MT@undefined@char{utf8}\else\expandafter ##1\fi}%
```

For ucs (utf8x). Let's call it experimental ...

```
3429   \MT@ifdefined@c@T\PrerenderUnicode
3430     {\PrerenderUnicode{\@tempa}\let\unicode@charfilter\@firstofone}%
```

The `\expandafter` hocus-pocus should please `newunicodechar`.

```
3431   \edef\x{\endgroup
3432     \def\@noexpand\@tempa{\expandafter\expandafter\expandafter\@empty\@tempa}%
```

Append what we think the translation is to the token register we use for the log.

```
3433     \MT@toks={\the\MT@toks\space(=
3434               \expandafter\expandafter\expandafter\@empty\@tempa)}%
3435   }%
3436   \x
3437   \fi
3438 }
```

`\MT@undefined@char` For characters not defined in the current input encoding.

```
3439 \def\MT@undefined@char#1{undefined in input encoding ``#1''}
```

`\MT@is@symbol` The symbol commands might expand to funny stuff, depending on context. Instead of simply expanding `\<command>`, we construct the command `\<encoding>\<command>` and see whether its meaning is `\char" <hex number>`, which is the case for everything that has been defined with `\DeclareTextSymbol` in the encoding definition files.

```
3440 \def\MT@is@symbol{%
3441   \expandafter\def\expandafter\MT@char\expandafter
3442     {\csname\MT@encoding\MT@detokenize@c\@tempa\endcsname}%
```

Since recently, some glyphs are defined optionally in L<sup>A</sup>T<sub>E</sub>X by checking if the glyph actually exists in the font (e.g., `\textasteriskcentered`).

```
3443   \expandafter\expandafter\expandafter
3444     \MT@is@opt@char\MT@char\iffontchar\char\else\fi\relax
3445   \expandafter\MT@exp@two@c\expandafter\MT@is@char\expandafter
3446     \meaning\expandafter\MT@char\MT@charstring\relax\relax\relax
3447   \ifnum\MT@char@ < \z@
```

In TU encoding, some commands (currently, `\textquotesingle`, `\textasciigrave` and `\textquotedbl`) are defined by means of the auxiliary macro `\remove@tlig`, which we take care of here.



```

3448 \expandafter\expandafter\expandafter\MT@is@tlig\MT@char\relax\relax
3449 \ifnum\MT@char@ < \z@

```

Finally, if it hasn't been defined by `\DeclareTextSymbol`, it could be a letter (e.g., `\i`, when using `frenchpro`).

```

3450 \expandafter\expandafter\expandafter\MT@is@letter\MT@char\relax\relax
3451 \fi
3452 \fi
3453 }

```

`\MT@is@opt@char` This seems adventurous, but we're only redefining the text command within the scope of our setup.

```

3454 \def\MT@is@opt@char#1\iffontchar#2\char#3\else#4\fi\relax{%
3455 \MT@ifempty{#1}{%
3456 \iffontchar#2%
3457 \expandafter\chardef
3458 \csname\MT@encoding\MT@detokenize@c\@tempa\endcsname=#3\relax
3459 \fi
3460 }\relax
3461 }

```

`\MT@is@char` A helper macro that inspects the meaning of its argument.

```

\MT@charstring 3462 \begingroup
3463 \catcode`\=/\z@

3464 /MT@map@tlist@n{/CHARLEX}/@makeother
3465 /lowercase{%
3466 /def/x{/endgroup
3467 /def/MT@charstring{\CHAR"%
3468 /def/MT@is@char##1\CHAR"##2##3##4/relax{%
3469 /ifx/relax##4/relax
3470 /ifMT@xunicode
3471 /expandafter/MT@is@charx/MT@strip@prefix##1>/relax\CHAR "%
3472 /relax/relax/relax/relax/relax
3473 /fi
3474 /else
3475 /ifx/relax##1/relax
3476 /if##3\relax
3477 /edef/MT@char@{/number"##2}%
3478 /MT@ifstreq/MT@charstring{##3##4}/relax/MT@noestfalse
3479 /else
3480 /edef/MT@char@{/number"##2##3}%
3481 /MT@ifstreq/MT@charstring{##4}/relax
3482 {/MT@is@xchar##2##3|##4\CHAR"/relax}%
3483 /fi
3484 (debug) /MT@dinfo@n1{3}{>~/the/MT@toks' is a \char (/MT@char@)}%
3485 /fi
3486 /fi
3487 }%

```

`\MT@is@xchar` With `fontspec`'s TU encoding, glyph numbers may be up to four digits.

```

3488 /def/MT@is@xchar##1|##2\CHAR"##3##4/relax{%
3489 /MT@ifstreq/MT@charstring{##3##4}%
3490 {/edef/MT@char@{/number"##1##2}}/MT@noestfalse
3491 }%

```

`\MT@charxstring` For xunicode, which doesn't `\countdef`, but rather `\defs` the chars.

```

\MT@strip@prefix 3492 /def/MT@charxstring{\CHAR "%
\MT@is@charx 3493 /def/MT@strip@prefix##1>##2/relax{##2}%
3494 /def/MT@is@charx##1\CHAR "##2##3##4##5##6/relax{%
3495 /ifx/relax##1/relax
3496 /ifx/relax##6/relax/else
3497 /edef/MT@char@{/number"##2##3##4##5}%
3498 /MT@ifstreq{\RELAX >\CHAR "}{##6}/relax/MT@noestfalse
3499 (debug) /MT@dinfo@n1{3}{>~/the/MT@toks' is a xunicode \char (/MT@char@)}%

```

```

3500         /fi
3501     /fi
3502     }%
3503 }%
3504 }
3505 /x

```

`\MT@is@tlig` This might have to change again with the next L<sup>A</sup>T<sub>E</sub>X release, ... or so I feared, but it still seems to be fine.

```

3506 \def\MT@is@tlig#1#2\relax{%
3507     \ifx\remove@tlig#1%
3508     <debug> \MT@info{n1}{3}{> `the\MT@toks' (removing remove@tlig)}%
3509     \MT@remove@tlig
3510     \fi
3511 }

```

`\MT@remove@tlig` We remove the `\remove@tlig` command and only pass on the number.

```

3512 \def\MT@remove@tlig{%
3513     \expandafter\MT@exp@two@c\expandafter\MT@is@number
3514     \expandafter\@secondoftwo\MT@char\relax\relax
3515 }

```

`\MT@is@composite` Here, we are dealing with accented characters, specified as two tokens.

```

3516 \def\MT@is@composite#1#2\relax{%
3517     \ifx\#2\\\else

```

Again, we construct a control sequence, this time of the form: `\<encoding>\<accent>-(character)`, e.g., `\T1"-a`, which we then expand once to see if it is a letter (if it has been defined by `\DeclareTextComposite`). This should be robust, finally, especially, since we also `\detokenize` the input instead of only `\stringifying` it. Thus, we will die gracefully even on wrong Unicode input without `utf8`.

```

3518     \expandafter\def\expandafter\MT@char\expandafter{\csname\expandafter
3519         \string\csname\MT@encoding\endcsname
3520         \MT@detokenize@n{#1}-\MT@detokenize@n{#2}\endcsname}%

```

In 2017, L<sup>A</sup>T<sub>E</sub>X introduced a new way of declaring accented Unicode commands (`\DeclareUnicodeComposite`), which we take care of here (`\UnicodeEncodingName` has been introduced at the same time):

```

3521     \ifx\UnicodeEncodingName\undefined\else
3522     \expandafter\expandafter\expandafter
3523     \MT@is@uni@comp\MT@char\iffontchar\else\fi\relax
3524     \fi
3525     \expandafter\expandafter\expandafter\MT@is@letter\MT@char\relax\relax

```

Again, xunicode.

```

3526     \ifnum\MT@char@ < \z@
3527     \ifMT@xunicode
3528     \edef\MT@char{\MT@exp@two@c\MT@strip@prefix\meaning\MT@char>\relax}%
3529     \expandafter\MT@exp@two@c\expandafter\MT@is@charx\expandafter
3530     \MT@char\MT@charxstring\relax\relax\relax\relax\relax
3531     \fi
3532     \fi
3533     \fi
3534 }

```

`\MT@is@uni@comp` Helper for `\DeclareUnicodeComposite`.

```

3535 \def\MT@is@uni@comp#1\iffontchar#2\else#3\fi\relax{%
3536     \ifx\#1\\\edef\MT@char{\iffontchar#2\fi}\fi
3537 }

```

[What about math? Well, for a moment the following looked like a solution, with `\mt@is@mathchar` defined accordingly, analogous to `\MT@is@char` above, to pick up

the last two tokens (the `\meaning` of a `\mathchardef`'ed command expands to its hexadecimal notation):

```
\def\MT@is@mathchar#1{%
  \if\relax\noexpand#1% it's a macro
    \let\x#1%
  \else % it's a character
    \mathchardef\x=\mathcode`#1\relax
  \fi
  \expandafter\MT@exp@two@c\expandafter\mt@is@mathchar\expandafter
    \meaning\expandafter\x\mt@mathcharstring\relax\relax\relax
}
```

However, the problem is that `\mathcodes` and `\mathchardefs` have global scope. Therefore, if they are changed by a package that loads different math fonts, there is no guarantee whatsoever that things will still be correct (e.g., the minus in `cmsy` when the `euler` package is loaded). So, no way to go, unfortunately.]

Some warning messages, for performance reasons separated here.

`\MT@curr@list@name` The type and name of the current list, defined at various places.

```
\MT@set@listname 3538 \def\MT@set@listname{%
3539   \edef\MT@curr@list@name{\@nameuse{MT@abbr@}\MT@feat} list\noexpand\MessageBreak
3540   ~\@nameuse{MT@\MT@feat @c@name}'}%
3541 }
```

`\MT@warn@ascii` For ‘other’ characters > 127, we issue a warning (inputenc probably hasn’t been loaded), since correspondence with the slot numbers would be purely coincidental.

```
3542 \def\MT@warn@ascii{%
3543   \MT@warning@nl{Character ~\the\MT@toks' (= \MT@char@)
3544   is outside of ASCII range.\MessageBreak
3545   You must load the ~inputenc' package before using\MessageBreak
3546   8-bit characters in \MT@curr@list@name}%
3547 }
```

`\MT@warn@number@too@large` Number too large.

```
3548 \def\MT@warn@number@too@large#1{%
3549   \MT@warning@nl{%
3550     Number #1 in encoding ~\MT@encoding' too large!\MessageBreak
3551     Ignoring it in \MT@curr@list@name}%
3552 }
```

`\MT@warn@rest` Not all of the string has been parsed.

```
3553 \def\MT@warn@rest{%
3554   \MT@warning@nl{%
3555     Unknown slot number of character\MessageBreak~\the\MT@toks'%
3556     \MT@warn@maybe@inputenc\MessageBreak
3557     in font encoding ~\MT@encoding'.\MessageBreak
3558     Make sure it's a single character\MessageBreak
3559     (or a number) in \MT@curr@list@name}%
3560 }
```

`\MT@warn@unknown` No idea what went wrong.

```
3561 \def\MT@warn@unknown{%
3562   \MT@warning@nl{%
3563     Unknown slot number of character\MessageBreak~\the\MT@toks'%
3564     \MT@warn@maybe@inputenc\MessageBreak
3565     in font encoding ~\MT@encoding' in \MT@curr@list@name}%
3566 }
```

`\MT@warn@maybe@inputenc` In case an input encoding had been requested.

```
3567 \def\MT@warn@maybe@inputenc{%
3568   \MT@ifdefined@n@T
3569   {MT@\MT@feat @\MT@cat @\csname MT@\MT@feat @\MT@cat @name\endcsname @inputenc}%
}
```

```

3570 { (input encoding ~\@nameuse
3571 {MT@MT@feat @MT@cat @\csname MT@MT@feat @MT@cat @name\endcsname @inputenc}')}%
3572 }

```

### 1.2.9 Hook into L<sup>A</sup>T<sub>E</sub>X's font selection

We append `\MT@setupfont` to `\pickup@font`, which is called by L<sup>A</sup>T<sub>E</sub>X every time a font is selected. We then check whether we've already seen this font, and if not, set it up for micro-typography. This ensures that we will catch all fonts, and that we will not set up fonts more than once. The whole package really hangs on this command.

In contrast to the `pdfcprot` package, it is not necessary to declare in advance which fonts should benefit from micro-typographic treatment. Also, only those fonts that are actually being used will be set up.

For my reference:

- `\pickup@font` is called by `\selectfont`, `\wrong@fontshape`, or `\getanddefine@fonts` (for math).
- `\pickup@font` calls `\define@newfont`.
- `\define@newfont` may call (inside a group!)
  - `\wrong@fontshape`, which in turn will call `\pickup@font`, and thus `\define@newfont` again, or
  - `\extract@font`.
- `\get@external@font` is called by `\extract@font`, by itself, and by the substitution macros.

Up to version 1.3 of this package, we were using `\define@newfont` as the hook, which is only called for *new* fonts, and therefore seemed the natural choice. However, this meant that we had to take special care to catch all fonts: we additionally had to set up the default font, the error font (if it wasn't the default font), we had to check for some packages that might have been loaded before `microtype` and were loading fonts, e.g., `jurabib`, `ledmac`, `pifont` (loaded by `hyperref`), `tipa`, and probably many more. Furthermore, we had to include a hack for the `IEEEtran` class which loads all fonts in the class file itself (to fine tune inter-word spacing), and the `memoir` class, too. To cut this short: it seemed to get out of hand, and I decided that it would be better to use `\pickup@font` and decide for ourselves whether we've already seen that font. I hope the overhead isn't too large.

`\MT@font@list` We use a comma separated list.

```

\MT@font 3573 \let\MT@font@list\@empty
3574 \let\MT@font\@empty

```

All this is done at the beginning of the document. It doesn't work for plain, of course, which doesn't have `\pickup@font`.

```

3575 </package>
3576 <*package|letterspace>
3577 <plain>\MT@requires@latex2{
3578 \MT@addto@setup{%

```

`\MT@orig@pickupfont` The `luatexja` package redefines `\char`, which will upset our parsing of text symbols and commands; instead of fixing this, we won't bother, at least for the moment, but simply issue a warning and disable all further warnings. The fix is left to the user by

not specifying any text commands but only (Unicode) letters. The xeCJK package, or rather its xunicode-addon, also modifies the way text symbols are defined (like luatexja but in a different way). Again, we only issue a warning.

```
3579 (package) \MT@with@package@T{\luatexja}{\MT@warn@unknown@once{\luatexja}}%
3580 (package) \MT@with@package@T{xeCJK} {\MT@warn@unknown@once{xeCJK}}%
```

microtype also works with CJK in the sense that nothing will break when both packages are used at the same time. However, since CJK has its own way of encoding, it is currently not possible to create character-specific settings. That is, the only feature available with CJK fonts is (non-selected) expansion. (Tracking doesn't really work for other reasons.) Like us, CJK redefines \pickup@font.

```
3581 \ifpackage@loaded{CJK}{%
```

The xeCJK package in turn pretends that CJK was loaded, but does not change the definition of \pickup@font. With xeCJK, protrusion should be possible also for C/J/K characters; I haven't tried it, though.

```
3582 \ifpackage@loaded{xeCJK}{\@firstofone}{%
3583 \ifpackage@later{CJK}{2006/10/17}% 4.7.0
3584 {\def\MT@orig@pickupfont{\CJK@ifundefined\CJK@plane}}%
3585 {\def\MT@orig@pickupfont{\@ifundefined{CJK@plane}}}%
3586 \g@addto@macro\MT@orig@pickupfont
3587 {\expandafter\ifx\font@name\relax\define@newfont\fi}}%
```

CJKutf8 redefines \pickup@font once more (recent versions, in PDF mode, as determined by ifpdf, which CJKutf8 loads).

```
3588 \ifpackage@loaded{CJKutf8}%
3589 {\ifpackage@later{CJKutf8}{2008/05/22}% 4.8.0
3590 {\ifpdf\expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi}%
3591 {\@firstoftwo}}%
3592 {\@firstoftwo}%
3593 {\g@addto@macro\MT@orig@pickupfont{%
3594 \expandafter\ifx\csname\curr@fontshape/\f@size/\CJK@plane\endcsname\relax
3595 \define@newfont\else\xdef\font@name{%
3596 \csname \curr@fontshape/\f@size/\CJK@plane\endcsname}\fi}}}%
3597 {\g@addto@macro\MT@orig@pickupfont{%
3598 \expandafter\ifx\csname \curr@fontshape/\f@size/\CJK@plane\endcsname\relax
3599 \define@newfont\def\CJK@temp{v}%
3600 \ifx\CJK@temp\CJK@plane
3601 \expandafter\ifx\csname CJK@cmap/\f@family\CJK@plane\endcsname\relax
3602 \else\csname CJK@cmap/\f@family\CJK@plane\endcsname\fi
3603 \else \CJK@addcmap\CJK@plane \fi
3604 \else\xdef\font@name{%
3605 \csname \curr@fontshape/\f@size/\CJK@plane\endcsname}\fi}}}%
3606 \@gobble
3607 }%
3608 }{\@firstofone}%
```

This is the normal L<sup>A</sup>T<sub>E</sub>X definition.

```
3609 {\def\MT@orig@pickupfont{\expandafter\ifx\font@name\relax\define@newfont\fi}}%
```

Check whether \pickup@font is defined as expected. The warning issued by \CheckCommand\* would be a bit too generic.

```
3610 \ifx\pickup@font\MT@orig@pickupfont \else
3611 \MT@warning@nl{%
3612 Command \string\pickup@font\space is not defined as expected.%
3613 \MessageBreak Patching it anyway. Some things may break%
3614 (*package)
3615 .\MessageBreak Double-check whether micro-typography is indeed%
3616 \MessageBreak applied to the document.%
3617 \MessageBreak (Hint: Turn on 'verbose' mode)%
3618 (/package)
3619 }%
```

```

3620 \fi

\pickup@font    Then we append our stuff. Everything is done inside a group.
3621 \g@addto@macro\pickup@font{\begin@group}%

    If the trace package is loaded, we turn off tracing of microtype's setup, which is
    extremely noisy.
3622 \MT@with@package@T{trace}{\g@addto@macro\pickup@font{\conditionally@traceoff}}%
3623 \g@addto@macro\pickup@font{%
3624     \escapechar\m@ne
3625     \*package
3626     \debug      \global\MT@inannottrue
3627     \debug      \MT@gl@et\MT@pdf@annot\@empty
3628     \debug      \MT@addto@annot{(line \number\inputlineno)}%

    If \MT@font is empty, no substitution has taken place, hence \font@name is correct.
    Otherwise, if they are different, \font@name does not describe the font actually
    used. This test will catch first order substitutions, like bx to b, but it will still fail if
    the substituting font is itself substituted.
3629     \MT@let@cn\MT@font{\MT@subst@expandafter\string\font@name}%
3630     \ifx\MT@font\relax
3631     \let\MT@font\font@name
3632     \else
3633     \ifx\MT@font\font@name \else
3634     \debug      \MT@addto@annot{= substituted with \MT@font}%
3635     \MT@register@subst@font
3636     \fi
3637     \fi
3638     \MT@setupfont
3639 \*package
3640 \letterspace      \MT@tracking
3641 \endgroup
3642 }%
3643 \*package

\MT@pickupfont    Remember the patched command, because we may have to disable ourselves in
\MT@MT@pickupfont certain situations.
\MT@ltx@pickupfont
3644 \let\MT@pickupfont\pickup@font
3645 \def\MT@MT@pickupfont {\let\pickup@font\MT@pickupfont}%
3646 \def\MT@ltx@pickupfont{\let\pickup@font\MT@orig@pickupfont}%

\do@subst@correction    Additionally, we hook into \do@subst@correction, which is called if a substitution
                        has taken place, to record the name of the ersatz font. Unfortunately, this will only
                        work for one-level substitutions. We have to remember the substitute for the rest of
                        the document, not just for the first time it is called, since we need it every time a
                        font is letterspaced.
3647 \g@addto@macro\do@subst@correction
3648 { \edef\MT@font{\csname\curr@fontshape\font@size\endcsname}%
3649   \MT@gl@et@nc{\MT@subst@expandafter\string\font@name}\MT@font}%

\add@accent    Inside \add@accent, we have to disable microtype's setup, since the grouping in
\MT@orig@add@accent the patched \pickup@font would break the accent if different fonts are used for
                        the base character and the accent. Fortunately, LATEX takes care that the fonts used
                        for the \accent are already set up, so that we cannot be overlooking them.
3650 \let\MT@orig@add@accent\add@accent
3651 \def\add@accent#1#2{%
3652     \MT@ltx@pickupfont
3653     \MT@orig@add@accent{#1}{#2}%
3654     \MT@MT@pickupfont
3655 }%
3656 \*package

```

```

3657 }
3658 {plain}\relax
3659 {*package}

```

Consequently (if all goes well), we are the last ones to change these commands, therefore there is no need to check whether our definition has survived.

`\MT@check@font` Check whether we've already seen the current font.

```

3660 \def\MT@check@font{\MT@exp@one@n\MT@in@clist\MT@font\MT@font@list}

```

`\MT@register@font` Register the current font.

```

3661 \def\MT@register@font{\xdef\MT@font@list{\MT@font@list\MT@font,}}

```

`\MT@register@subst@font` Register the substituted font (only if it isn't registered already). Additionally, we have to remove the substitute font from the list of fonts, so that we set it up again.

```

3662 \def\MT@register@subst@font{%
3663   \MT@exp@one@n\MT@in@clist\font@name\MT@font@list
3664   \ifMT@inlist@else
3665     \xdef\MT@font@list{\MT@font@list\font@name,}%
3666     \expandafter\MT@rem@from@clist\MT@font\MT@font@list
3667   \fi
3668 }

```

### 1.2.10 Context-sensitive setup

Here are the variants for context-sensitive setup.

`\MT@active@features` The activated features are stored in this command.

```

3669 \let\MT@active@features\@empty

```

`\MT@check@font@cx` Every feature has its own list of fonts that have already been dealt with. If the font needn't be set up for a feature, we temporarily disable the corresponding setup command. This should be more efficient than book-keeping the fonts in lists associated with the combination of contexts, as we've done it before.

```

3670 \def\MT@check@font@cx{%
3671   \MT@if@true
3672   \MT@map@clist@c\MT@active@features{%
3673     \expandafter\MT@exp@one@n\expandafter\MT@in@clist\expandafter\MT@font
3674     \csname MT@##1@\csname MT@##1@context\endcsname font@list\endcsname
3675     \ifMT@inlist@
3676       \MT@let@nc{MT@\@nameuse{MT@abbr@##1}}\relax
3677     \else
3678       \MT@if@false
3679     \fi
3680   }%
3681   \ifMT@if@ \MT@inlist@true \else \MT@inlist@false \fi
3682 }

```

`\MT@register@subst@font@cx` Add the substituted font to each feature list and possibly remove substitute font.

```

3683 \def\MT@register@subst@font@cx{%
3684   \MT@map@clist@c\MT@active@features{%
3685     \expandafter\MT@exp@one@n\expandafter\MT@in@clist\expandafter\font@name
3686     \csname MT@##1@\csname MT@##1@context\endcsname font@list\endcsname
3687     \ifMT@inlist@ \else
3688       \MT@exp@cs\MT@xadd
3689       {MT@##1@\csname MT@##1@context\endcsname font@list}%
3690       {\font@name,}%
3691     \expandafter\MT@exp@one@n\expandafter\MT@rem@from@clist\expandafter\MT@font
3692     \csname MT@##1@\csname MT@##1@context\endcsname font@list\endcsname
3693     \fi
3694   }%
3695 }

```

<code>\MT@register@font@cx</code>	For each feature, add the current font to the list, unless we didn't set it up.
3696	<code>\def\MT@register@font@cx{%</code>
3697	<code>\MT@map@clist@c\MT@active@features{%</code>
3698	<code>\MT@exp@cs\ifx{MT@nameuse{MT@abbr@#1}}\relax\else</code>
3699	<code>\MT@exp@cs\MT@xadd</code>
3700	<code>{MT@#1\csname MT@#1@context\endcsname font@list}%</code>
3701	<code>{\MT@font,%}</code>
3702	<code>\def\@tempa{#1}%</code>
3703	<code>\MT@exp@cs\MT@map@tlist@c{MT@#1@doc@contexts}\MT@maybe@rem@from@list</code>
3704	<code>\fi</code>
3705	<code>}%</code>
3706	<code>}</code>
<code>\MT@maybe@rem@from@list</code>	Recurse through all context font lists of the document and remove the font, unless it's the current context.
3707	<code>\def\MT@maybe@rem@from@list#1{%</code>
3708	<code>\MT@ifstreq{\@tempa/#1}{\@tempa/\csname MT@\@tempa @context\endcsname}\relax{%</code>
3709	<code>\expandafter\MT@exp@one@n\expandafter\MT@rem@from@clist\expandafter</code>
3710	<code>\MT@font \csname MT@\@tempa @#1font@list\endcsname</code>
3711	<code>}%</code>
3712	<code>}</code>
<code>\microtypecontext</code>	The user may change the context, so that different setups are possible. This is especially useful for multi-lingual documents.
<code>\MT@microtypecontext</code>	Inside the preamble, this command shouldn't actually do anything but remember itself for later.
3713	<code>\def\microtypecontext{\MT@begin@catcodes\MT@microtypecontext}</code>
3714	<code>\def\MT@microtypecontext#1{\MT@end@catcodes\MT@addto@setup{\microtypecontext{#1}}}</code>
3715	<code>\MT@addto@setup{%</code>
3716	<code>\DeclareRobustCommand\microtypecontext{%</code>
3717	<code>\MT@begin@catcodes</code>
3718	<code>\MT@microtypecontext</code>
3719	<code>}%</code>
3720	<code>\def\MT@microtypecontext#1{%</code>
3721	<code>\MT@end@catcodes</code>
3722	<code>\MT@setup@contexts</code>
3723	<code>\let\MT@reset@context\relax</code>
	We need to ensure that math fonts are set up anew.
3724	<code>\MT@glet\glb@currsiz@empty</code>
3725	<code>\setkeys{MTC}{#1}%</code>
3726	<code>\selectfont</code>
3727	<code>\MT@reset@context</code>
3728	<code>}%</code>
3729	<code>}</code>
<code>\textmicrotypecontext</code>	This is just a wrapper around <code>\microtypecontext</code> .
<code>\MT@textmicrotypecontext</code>	3730 <code>\DeclareRobustCommand\textmicrotypecontext{\MT@begin@catcodes\MT@textmicrotypecontext}</code>
<code>\MT@text@microtypecontext</code>	3731 <code>\def\MT@textmicrotypecontext#1{\MT@end@catcodes\MT@text@microtypecontext{#1}}</code>
	3732 <code>\def\MT@text@microtypecontext#1#2{{\microtypecontext{#1}#2}}</code>
<code>\MT@reset@context</code>	We have to reset the font at the end of the group, provided there actually was a change.
<code>\MT@reset@context@</code>	
3733	<code>\def\MT@reset@context@{%</code>
3734	<code>\MT@vinfo{&lt;&lt;&lt; Resetting contexts\on@line</code>
3735	<code>(debug) \MessageBreak= \MT@pr@context/\MT@ex@context</code>
3736	<code>(debug) \MT@tr@context/\MT@kn@context/\MT@sp@context</code>
3737	<code>}%</code>
3738	<code>\selectfont</code>
3739	<code>}</code>
<code>\MT@setup@contexts</code>	The first time <code>\microtypecontext</code> is called, we initialise the context lists and redefine the commands used in <code>\pickup@font</code> .



```

3740 \def\MT@setup@contexts{%
3741   \MT@map@clist@c\MT@active@features
3742   {\MT@gl@et@nc{MT@##1@font@list}\MT@font@list}%
3743   \MT@gl@et\MT@check@font\MT@check@font@cx
3744   \MT@gl@et\MT@register@font\MT@register@font@cx
3745   \MT@gl@et\MT@register@subst@font\MT@register@subst@font@cx
3746   \MT@gl@et\MT@setup@contexts\relax
3747 }

```

Define context keys.

```

3748 \MT@map@clist@c\MT@features@long{%
3749   \define@key{MTC}{#1}[] {%
3750     \edef\@tempb{\@nameuse{MT@rbba@#1}}%
3751     \MT@exp@one@n\MT@in@clist\@tempb\MT@active@features
3752     \ifMT@inlist@

```

Using an empty context is only asking for trouble, therefore we choose the ‘@’ instead (hoping for the L<sup>A</sup>T<sub>E</sub>X users’ natural awe of this character).

```

3753   \MT@ifempty{##1}{\def\MT@val{0}}{\def\MT@val{##1}}%
3754   \MT@exp@cs@ifx{MT@\@tempb @context}\MT@val
3755   <debug>\MT@dinfo{1}{>>> no change of #1 context: `~\MT@val'}%
3756   \else
3757     \MT@vinfo{>>> Changing #1 context to `~\MT@val'\MessageBreak\on@line
3758     <debug>         \space(previous: `~\@nameuse{MT@\@tempb @context}')}%
3759     }%
3760   \def\MT@reset@context{\aftergroup\MT@reset@context@}%

```

The next time we see the font, we have to reset *all* factors.

```

3761   \MT@gl@et@nn{MT@reset@\@tempb @codes}\MT@reset@\@tempb @codes}%

```

We must also keep track of all contexts in the document.

```

3762   \expandafter\MT@exp@one@n\expandafter\MT@in@tlist\expandafter
3763   \MT@val \csname MT@\@tempb @doc@contexts\endcsname
3764   \ifMT@inlist@ \else
3765     \MT@exp@cs\MT@xadd{MT@\@tempb @doc@contexts}{\MT@val}}%
3766   <debug>\MT@dinfo{1}{||| added #1 context: \@nameuse{MT@\@tempb @doc@contexts}}%
3767   \fi
3768   \MT@edef@n{MT@\@tempb @context}{\MT@val}%
3769   \fi
3770   \fi
3771   }%
3772 }

```

We also allow the activate shortcut.

```

3773 \define@key{MTC}{activate}[] {%
3774   \setkeys{MTC}{protrusion={#1}}%
3775   \setkeys{MTC}{expansion={#1}}%
3776 }

```

\MT@pr@context     Initialise the contexts.

\MT@ex@context 3777 \MT@exp@one@n\MT@map@clist@n{\MT@features,nl}{%}

\MT@tr@context 3778 \MT@def@n{MT@#1@context}{@}%

\MT@sp@context 3779 \MT@def@n{MT@#1@doc@contexts}{@}%

3780 }

\MT@kn@context 3781 \let\MT@extra@context\empty

\MT@pr@doc@contexts

\MT@ex@doc@contexts

\MT@tr@doc@contexts

\MT@sp@doc@contexts

\MT@kn@doc@contexts

\DeclareMicrotypeSet

\MT@extra@context

\DeclareMicrotypeSet\*

## 1.3 Configuration

### 1.3.1 Font sets

Calling this macro will create a comma list for every font attribute of the form: `\MT{feature}list@{attribute}@{set name}`. If the optional argument is empty, lists for all available features will be created.

The third argument must be a list of key=value pairs. If a font attribute is not specified, we define the corresponding list to `\relax`, so that it does not constitute a constraint.

```

3782 \def\DeclareMicrotypeSet{%
3783   \MT@begin@catcodes
3784   \ifstar
3785     \MT@DeclareSetAndUseIt
3786     \MT@DeclareSet
3787 }

```

`\MT@DeclareSet`

```

3788 \newcommand\MT@DeclareSet[3][]{%
3789   \MT@ifempty{#1}{%
3790     \MT@map@clist@MT@features{\begingroup\MT@declare@sets{##1}{#2}{#3}\endgroup}%
3791   }{%
3792     \MT@map@clist@n{#1}{\begingroup
3793       \MT@ifempty{##1}\relax{%
3794         \MT@is@feature{##1}{set declaration `#2'}{%
3795           \MT@exp@one@n\MT@declare@sets
3796             {\csname MT@rbba@##1\endcsname}{#2}{#3}%
3797         }%
3798       }%
3799     \endgroup}%
3800   }%
3801   \MT@end@catcodes
3802 }

```

`\MT@DeclareSetAndUseIt`

```

3803 \newcommand\MT@DeclareSetAndUseIt[3][]{%
3804   \MT@DeclareSet[#1]{#2}{#3}%
3805   \UseMicrotypeSet[#1]{#2}%
3806 }

```

`\MT@curr@set@name` We need to remember the name of the set currently being declared.

```

3807 \let\MT@curr@set@name\@empty

```

`\MT@declare@sets` Define the current set name and parse the keys.

```

3808 \def\MT@declare@sets#1#2#3{%
3809   \def\MT@curr@set@name{#2}%
3810   \MT@ifdefined@nT{MT@#1@set@@\MT@curr@set@name}{%
3811     \MT@warning{Redefining \@nameuse{MT@abbr@#1} set ~\MT@curr@set@name'}%
3812     \MT@map@clist@n{font,encoding,family,series,shape,size}{%
3813       \MT@glet@nc{MT@#1list@##1@MT@curr@set@name}\@undefined
3814     }%
3815   }%
3816   \MT@glet@nc{MT@#1@set@@\MT@curr@set@name}\@empty
3817   <debug>\MT@dinfo{1}{declaring \@nameuse{MT@abbr@#1} set ~\MT@curr@set@name'}%
3818   \setkeys{MT@#1@set}{#3}%
3819 }

```

`\MT@define@set@key@` <#1> = font axis, <#2> = feature.

```

3820 \def\MT@define@set@key@#1#2{%
3821   \define@key{MT@#2@set}{#1}[]{%
3822     \MT@glet@nc{MT@#2list@#1@MT@curr@set@name}\@empty
3823     \MT@map@clist@n{##1}{%
3824       \KV@sp@def\MT@val{###1}%
3825       \MT@get@highlevel{#1}%

```

We do not add the expanded value to the list ...

```

3826     \MT@exp@two@n@g@addto@macro
3827     {\csname MT@#2list@#1@MT@curr@set@name\expandafter\endcsname}%
3828     {\MT@val,}%
3829   }%

```

... but keep in mind that the list has to be expanded at the end of the preamble.

```
3830 \expandafter\g@addto@macro\expandafter\MT@font@sets
3831 \csname MT@#2list@#1@MT@curr@set@name\endcsname
3832 (debug)\MT@info{n1}{1}{-- #1: \nameuse{MT@#2list@#1@MT@curr@set@name}}%
3833 }%
3834 }
```

`\MT@get@highlevel`      Saying, for instance, ‘family=rm\*’ or ‘shape=bf\*’ will expand to `\rmdefault` resp. `\bfdefault`.

```
3835 \def\MT@get@highlevel#1{%
3836 \expandafter\MT@test@ast\MT@val*\@nil\relax{%
```

And ‘family = \*’ will become `\familydefault`.

```
3837 \MT@ifempty\@tempa{\def\@tempa{#1}}\relax
```

Test whether the command is actually defined.

```
3838 \MT@ifdefined@n@TF{\@tempa default}%
3839 {\edef\MT@val{\expandafter\noexpand\csname \@tempa default\endcsname}}%
3840 {\MT@warning{\@backslashchar\@tempa default' is not a defined command.\MessageBreak
3841 Ignoring `#1 = {\@tempa*}' in font set\MessageBreak\MT@curr@set@name'}}%
3842 \let\MT@val\@empty}%

```

In contrast to earlier versions, these values will not be expanded immediately, but at the end of the preamble.

```
3843 }%
3844 }
```

`\MT@test@ast`      It the last character is an asterisk, execute the second argument, otherwise the first one.

```
3845 \def\MT@test@ast#1*#2\@nil{%
3846 \def\@tempa{#1}%
3847 \MT@ifempty{#2}%
3848 }
```

`\MT@font@sets`      Fully expand the font specification and fix catcodes for all font sets. Also remove  
`\MT@fix@font@set`    fontspec’s counters.

```
3849 \let\MT@font@sets\@empty
3850 \def\MT@fix@font@set#1{%
3851 \MT@ifdefined@c@T{#1}{%
3852 \xdef#1{#1}%
3853 \ifMT@fontspec
3854 \xdef#1{\expandafter\MT@scrubfeatures#1()\relax}%
3855 \fi
3856 \global\@onelevel@sanitize#1%
3857 }%
3858 }
```

`\MT@define@set@key@size`      size requires special treatment.

```
3859 \def\MT@define@set@key@size#1{%
3860 \define@key{MT@#1@set}{size}{\@if}%
3861 \MT@map@clist{n}{#1}{%
3862 \def\MT@val{###1}%
3863 \expandafter\MT@get@range\MT@val--\@nil
3864 \ifx\MT@val\relax \else
3865 \MT@exp@cs\MT@xadd
3866 {MT@#1list@size@MT@curr@set@name}%
3867 {{{\MT@lower}{\MT@upper}\relax}}%
3868 \fi
3869 }%
3870 (debug)\MT@info{n1}{1}{-- size: \nameuse{MT@#1list@size@MT@curr@set@name}}%
3871 }%
3872 }
```

Font sizes may also be specified as ranges. This has been requested by Andreas Bhmann, who has also offered valuable help in implementing this. Now, it is for instance possible to set up different lists for fonts with optical sizes. (The MinionPro project does this for the OpenType version of Adobe’s Minion. (Available from CTAN at [pkg/minionpro](#)))

`\MT@get@range` Ranges will be stored as triplets of  $\{\langle lower\ bound\rangle\}\{\langle upper\ bound\rangle\}\{\langle list\ name\rangle\}$ .  
`\MT@upper` For simple sizes, the upper boundary is  $-1$ .

```

\MT@lower 3873 \def\MT@get@range#1-#2-#3\@nil{%
3874   \MT@ifempty{#1}{%
3875     \MT@ifempty{#2}{%
3876       \let\MT@val\relax
3877     }{%
3878       \def\MT@lower{0}%
3879       \def\MT@val{#2}%
3880       \MT@get@size
3881       \edef\MT@upper{\MT@val}%
3882     }%
3883   }{%
3884     \def\MT@val{#1}%
3885     \MT@get@size
3886     \ifx\MT@val\relax \else
3887       \edef\MT@lower{\MT@val}%
3888       \MT@ifempty{#2}{%
3889         \MT@ifempty{#3}%
3890       }{\def\MT@upper{-1}}%

```

2048 pt is T<sub>E</sub>X’s maximum font size.

```

3891   {\def\MT@upper{2048}}%
3892 }{%
3893   \def\MT@val{#2}%
3894   \MT@get@size
3895   \ifx\MT@val\relax \else
3896     \MT@ifdim\MT@lower>\MT@val{%
3897       \MT@error{%
3898         Invalid size range (\MT@lower\space > \MT@val) in font set
3899         ~\MT@curr@set@name'.\MessageBreak Swapping sizes}}{%
3900       \edef\MT@upper{\MT@lower}%
3901       \edef\MT@lower{\MT@val}%
3902     }{%
3903       \edef\MT@upper{\MT@val}%
3904     }%
3905     \MT@ifdim\MT@lower=\MT@upper
3906     {\def\MT@upper{-1}}%
3907     \relax
3908   \fi
3909 }%
3910 \fi
3911 }%
3912 }

```

`\MT@get@size` Translate a size selection command and normalise it.

```

3913 \def\MT@get@size{%

```

A single star would mean `\sizedefault`, which doesn’t exist, so we define it to be `\normalsize`.

```

3914   \if*\MT@val\relax
3915     \def\@tempa{\normalsize}%
3916   \else
3917     \MT@let@cn\@tempa{\MT@val}%
3918   \fi
3919   \ifx\@tempa\relax\else
3920     \MT@get@size@

```

3921 \fi

Test whether we finally got a number or dimension so that we can strip the ‘pt’  
(\@defaultunits and \strip@pt are kernel macros).

```
3922 \MT@ifdimen\MT@val{%
3923   \@defaultunits\@tempdima\MT@val pt\relax\@nnil
3924   \edef\MT@val{\strip@pt\@tempdima}%
3925 }{%
3926   \MT@warning{Could not parse font size `\'MT@val'\MessageBreak
3927               in font set `\'MT@curr@set@name'}%
3928   \let\MT@val\relax
3929 }%
3930 }
```

\MT@get@size@ The relsize solution of parsing \@setfontsize does not work with the AMS  
 \MT@get@size@@ classes, among others. I hope my hijacking doesn’t do any harm. We redefine  
 \set@fontsize instead of \@setfontsize because some classes might define the  
 size selection commands by simply using \fontsize (e.g., the a0poster class).

```
3931 \def\MT@get@size@@{%
3932   \begingroup
3933   \def\set@fontsize##1##2##3##4\@nil{\endgroup\def\MT@val{##2}}%
3934   \@tempa\@nil
3935 }
```

The svjour3 class defines the size commands using conditionals; using e-TeX  
 primitives, we close any leftovers here.

```
3936 ^^X\@ifclassloaded{svjour3}{%
3937 ^^X   \def\MT@get@size@{%
3938 ^^X     \@tempcnta=currentiflevel
3939 ^^X     \MT@get@size@@
3940 ^^X     \MT@loop
3941 ^^X       \ifnum\numexprcurrentiflevel-1>\@tempcnta
3942 ^^X         \csname fi\endcsname
3943 ^^X       \MT@repeat
3944 ^^X     }%
3945 ^^X}%
3946 \let\MT@get@size@\MT@get@size@@
3947 ^^X}
```

\MT@define@set@key@font

```
3948 \def\MT@define@set@key@font#1{%
3949   \define@key{MT@#1@set}{font}[]{%
3950     \MT@glet@nc{MT@#1list@font@\'MT@curr@set@name}\@empty
3951     \MT@map@cclist@n{##1}{%
3952       \def\MT@val{###1}%
3953       \MT@ifstreq\MT@val*{\def\MT@val{*/*/*/*/}}\relax
3954       \expandafter\MT@get@font\MT@val///// \@nil
3955       \MT@exp@two@n@g@addto@macro
3956       {\csname MT@#1list@font@\'MT@curr@set@name\expandafter\endcsname}%
3957       {\MT@val,}%
3958     }%
3959     \expandafter\g@addto@macro\expandafter\MT@font@sets
3960     \csname MT@#1list@font@\'MT@curr@set@name\endcsname
3961     <debug>\MT@edinfo@n1{1}{-- font: \@nameuse{MT@#1list@font@\'MT@curr@set@name}}%
3962   }%
3963 }
```

\MT@get@font Translate any asterisks.

```
3964 \def\MT@get@font#1/#2/#3/#4/#5/#6\@nil{%
3965   \MT@get@font@{#1}{#2}{#3}{#4}{#5}{0}%
3966   \ifx\MT@val\relax\def\MT@val{0}\fi
3967   \expandafter\g@addto@macro\expandafter\@tempb\expandafter{\MT@val}%
3968   \let\MT@val\@tempb
```

3969 }

`\MT@get@font@` Helper macro, also used by `\MT@get@font@and@size`.

```

3970 \def\MT@get@font@#1#2#3#4#5#6{%
3971   \let\@tempb\@empty
3972   \def\MT@temp{#1/#2/#3/#4/#5}%
3973   \MT@get@axis{encoding}{#1}%
3974   \MT@get@axis{family}{#2}%
3975   \MT@get@axis{series}{#3}%
3976   \MT@get@axis{shape}{#4}%
3977   \ifnum#6>\z@\edef\@tempb{\@tempb*}\fi
3978   \MT@ifempty{#5}{%
3979     \MT@warn@axis@empty{size}{\string\normalsize}%
3980     \def\MT@val{*}%
3981   }{%
3982     \def\MT@val{#5}%
3983   }%
3984   \MT@get@size
3985 }
```

`\MT@get@axis`

```

3986 \def\MT@get@axis#1#2{%
3987   \def\MT@val{#2}%
3988   \MT@get@highlevel{#1}%
3989   \MT@ifempty\MT@val{%
3990     \MT@warn@axis@empty{#1}{\csname #1default\endcsname}%
3991     \expandafter\def\expandafter\MT@val\expandafter{\csname #1default\endcsname}%
3992   }\relax
3993   \expandafter\g@addto@macro\expandafter\@tempb\expandafter{\MT@val/}%
3994 }
```

`\MT@warn@axis@empty`

```

3995 \def\MT@warn@axis@empty#1#2{%
3996   \MT@warning{#1 axis is empty in font specification\MessageBreak
3997     ~\MT@temp'. Using ~#2' instead}%
3998 }
```

We can finally assemble all pieces to define `\DeclareMicrotypeSet`'s keys. They are also used for `\DisableLigatures`.

```

3999 \MT@exp@one@n\MT@map@clist@n{\MT@features,nl}{%
4000   \MT@define@set@key@{encoding}{#1}%
4001   \MT@define@set@key@{family}{#1}%
4002   \MT@define@set@key@{series}{#1}%
4003   \MT@define@set@key@{shape}{#1}%
4004   \MT@define@set@key@size{#1}%
4005   \MT@define@set@key@font{#1}%
4006 }
```

`\UseMicrotypeSet` To use a particular set we simply redefine `MT@<feature>@setname`. If the optional argument is empty, set names for all features will be redefined.

```

4007 \def\UseMicrotypeSet{%
4008   \MT@begin@catcodes
4009   \MT@UseMicrotypeSet
4010 }
```

`\MT@UseMicrotypeSet`

```

4011 \newcommand*\MT@UseMicrotypeSet[2][]{%
4012   \MT@ifempty{#1}{%
4013     \MT@map@clist@c\MT@features{\begin@group\MT@use@set{##1}{#2}\end@group}%
4014   }{%
4015     \MT@map@clist@n{#1}{\begin@group
4016       \MT@ifempty{##1}\relax%
4017       \MT@is@feature{##1}{activation of set ~#2'}{%
4018         \MT@exp@one@n\MT@use@set
```

```

4019         {\csname MT@rbba@##1\endcsname}{#2}%
4020     }%
4021 }%
4022 \endgroup}%
4023 }%
4024 \MT@end@catcodes
4025 }

```

\MT@pr@setname Only use sets that have been declared.

```

\MT@ex@setname 4026 \def\MT@use@set#1#2{%
\MT@tr@setname 4027 \MT@ifdefined@n@TF{MT@#1@set@#2}{%
4028     \MT@xdef@n{MT@#1@setname}{#2}%
\MT@sp@setname 4029 }{%
\MT@kn@setname 4030 \MT@ifdefined@n@TF{MT@#1@setname}\relax{%
4031     \MT@xdef@n{MT@#1@setname}{\@nameuse{MT@default@#1@set}}}%
\MT@use@set 4032 }%
4033 \MT@error{%
4034     The \@nameuse{MT@abbr@#1} set `#2' is undeclared.\MessageBreak
4035     Using set \@nameuse{MT@#1@setname}' instead}{}%
4036 }%
4037 }

```

\DeclareMicrotypeSetDefault This command can be used in the main configuration file to declare the default font set, in case no set is specified in the package options.

```

4038 \def\DeclareMicrotypeSetDefault{%
4039     \MT@begin@catcodes
4040     \MT@DeclareMicrotypeSetDefault
4041 }

```

\MT@DeclareMicrotypeSetDefault

```

4042 \newcommand*\MT@DeclareMicrotypeSetDefault[2][ ]{%
4043     \MT@ifempty{#1}{%
4044         \MT@map@clist@c\MT@features{\begingroup\MT@set@default@set{##1}{#2}\endgroup}%
4045     }{%
4046         \MT@map@clist@n{#1}{\begingroup
4047             \MT@ifempty{##1}\relax{%
4048                 \MT@is@feature{##1}{declaration of default set `#2'}{%
4049                     \MT@exp@one@n\MT@set@default@set
4050                     {\csname MT@rbba@##1\endcsname}{#2}%
4051                 }%
4052             }%
4053         \endgroup}%
4054     }%
4055     \MT@end@catcodes
4056 }

```

\MT@default@pr@set

```

\MT@default@ex@set 4057 \def\MT@set@default@set#1#2{%
\MT@default@tr@set 4058 \MT@ifdefined@n@TF{MT@#1@set@#2}{%
4059     <debug>\MT@edinfo{1}{declaring default \@nameuse{MT@abbr@#1} set `#2'}%
\MT@default@sp@set 4060 \MT@xdef@n{MT@default@#1@set}{#2}%
\MT@default@kn@set 4061 }{%
\MT@set@default@set 4062 \MT@error{%
4063     The \@nameuse{MT@abbr@#1} set `#2' is not declared.\MessageBreak
4064     Cannot make it the default set. Using set\MessageBreak `all' instead}{}%
4065     \MT@xdef@n{MT@default@#1@set}{all}%
4066 }%
4067 }

```

### 1.3.2 Variants and aliases

\DeclareMicrotypeVariants Specify suffixes for variants (see fontname/variants.map). The starred version \MT@variants appends to the list.

```

4068 \let\MT@variants\@empty
4069 \def\DeclareMicrotypeVariants{%
4070   \MT@begin@catcodes
4071   \ifstar
4072     \MT@DeclareVariants
4073   {\let\MT@variants\@empty\MT@DeclareVariants}%
4074 }

```

\MT@DeclareVariants

```

4075 \def\MT@DeclareVariants#1{%
4076   \MT@map@clist@n{#1}%
4077   \def\@tempa{##1}%
4078   \@onelevel@sanitize\@tempa
4079   \xdef\MT@variants{\MT@variants{\@tempa}}%
4080 }%
4081 \MT@end@catcodes
4082 }

```

\DeclareMicrotypeAlias      This can be used to set an alias name for a font, so that the file and the settings for the aliased font will be loaded.

```

4083 \def\DeclareMicrotypeAlias{%
4084   \MT@begin@catcodes
4085   \MT@DeclareMicrotypeAlias
4086 }

```

\MT@DeclareMicrotypeAlias

```

4087 \newcommand*\MT@DeclareMicrotypeAlias[2]{%
4088   \def\@tempb{#2}%
4089   \@onelevel@sanitize\@tempb
4090   \MT@ifdefined@n@T{MT@#1@alias}{%
4091     \MT@warning{Alias font family '\@tempb' will override
4092       alias '\@nameuse{MT@#1@alias}'\MessageBreak
4093     for font family '#1'}%
4094   \MT@xdef@n{MT@#1@alias}{\@tempb}%

```

If we encounter this command while a font is being set up, we also set the alias for the current font so that if \DeclareMicrotypeAlias has been issued inside a configuration file, the configuration file for the alias font will be loaded, too.

```

4095   \MT@ifdefined@c@T\MT@family{%
4096     (debug)\MT@edinfo{1}{Activating alias font '\@tempb' for '\MT@family'}%
4097     \MT@glet\MT@familyalias\@tempb
4098   }%
4099   \MT@end@catcodes
4100 }

```

\LoadMicrotypeFile      May be used to load a configuration file manually.

```

4101 \def\LoadMicrotypeFile#1{%
4102   \edef\@tempa{\zap@space#1 \@empty}%
4103   \@onelevel@sanitize\@tempa
4104   \MT@exp@one@n\MT@in@clist\@tempa\MT@file@list
4105   \ifMT@inlist@
4106     \MT@vinfo{... Configuration file mt-\@tempa.cfg already loaded}%
4107   \else
4108     \MT@xadd\MT@file@list{\@tempa,}%
4109     \MT@begin@catcodes
4110     \InputIfFileExists{mt-\@tempa.cfg}{%
4111       \edef\MT@curr@file{mt-\@tempa.cfg}%
4112       \MT@vinfo{... Loading configuration file \MT@curr@file}%
4113     }{%
4114       \MT@warning{Configuration file mt-\@tempa.cfg\MessageBreak
4115         does not exist}%
4116     }%
4117     \MT@end@catcodes
4118   \fi

```



```

4119 }
4120 </package>
4121 </package|letterspace>

```

### 1.3.3 Disabling ligatures

`\DisableLigatures` This is really simple now: we can re-use the set definitions of `\DeclareMicrotypeSet`; there can only be one set, which we'll call 'no ligatures'.

`\MT@nl@setname` The optional argument may be used to disable selected ligatures only.

```

\MT@nl@ligatures 4122 <*pdf-|lua->
4123 <pdf->\MT@requires@pdftex5{
4124 \def\DisableLigatures{%
4125 \MT@begin@catcodes
4126 \MT@DisableLigatures
4127 }
4128 \newcommand*\MT@DisableLigatures[2][]{%
4129 \MT@ifempty{#1}\relax{\gdef\MT@nl@ligatures{#1}}%
4130 \xdef\MT@active@features{\MT@active@features,nl}%
4131 \global\MT@no_ligaturestrue
4132 \MT@declare@sets{nl}{no ligatures}{#2}%
4133 \gdef\MT@nl@setname{no ligatures}%
4134 \MT@end@catcodes
4135 }
4136 <pdf->}{
4137 </pdf-|lua->

```

If pdfTeX is too old, we throw an error.

```

4138 <*pdf-|xe->
4139 \renewcommand*\DisableLigatures[2][]{%
4140 \MT@error{Disabling ligatures of a font is only possible\MessageBreak
4141 with pdftex version 1.30 or newer.\MessageBreak
4142 Ignoring \string\DisableLigatures}{%
4143 <pdf-> Upgrade
4144 <xe-> Use
4145 pdftex.}%
4146 }
4147 <pdf->}{
4148 </pdf-|xe->

```

### 1.3.4 Interaction with babel

`\DeclareMicrotypeBabelHook` Declare the context that should be loaded when a babel language is selected. The command will not check whether a previous declaration will be overwritten.

```

4149 <*package>
4150 \def\DeclareMicrotypeBabelHook#1#2{%
4151 \MT@map@clist@n{#1}{%
4152 \KV@sp@def\@tempa{##1}%
4153 \MT@gdef\MT@babel@{\@tempa}{#2}%
4154 }%
4155 }

```

### 1.3.5 Fine tuning

The commands `\SetExpansion` and `\SetProtrusion` provide an interface for setting the character protrusion resp. expansion factors for a set of fonts.

`\SetProtrusion` This macro accepts three arguments: [options,] set of font attributes and list of character protrusion factors.

A new macro called `\MT@pr@c@<name>` will be defined to be `<#3>` (i.e., the list of characters, not expanded).

```
4156 \def\SetProtrusion{%
4157   \MT@begin@catcodes
4158   \MT@SetProtrusion
4159 }
```

`\MT@SetProtrusion` We want the catcodes to be correct even if this is called in the preamble.

```
\MT@pr@c@name 4160 \newcommand*\MT@SetProtrusion[3] [] {%
\MT@extra@context 4161   \let\MT@extra@context\@empty
```

`\MT@permutelist` Parse the optional first argument. We first have to know the name before we can deal with the extra options.

```
4162   \MT@set@named@keys{MT@pr@c@}{#1}%
4163   <debug>\MT@edinfo{1}{creating protrusion list `~\MT@pr@c@name'}%
4164   \def\MT@permutelist{pr@c}%
4165   \setkeys{MT@cfg}{#2}%
```

We have parsed the second argument, and can now define macros for all permutations of the font attributes to point to `\MT@pr@c@<name>`, ...

```
4166   \MT@permute
```

... which we can now define to be `<#3>`. Here, as elsewhere, we have to make the definitions global, since they will occur inside a group.

```
4167   \MT@gdef@n{MT@pr@c@\MT@pr@c@name}{#3}%
4168   \MT@end@catcodes
4169 }
4170 </package>
```

`\SetExpansion` `\SetExpansion` only differs in that it allows some extra options (stretch, shrink, step, auto).

```
4171 <*pdf-|lua->
4172 \def\SetExpansion{%
4173   \MT@begin@catcodes
4174   \MT@SetExpansion
4175 }
```

`\MT@SetExpansion`

```
\MT@ex@c@name 4176 \newcommand*\MT@SetExpansion[3] [] {%
\MT@extra@context 4177   \let\MT@extra@context\@empty
4178   \MT@set@named@keys{MT@ex@c@}{#1}%
\MT@permutelist 4179   \MT@ifdefined@n@T{MT@ex@c@\MT@ex@c@name @factor}{%
4180     \ifnum\csname MT@ex@c@\MT@ex@c@name @factor\endcsname > \@m
4181       \MT@warning@n1{Expansion factor \number\@nameuse{MT@ex@c@\MT@ex@c@name @factor}
4182         too large in list\MessageBreak `~\MT@ex@c@name'. Setting it to the
4183         maximum of 1000}%
4184       \MT@glet@nc{MT@ex@c@\MT@ex@c@name @factor}\@m
4185       \fi
4186     }%
4187   <debug>\MT@edinfo{1}{creating expansion list `~\MT@ex@c@name'}%
4188   \def\MT@permutelist{ex@c}%
4189   \setkeys{MT@cfg}{#2}%
4190   \MT@permute
4191   \MT@gdef@n{MT@ex@c@\MT@ex@c@name}{#3}%
4192   \MT@end@catcodes
4193 }
```

`\SetTracking`

```
4194 \def\SetTracking{%
4195   \MT@begin@catcodes
4196   \MT@SetTracking
4197 }
```

`\MT@SetTracking` Third argument may be empty.

```

4198 \newcommand*\MT@SetTracking[3] [] {%
4199   \let\MT@extra@context\@empty
4200   \MT@set@named@keys{MT@tr@ec}{#1}%
4201   (debug)\MT@dinfn{1}{creating tracking list `~\MT@tr@ec@name'}%
4202   \def\MT@permute{list{tr@ec}%
4203   \setkeys{MT@cfg}{#2}%
4204   \MT@permute
4205   \KV@sp@def\@tempa{#3}%
4206   \MT@ifempty\@tempa\relax{%
4207     \MT@ifint\@tempa
4208     {\MT@gdef\MT@tr@ec@MT@tr@ec@name}{\@tempa}}%
4209     {\MT@warning{Value `~\@tempa' is not a number in\MessageBreak
4210       tracking set `~\MT@curr@set@name'}}}%
4211   \MT@end@catcodes
4212 }
4213 (pdf-|lua-)

```

`\SetExtraSpacing`

```

4214 (pdf-)
4215 \def\SetExtraSpacing{%
4216   \MT@begin@catcodes
4217   \MT@SetExtraSpacing
4218 }

```

`\MT@SetExtraSpacing`

```

\MT@sp@ec@name 4219 \newcommand*\MT@SetExtraSpacing[3] [] {%
4220   \let\MT@extra@context\@empty
\MT@extra@context 4221   \MT@set@named@keys{MT@sp@ec}{#1}%
\MT@permute{list 4222   (debug)\MT@dinfn{1}{creating spacing list `~\MT@sp@ec@name'}%
4223   \def\MT@permute{list{sp@ec}%
4224   \setkeys{MT@cfg}{#2}%
4225   \MT@permute
4226   \MT@gdef\MT@sp@ec@MT@sp@ec@name}{#3}%
4227   \MT@end@catcodes
4228 }

```

`\SetExtraKerning`

```

4229 \def\SetExtraKerning{%
4230   \MT@begin@catcodes
4231   \MT@SetExtraKerning
4232 }

```

`\MT@SetExtraKerning`

```

\MT@kn@c@name 4233 \newcommand*\MT@SetExtraKerning[3] [] {%
4234   \let\MT@extra@context\@empty
\MT@extra@context 4235   \MT@set@named@keys{MT@kn@c}{#1}%
\MT@permute{list 4236   (debug)\MT@dinfn{1}{creating kerning list `~\MT@kn@c@name'}%
4237   \def\MT@permute{list{kn@c}%
4238   \setkeys{MT@cfg}{#2}%
4239   \MT@permute
4240   \MT@gdef\MT@kn@c@MT@kn@c@name}{#3}%
4241   \MT@end@catcodes
4242 }
4243 (pdf-)

```

`\MT@set@named@keys` We first set the name (if specified), then remove it from the list, and set the remaining keys.

`\MT@options`

```

4244 (package)
4245 \def\MT@set@named@keys#1#2{%
4246   \def\x##1name=##2,##3\@nil{%
4247     \setkeys{#1}{name=##2}%
4248     \gdef\MT@options{##1##3}%
4249     \MT@rem@from@clist{name=}\MT@options

```

```

4250 }%
4251 \x#2,name=,\@nil
4252 \@expandtwoargs\setkeys{#1}\MT@options
4253 }

```

`\MT@define@code@key` Define the keys for the configuration lists (which are setting the codes, in pdfTeX speak).

```

4254 \def\MT@define@code@key#1#2{%
4255   \define@key{MT@#2}{#1}[] {%
4256     \@tempcnta=\@ne
4257     \MT@map@clist@n{##1}%
4258     \KV@@sp@def\MT@val{###1}%

```

Here, too, we allow for something like ‘bf\*’. It will be expanded immediately.

```

4259   \MT@get@highlevel{#1}%
4260   \MT@edef@n{MT@temp#1\the\@tempcnta}\MT@val}%
4261   \advance\@tempcnta \@ne
4262 }%
4263 }%
4264 }

```

`\MT@define@code@key@family` Remove fontspec’s internal feature counter.

```

4265 \def\MT@define@code@key@family#1{%
4266   \define@key{MT@#1}{family}[] {%
4267     \@tempcnta=\@ne
4268     \MT@map@clist@n{##1}%
4269     \KV@@sp@def\MT@val{###1}%
4270     \MT@get@highlevel{family}%
4271     \ifMT@fontspec
4272       \edef\x{\edef\noexpand\MT@val{\noexpand\MT@scrubfeature\MT@val()\relax}}\x
4273     \fi
4274     \MT@edef@n{MT@tempfamily\the\@tempcnta}\MT@val}%
4275     \advance\@tempcnta \@ne
4276   }%
4277 }%
4278 }

```

`\MT@define@code@key@size` `\MT@tempsize` must be in a `\csname`, so that it is at least `\relax`, not undefined.

```

4279 \def\MT@define@code@key@size#1{%
4280   \define@key{MT@#1}{size}[] {%
4281     \MT@map@clist@n{##1}%
4282     \KV@@sp@def\MT@val{###1}%
4283     \expandafter\MT@get@range\MT@val--\@nil
4284     \ifx\MT@val\relax \else
4285       \MT@exp@cs\MT@xadd{MT@tempsize}%
4286       {{{\MT@lower}{\MT@upper}{\MT@curr@set@name}}}%
4287     \fi
4288   }%
4289 }%
4290 }

```

`\MT@define@code@key@font`

```

4291 \def\MT@define@code@key@font#1{%
4292   \define@key{MT@#1}{font}[] {%
4293     \MT@map@clist@n{##1}%
4294     \KV@@sp@def\MT@val{###1}%
4295     \MT@ifstreq\MT@val*{\def\MT@val{*/**/*/*}}\relax
4296     \expandafter\MT@get@font@and@size\MT@val////\@nil
4297     \ifMT@fontspec
4298       \edef\@tempb{\expandafter\MT@scrubfeatures\@tempb()\relax}%
4299     \fi
4300     \MT@xdef@n{MT@MT@permutelist @\@tempb\MT@extra@context}%
4301     {\csname MT@\MT@permutelist @name\endcsname}%
4302     <debug>\MT@info@n1{1}{initialising: use list for font \@tempb=\MT@val
4303     <debug>\ifx\MT@extra@context\@empty\else\MessageBreak

```

```

4304 <debug> (context: \MT@extra@context)\fi}%
4305 \MT@exp@cs\MT@xaddb
4306 {MT@\MT@permute\list @\@tempb\MT@extra@context @sizes}%
4307 {{\MT@eval}{\m@ne}{\MT@curr@set@name}}}%
4308 }%
4309 }%
4310 }

```

\MT@get@font@and@size Translate any asterisks and split off the size.

```

4311 \def\MT@get@font@and@size#1/#2/#3/#4/#5/#6\@nil{%
4312 \MT@get@font@{#1}{#2}{#3}{#4}{#5}{1}%
4313 }
4314 \MT@define@code@key{encoding}{cfg}
4315 \MT@define@code@key{family} {cfg}
4316 \MT@define@code@key{series} {cfg}
4317 \MT@define@code@key{shape} {cfg}
4318 \MT@define@code@key{size} {cfg}
4319 \MT@define@code@key{font} {cfg}

```

\MT@define@opt@key

```

4320 \def\MT@define@opt@key#1#2{%
4321 \define@key{MT@#1@c}{#2}[]{\MT@ifempty{##1}\relax{%
4322 \MT@xdef@n{MT@#1@c@MT@curr@set@name @#2}{##1}}}%
4323 }

```

\MT@listname@count The options in the optional first argument.

```

4324 \newcount\MT@listname@count
4325 \MT@map@clist@c\MT@features{%

```

Use file name and line number as the list name if the user didn't bother to invent one – also check whether the name already exists (in case more than one unnamed list is loaded in the same line, for example \AtBeginDocument).

```

4326 \define@key{MT@#1@c}{name}[]{%
4327 \MT@ifempty{##1}{%
4328 \MT@ifdefined@nTF{MT@#1@c@MT@curr@file/\the\inputlineno}{%
4329 \global\advance\MT@listname@count\@ne
4330 \MT@edef@n{MT@#1@c@name}{\MT@curr@file/\the\inputlineno
4331 (\number\MT@listname@count)}%
4332 }%
4333 \MT@edef@n{MT@#1@c@name}{\MT@curr@file/\the\inputlineno}%
4334 }%
4335 }%
4336 \MT@edef@n{MT@#1@c@name}{##1}%
4337 \MT@ifdefined@nTF{MT@#1@c@csname MT@#1@c@name\endcsname}{%
4338 \MT@warning{Redefining \@nameuse{MT@abbr#1} list ~\@nameuse{MT@#1@c@name}}%
4339 }%
4340 }%
4341 \MT@let@cn\MT@curr@set@name{MT@#1@c@name}%
4342 }%
4343 \MT@define@opt@key{#1}{load}%
4344 \MT@define@opt@key{#1}{factor}%
4345 \MT@define@opt@key{#1}{preset}%
4346 \MT@define@opt@key{#1}{inputenc}%

```

Only one context is allowed. This might change in the future.

```

4347 \define@key{MT@#1@c}{context}[]{\MT@ifempty{##1}\relax{\def\MT@extra@context{##1}}}%
4348 }
4349 </package>

```

Automatically enable font copying if we find a protrusion or expansion context. After the preamble, check whether font copying is enabled. For older pdfTeX versions, disallow. It also works with LuaTeX 0.30 or newer.

```

4350 <*pdf-|lua-|

```

```

4351 <pdf->\MT@requires@pdftex7{
4352   \define@key{MT@ex@c}{context}[]{%
4353     \MT@ifempty{#1}\relax{%
4354       \MT@gllet\MT@copy@font\MT@copy@font@
4355       \def\MT@extra@context{#1}%
4356     }%
4357   }
4358   \MT@addto@setup{%
4359     \define@key{MT@ex@c}{context}[]{%
4360       \ifx\MT@copy@font\MT@copy@font@
4361         \MT@ifempty{#1}\relax{\def\MT@extra@context{#1}}%
4362       \else
4363         \MT@error{\MT@MT\space isn't set up for expansion contexts.\MessageBreak
4364           Ignoring `context' key\on@line}%
4365         {Either move the settings inside the preamble,\MessageBreak
4366           or load the package with the `copyfonts' option.}%
4367       \fi
4368     }%
4369   }

```

Protrusion contexts *might* also work without copying the font, so we don't issue an error but only a warning. The problem is that pdfTeX only allows one set of protrusion factors for a given font within one paragraph (those that are in effect at the end of the paragraph will be in effect for the whole paragraph). When different fonts are loaded – like in the example with the footnote markers – we don't need to copy the fonts.

```

4370   \define@key{MT@pr@c}{context}[]{%
4371     \MT@ifempty{#1}\relax{%
4372       \MT@gllet\MT@copy@font\MT@copy@font@
4373       \def\MT@extra@context{#1}%
4374     }%
4375   }
4376   \MT@addto@setup{%
4377     \define@key{MT@pr@c}{context}[]{%
4378       \MT@ifempty{#1}\relax{\def\MT@extra@context{#1}}%
4379       \ifx\MT@copy@font\MT@copy@font@\else
4380         \MT@warning@n{If protrusion contexts don't work as expected,
4381           \MessageBreak load the package with the `copyfonts' option}%
4382       \fi
4383     }%
4384   }
4385 </pdf-|lua->
4386 <*pdf->
4387 }{
4388   \define@key{MT@ex@c}{context}[]{%
4389     \MT@error{Expansion contexts only work with pdftex 1.40.4\MessageBreak
4390       or later. Ignoring `context' key\on@line}%
4391     {Upgrade pdftex.}%
4392   }
4393 </pdf->
4394 <*pdf-|xe->
4395   \define@key{MT@pr@c}{context}[]{%
4396     \MT@error{Protrusion contexts only work with pdftex
4397 <pdf->      1.40.4\MessageBreak or later.
4398 <xe->      \MessageBreak or luatex.
4399           Ignoring `context' key\on@line}%
4400 <pdf->      {Upgrade pdftex.}%
4401 <xe->      {Use pdftex or luatex.}%
4402   }
4403 </pdf-|xe->
4404 <pdf->}

```

\MT@warn@nodim

```

4405 <*package>

```

```

4406 \def\MT@warn@nodim#1{%
4407   \MT@warning{\@tempa' is not a dimension.\MessageBreak
4408             Ignoring it and setting values relative to\MessageBreak #1}%
4409 }

```

Protrusion codes may be relative to character width, or to any dimension.

```

4410 \define@key{MT@pr@c}{unit}[character]{%
4411   \MT@gl@et@nc{MT@pr@c@MT@curr@set@name @unit}\@empty
4412   \def\@tempa{#1}%
4413   \MT@ifstreq\@tempa{character}\relax{%

```

Test whether it's a dimension, but do not translate it into its final form here, since it may be font-specific.

```

4414     \MT@ifdimen\@tempa
4415     {\MT@gl@et@nc{MT@pr@c@MT@curr@set@name @unit}\@tempa}%
4416     {\MT@warn@nodim{character widths}}%
4417   }%
4418 }
4419 </package>

```

Tracking may only be relative to a dimension.

```

4420 <*pdf-|lua->
4421 \define@key{MT@tr@c}{unit}[1em]{%
4422   \MT@gl@et@nc{MT@tr@c@MT@curr@set@name @unit}\@empty
4423   \def\@tempa{#1}%
4424   \MT@ifdimen\@tempa
4425   {\MT@gl@et@nc{MT@tr@c@MT@curr@set@name @unit}\@tempa}%
4426   {\MT@warn@nodim{1em}%
4427     \MT@gdef@n{MT@tr@c@MT@curr@set@name @unit}{1em}}%
4428 }
4429 </pdf-|lua->

```

Spacing and kerning codes may additionally be relative to space dimensions.

```

4430 <*pdf->
4431 \MT@map@clist@n{sp,kn}{%
4432   \define@key{MT@#1@c}{unit}[space]{%
4433     \MT@gl@et@nc{MT@#1@c@MT@curr@set@name @unit}\@empty
4434     \def\@tempa{##1}%
4435     \MT@ifstreq\@tempa{character}\relax{%
4436       \MT@gl@et@nc{MT@#1@c@MT@curr@set@name @unit}\m@ne
4437       \MT@ifstreq\@tempa{space}\relax{%
4438         \MT@ifdimen\@tempa
4439         {\MT@gl@et@nc{MT@#1@c@MT@curr@set@name @unit}\@tempa}%
4440         {\MT@warn@nodim{width of space}}%
4441       }%
4442     }%
4443   }%
4444 }
4445 </pdf->

```

The first argument to \SetExpansion accepts some more options.

```

4446 <*pdf-|lua->
4447 \MT@map@clist@n{stretch,shrink,step}{%
4448   \define@key{MT@ex@c}{#1}[]{%
4449     \MT@ifempty{##1}\relax{%
4450       \MT@ifint{##1}{%

```

A space terminates the number.

```

4451       \MT@gdef@n{MT@ex@c@MT@curr@set@name @#1}{##1 }%
4452     }%
4453     \MT@warning{%
4454       Value `##1' for option `#1' is not a number.\MessageBreak
4455       Ignoring it}%
4456   }%
4457 }%

```

```

4458 }%
4459 }
4460 \define@key{MT@ex@}{auto}[true]{%
4461 \def\@tempa{#1}%
4462 \csname if\@tempa\endcsname

```

Don't use autoexpand for pdfTeX version older than 1.20.

```

4463 <pdf-> \MT@requires@pdftex4%
4464 <lua-> \MT@requires@luatex3\relax
4465 {\MT@gdef@n{MT@ex@}{MT@curr@set@name @auto}{autoexpand}}%
4466 <pdf-> {\MT@warning{pdftex too old for automatic font expansion}}%
4467 \else
4468 <pdf-> \MT@requires@pdftex4%
4469 <*lua->
4470 \MT@requires@luatex3{%
4471 \MT@warning{Non-automatic font expansion doesn't work with\MessageBreak
4472 \luatex}}%
4473 </lua->
4474 {\MT@glet@nc{MT@ex@}{MT@curr@set@name @auto}\@empty}%
4475 <pdf-> \relax
4476 \fi
4477 }

```

Tracking: Interword spacing and outer kerning. The variant with space just in case `\SetTracking` is called inside an argument (e.g., to `\IfFileExists`).

```

4478 \MT@define@opt@key{tr}{spacing}
4479 \MT@define@opt@key{tr}{outerspacing}
4480 \MT@define@opt@key{tr}{outerkerning}

```

Which ligatures should be disabled?

```

4481 \define@key{MT@tr@}{noligatures}[]%
4482 {\MT@xdef@n{MT@tr@}{MT@curr@set@name @noligatures}{#1}}
4483 \define@key{MT@tr@}{outer spacing}[]{\setkeys{MT@tr@}{outerspacing={#1}}}
4484 \define@key{MT@tr@}{outer kerning}[]{\setkeys{MT@tr@}{outerkerning={#1}}}
4485 \define@key{MT@tr@}{no ligatures}[]{\setkeys{MT@tr@}{noligatures={#1}}}
4486 <pdf-|lua->

```

### 1.3.6 Character inheritance

`\DeclareCharacterInheritance` This macro may be used in the configuration files to declare characters that should inherit protrusion resp. expansion values from other characters. Thus, there is no need to define all accented characters (e.g., `\'a`, `\'a`, `\^a`, `\~a`, `\"a`, `\r{a}`, `\k{a}`, `\u{a}`), which will make the configuration files look much nicer and easier to maintain. If a single character of an inheritance list should have a different value, one can simply override it.

`\MT@inh@feat` The optional argument may be used to restrict the list to some features,  
`\MT@extra@inputenc` and to specify an input encoding.

```

4487 <*package>
4488 \renewcommand*\DeclareCharacterInheritance[1][]{%
4489 \let\MT@extra@context\@empty
4490 \let\MT@extra@inputenc\undefined
4491 \let\MT@inh@feat\@empty
4492 \setkeys{MT@inh@}{#1}%
4493 \MT@begin@catcodes
4494 \MT@set@inh@list
4495 }

```

`\MT@set@inh@list` No need to create an inheritance list for tracking.

```

4496 \def\MT@set@inh@list#1#2{%
4497 \MT@ifempty\MT@inh@feat{%
4498 \MT@map@clist@c\MT@features{\begingroup

```



```

4499     \MT@ifstreq{##1}{tr}\relax{\MT@declare@char@inh{##1}{#1}{#2}}%
4500   \endgroup}%
4501 }{%
4502   \MT@map@clist@c\MT@inh@feat{\begingroup
4503     \KV@sp@def\@tempa{##1}%
4504     \MT@ifempty\@tempa\relax{%
4505       \edef\@tempa{\csname MT@rbba@\@tempa\endcsname}%
4506       \MT@ifstreq\@tempa{tr}\relax{%
4507         \MT@exp@one@n\MT@declare@char@inh{\@tempa}{#1}{#2}}}%
4508   \endgroup}%
4509 }%
4510 \MT@end@catcodes
4511 }

```

The keys for the optional argument.

```

4512 \MT@map@clist@c\MT@features@long{%
4513   \define@key{MT@inh@}{#1}[]{\edef\MT@inh@feat{\MT@inh@feat#1,}}%
4514   \define@key{MT@inh@}{inputenc}{\def\MT@extra@inputenc{#1}}

```

`\MT@declare@char@inh` The lists cannot be given a name by the user.

```

4515 \def\MT@declare@char@inh#1#2#3{%
4516   \MT@edef@n{MT@#1@inh@name}%
4517   {\MT@curr@file/\the\inputlineno (\@nameuse{MT@abbr@#1})}%
4518   \MT@let@cn\MT@curr@set@name{MT@#1@inh@name}%
4519   \MT@ifdefined@c@T\MT@extra@inputenc{%
4520     \MT@xdef@n{MT@#1@inh@\MT@curr@set@name @inputenc}{\MT@extra@inputenc}}%
4521   <debug>\MT@info{1}{creating inheritance list ~\@nameuse{MT@#1@inh@name}'}%
4522   \MT@gdef@n{MT@#1@inh@\csname MT@#1@inh@name\endcsname}{#3}%
4523   \def\MT@permutelist{#1@inh}%
4524   \setkeys{MT@inh}{#2}%
4525   \MT@permute
4526 }

```

Parse the second argument. `\DeclareCharacterInheritance` may also be set up for various combinations. We can reuse the key setup from the configuration lists (`\Set...`).

```

4527 \MT@define@code@key{encoding}{inh}
4528 \MT@define@code@key{family} {inh}
4529 \MT@define@code@key{series} {inh}
4530 \MT@define@code@key{shape} {inh}
4531 \MT@define@code@key{size} {inh}
4532 \MT@define@code@key{font} {inh}

```

`\MT@inh@do` Now parse the third argument, the inheritance lists. We define the commands `\MT@inh@<name>@<slot>@`, containing the inheriting characters. They will also be translated to slot numbers here, to save some time. The following will be executed only once, namely the first time this inheritance list is encountered (in `\MT@set@<feature>@codes`).

```

4533 \def\MT@inh@do#1,{%
4534   \ifx\relax#1\empty \else
4535     \MT@inh@split #1==\relax
4536     \expandafter\MT@inh@do
4537   \fi
4538 }

```

`\MT@inh@split` Only gather the inheriting characters here. Their codes will actually be set in `\MT@set@<feature>@codes`.

```

4539 </package>
4540 <*pdf-|lua-|xe->
4541 \def\MT@inh@split#1=#2=#3\relax{%
4542   \def\@tempa{#1}%
4543   \ifx\@tempa\empty \else
4544     \expandafter\MT@has@inh@prefix\@tempa()\relax\@ni1

```

```

4545 \MT@get@slot
4546 <pdf-|lua-|xe-|> \ifnum\MT@char > \m@ne
4547 <xe-|> \ifx\MT@char\empty\else
4548 \let\MT@val\MT@char
4549 \MT@map@clist@n{#2}{%
4550 \def\@tempa{##1}%
4551 \ifx\@tempa\empty \else
4552 \MT@get@slot
4553 <pdf-|lua-|xe-|> \ifnum\MT@char > \m@ne
4554 <xe-|> \ifx\MT@char\empty\else
4555 \ifx\MT@inh@prefix\empty
4556 \MT@exp@cs\MT@xadd\MT@inh\MT@listname @\MT@val @{{{ \MT@char }}}%
4557 \else
4558 \MT@exp@cs\MT@xadd\MT@inh\MT@listname @prefixes}%
4559 {{{ \MT@val }}\MT@char}\MT@inh@prefix@}%
4560 \fi
4561 \fi
4562 \fi
4563 }%
4564 <debug> \MT@edinfo@n1{2}{children of #1 (\MT@val):
4565 <debug> \@nameuse{MT@inh\MT@listname @\ifx\MT@inh@prefix\empty\MT@val @\else prefixes\fi}}%
4566 \fi
4567 \fi
4568 }
4569 </pdf-|lua-|xe-|>

```

\MT@inh@prefix If the inheriting character is preceded by (*prefix*), where *prefix* is one of l, r  
 \MT@has@inh@prefix or lr, this has a special meaning for protrusion. For the other features, we ignore these settings.

```

4570 <*package>
4571 \def\MT@has@inh@prefix#1(#2)#3#4\@nil{%
4572 \let\MT@temp\relax
4573 \ifx\relax#3%
4574 \def\@tempa{#1#2}%
4575 \let\MT@inh@prefix\empty
4576 \else
4577 \MT@ifstreq{\MT@feat}{pr}{%
4578 \MT@ifstreq{#2}{l}{\def\MT@inh@prefix@{{{1000}{0}}}\@firstoftwo}%
4579 \MT@ifstreq{#2}{r}{\def\MT@inh@prefix@{{{0}{1000}}}\@firstoftwo}%
4580 \MT@ifstreq{#2}{lr}{\def\MT@inh@prefix@{{{500}{500}}}\@firstoftwo}%
4581 \MT@warning@n1{`#2' is not a valid prefix in inheritance list%
4582 \MessageBreak\MT@listname. Ignoring it}%
4583 \@secondoftwo}}%
4584 {\def\@tempa{#3}%
4585 \def\MT@inh@prefix{#2}%
4586 \@gobble}%
4587 {\@firstofone}%
4588 }{\@firstofone}%
4589 {\let\MT@char\m@ne
4590 \let\MT@temp\@gobble
4591 }%
4592 \fi
4593 \MT@temp
4594 }

```

### 1.3.7 Permutation

\MT@permute Calling \MT@permute will define commands for all permutations of the specified font attributes of the form \MT@(*list type*)@/(*encoding*)/(*family*)/(*series*)/(*shape*)/(|\*) to be the expansion of \MT@(*list type*)@name, i.e., the name of the currently defined list. \MT@permute@@ Size ranges are held in a separate macro called \MT@(*list type*)@/(*font axes*)@sizes, \MT@permute@@@ which in turn contains the respective (*list name*)s attached to the ranges. So that,

```

\SetProtrusion
{ encoding = U,
  family   = {euroitc,euroitcs} }
{ E = {100,50} }
\SetProtrusion
{ encoding = U,
  family   = {euroitc,euroitcs},
  shape    = it* }
{ E = {100,} }

```

would yield the following assignments:

```

4595 \MT@gdef@n{MT@pr@c@U/euroitc///}{euroitc}
4596 \MT@gdef@n{MT@pr@c@U/euroitcs///}{euroitc}
4597 \MT@gdef@n{MT@pr@c@U/euroitc//it/}{euroitci}
4598 \MT@gdef@n{MT@pr@c@U/euroitcs//it/}{euroitci}
4599 \MT@gdef@n{MT@pr@c@euroitc}{E={100,50}}
4600 \MT@gdef@n{MT@pr@c@euroitci}{E={100,}}
4601 \def\MT@permute{%
4602   \let\MT@cnt@encoding\@ne
4603   \MT@permute@

```

Undefine commands for the next round.

```

4604 \MT@map@tlist@n{{encoding}{family}{series}{shape}}\MT@permute@reset
4605 \MT@gllet\MT@tempsize\@undefined
4606 }
4607 \def\MT@permute@{%
4608   \let\MT@cnt@family\@ne
4609   \MT@permute@@
4610   \MT@increment\MT@cnt@encoding
4611   \MT@ifdefined@n@T{MT@tempencoding\MT@cnt@encoding}%
4612   \MT@permute@
4613 }
4614 \def\MT@permute@@{%
4615   \let\MT@cnt@series\@ne
4616   \MT@permute@@@
4617   \MT@increment\MT@cnt@family
4618   \MT@ifdefined@n@T{MT@tempfamily\MT@cnt@family}%
4619   \MT@permute@@
4620 }
4621 \def\MT@permute@@@{%
4622   \let\MT@cnt@shape\@ne
4623   \MT@permute@@@@
4624   \MT@increment\MT@cnt@series
4625   \MT@ifdefined@n@T{MT@tempseries\MT@cnt@series}%
4626   \MT@permute@@@@
4627 }
4628 \def\MT@permute@@@@{%
4629   \MT@permute@@@@@
4630   \MT@increment\MT@cnt@shape
4631   \MT@ifdefined@n@T{MT@tempshape\MT@cnt@shape}%
4632   \MT@permute@@@@
4633 }

```

\MT@permute@@@@@ In order to save some memory, we can ignore unused encodings (inside the document).

```

4634 \def\MT@permute@@@@@{%
4635   \MT@permute@define(encoding)%
4636   \ifMT@document
4637     \ifx\MT@tempencoding\@empty \else
4638       \MT@ifdefined@n@TF{T@\MT@tempencoding}\relax
4639       {\expandafter\expandafter\expandafter\@gobble}%
4640     \fi
4641   \fi
4642   \MT@permute@@@@@

```

```

4643 }

\MT@permute@@@@@

4644 \def\MT@permute@@@@@{%
4645   \MT@permute@define{family}%
4646   \MT@permute@define{series}%
4647   \MT@permute@define{shape}%
4648   \edef\@tempa{\MT@tempencoding
4649               /\MT@tempfamily
4650               /\MT@tempseries
4651               /\MT@tempshape
4652               /\MT@ifdefined@c@T\MT@tempsize *}%

```

Some sanity checks: an encoding must be specified (unless nothing else is).

```

4653   \MT@ifstreq\@tempa{////}\relax{%
4654     \ifx\MT@tempencoding\@empty
4655       \MT@warning{%
4656         You have to specify an encoding for\MessageBreak
4657         \nameuse{MT@abbr@\MT@permutilist} list
4658         ~\nameuse{MT@\MT@permutilist @name}'.\MessageBreak
4659         Ignoring it}%
4660     }else
4661       \MT@ifdefined@c@TF\MT@tempsize{%

```

Add the list of ranges to the beginning of the current combination, after checking for conflicts.

```

4662       \MT@ifdefined@n@T{MT@\MT@permutilist @\@tempa\MT@extra@context @sizes}{%
4663         \MT@map@tlist@c\MT@tempsize\MT@check@rlist
4664       }%
4665       \MT@exp@cs\MT@xaddb
4666       {MT@\MT@permutilist @\@tempa\MT@extra@context @sizes}%
4667       \MT@tempsize
4668   <debug>\MT@dinfo@n1{1}{initialising: use list for font \@tempa,\MessageBreak
4669   <debug>           sizes: \csname MT@\MT@permutilist @\@tempa\MT@extra@context
4670   <debug>           @sizes\endcsname}%
4671   }{%

```

Only one list can apply to a given combination. But we don't warn if the overridden list is to be loaded by the current one.

```

4672       \MT@ifdefined@n@T{MT@\MT@permutilist @\@tempa\MT@extra@context}{%
4673         \MT@ifstreq{\csname MT@\MT@permutilist @\@tempa\MT@extra@context\endcsname}%
4674         {\csname MT@\MT@permutilist @\csname MT@\MT@permutilist @name\endcsname @load\endcsname}%
4675         \relax}%
4676       \MT@warning{\nameuse{MT@abbr@\MT@permutilist} list
4677         ~\nameuse{MT@\MT@permutilist @name}' will\MessageBreak override
4678         list ~\nameuse{MT@\MT@permutilist @\@tempa\MT@extra@context}'
4679         for \MessageBreak font ~\@tempa'}%
4680       }%
4681     }%
4682   <debug>\MT@dinfo@n1{1}{initialising: use list for font \@tempa
4683   <debug>           \ifx\MT@extra@context\@empty\else\MessageBreak
4684   <debug>           (context: \MT@extra@context)\fi}%
4685   }%
4686   \MT@xdef@n{MT@\MT@permutilist @\@tempa\MT@extra@context}%
4687   {\csname MT@\MT@permutilist @name\endcsname}%
4688   \fi
4689   }%
4690 }

```

\MT@permute@define Define the commands.

```

4691 \def\MT@permute@define#1{%
4692   \@tempcnta=\csname MT@cnt@#1\endcsname\relax
4693   \MT@ifdefined@n@TF{MT@temp#1\the\@tempcnta}%
4694   {\MT@edef@n{MT@temp#1}{\csname MT@temp#1\the\@tempcnta\endcsname}}%

```

```

4695     {\MT@let@nc{MT@temp#1}\@empty}%
4696 }

\MT@permute@reset    Reset the commands.

4697 \def\MT@permute@reset#1{%
4698   \@tempcnta=\@ne
4699   \MT@loop
4700   \MT@let@nc{MT@temp#1\the\@tempcnta}\@undefined
4701   \advance\@tempcnta\@ne
4702   \MT@ifdefined@n@TF{MT@temp#1\the\@tempcnta}%
4703   \iftrue
4704   \iffalse
4705   \MT@repeat
4706 }

\MT@check@rlist    For every new range item in \MT@tempsize, check whether it overlaps with ranges
                    in the existing list.
4707 \def\MT@check@rlist#1{\expandafter\MT@check@rlist@ #1}

\MT@check@rlist@    Define the current new range and ...

4708 \def\MT@check@rlist@#1#2#3{%
4709   \def\@tempb{#1}%
4710   \def\@tempc{#2}%
4711   \MT@if@false
4712   \MT@exp@cs\MT@map@tlist@
4713   {MT@\MT@permutelist @\@tempa\MT@extra@context @sizes}%
4714   \MT@check@range
4715 }

\MT@check@range    ... recurse through the list of existing ranges.
4716 \def\MT@check@range#1{\expandafter\MT@check@range@ #1}

\MT@check@range@    \@tempb and \@tempc are lower resp. upper bound of the new range, <#1> and <#2>
                    those of the existing range. <#3> is the list name.
4717 \def\MT@check@range@#1#2#3{%
4718   \MT@ifdim{#2}=\m@ne{%
4719     \MT@ifdim\@tempc=\m@ne{%

      • Both items are simple sizes.

4720       \MT@ifdim\@tempb={#1}\MT@if@true\relax
4721     }{%

      • Item in list is a simple size, new item is a range.

4722       \MT@ifdim\@tempb>{#1}\relax{%
4723         \MT@ifdim\@tempc>{#1}{%
4724           \MT@if@true
4725           \edef\@tempb{#1 (with range: \@tempb\space to \@tempc)}%
4726         }\relax
4727       }%
4728     }%
4729   }{%
4730     \MT@ifdim\@tempc=\m@ne{%

      • Item in list is a range, new item is a simple size.

4731       \MT@ifdim\@tempb<{#2}{%
4732         \MT@ifdim\@tempb<{#1}\relax\MT@if@true
4733       }\relax
4734     }{%

      • Both items are ranges.

4735       \MT@ifdim\@tempb<{#2}{%

```

```

4736      \MT@ifdim\@tempc>{#1}{%
4737      \MT@if@true
4738      \edef\@tempb{#1 to #2 (with range: \@tempb\space to \@tempc)}%
4739      }\relax
4740    }\relax
4741  }%
4742 }%
4743 \ifMT@if@
4744 \MT@ifstreq{#3}%
4745   {\csname MT@MT@permutelist @\csname MT@MT@permutelist @name\endcsname @load\endcsname}%
4746   \relax}%
4747 \MT@warning{\@nameuse{MT@abbr@MT@permutelist} list
4748   \@nameuse{MT@MT@permutelist @name}' will override\MessageBreak
4749   list `#3' for font \@tempa,\MessageBreak size \@tempb}%
4750 }%

```

If we've already found a conflict with this item, we can skip the rest of the list.

```

4751   \expandafter\MT@tlist@break
4752   \fi
4753 }

```

## 1.4 Package options

### 1.4.1 Declaring the options

`\ifMT@opt@expansion` Keep track of whether the user explicitly set these options.

```

\ifMT@opt@auto 4754 \newif\ifMT@opt@expansion
\ifMT@opt@DVI 4755 \newif\ifMT@opt@auto
4756 \newif\ifMT@opt@DVI

```

`\MT@optwarn@admissible` Some warnings.

```

4757 \def\MT@optwarn@admissible#1#2{%
4758   \MT@warning@n1{`#1' is not an admissible value for option\MessageBreak
4759     `#2'. Assuming `false'}%
4760 }

```

`\MT@optwarn@nan`

```

4761 </package>
4762 <*package|letterspace>
4763 <plain>\MT@requires@latex1{
4764 \def\MT@optwarn@nan#1#2{%
4765   \MT@warning@n1{Value `#1' for option `#2' is not a\MessageBreak number.
4766     Using default value of \number\@nameuse{MT@#2@default}}%
4767 }
4768 <plain>}\relax
4769 </package|letterspace>
4770 <*package>

```

`\MT@opt@def@set`

```

4771 \def\MT@opt@def@set#1{%
4772   \MT@ifdefined@n@TF{MT@\@tempb @set@\MT@val}{%
4773     \MT@xdef@n{MT@\@tempb @setname}{\MT@val}%
4774   }{%
4775     \MT@xdef@n{MT@\@tempb @setname}{\@nameuse{MT@default@\@tempb @set}}%
4776     \MT@warning@n1{The #1 set `MT@val' is undeclared.\MessageBreak
4777       Using set ` \@nameuse{MT@\@tempb @setname}' instead}%
4778   }%
4779 }

```

expansion and protrusion may be true, false, compatibility, nocompatibility and/or a *set name*.

```

4780 \MT@map@clist@n{protrusion,expansion}{%

```

```

4781 \define@key{MT}{#1}[true]{%
4782 \csname MT@opt@#1true\endcsname
4783 \MT@map@clist@n{##1}{%
4784 \KV@@sp@def\MT@val{###1}%
4785 \MT@ifempty\MT@val\relax{%
4786 \csname MT@#1true\endcsname
4787 \edef\@tempb{\csname MT@rbba@#1\endcsname}%
4788 \MT@ifstreq\MT@val{true}\relax
4789 {%
4790 \MT@ifstreq\MT@val{false}{%
4791 \csname MT@#1false\endcsname
4792 }{%
4793 \MT@ifstreq\MT@val{compatibility}{%
4794 \MT@let@nc\MT@\@tempb @level}\@ne
4795 }{%
4796 \MT@ifstreq\MT@val{nocompatibility}{%
4797 \MT@let@nc\MT@\@tempb @level}\tw@
4798 }{%

```

If everything failed, it should be a set name.

```

4799 \MT@opt@def@set{#1}%
4800 }%
4801 }%
4802 }%
4803 }%
4804 }%
4805 }%
4806 }%
4807 }

```

activate is a shortcut for protrusion and expansion.

```

4808 \define@key{MT}{activate}[true]{%
4809 \setkeys{MT}{protrusion={#1}}%
4810 \setkeys{MT}{expansion={#1}}%
4811 }

```

spacing, kerning and tracking do not have a compatibility level.

```

4812 \MT@map@clist@n{spacing,kerning,tracking}{%
4813 \define@key{MT}{#1}[true]{%
4814 \MT@map@clist@n{##1}{%
4815 \KV@@sp@def\MT@val{###1}%
4816 \MT@ifempty\MT@val\relax{%
4817 \csname MT@#1true\endcsname
4818 \MT@ifstreq\MT@val{true}\relax
4819 {%
4820 \MT@ifstreq\MT@val{false}{%
4821 \csname MT@#1false\endcsname
4822 }{%
4823 \edef\@tempb{\csname MT@rbba@#1\endcsname}%
4824 \MT@opt@def@set{#1}%
4825 }%
4826 }%
4827 }%
4828 }%
4829 }%
4830 }

```

`\MT@def@bool@opt` The true/false options: draft (may be inherited from the class options), auto, selected, babel, DVIoutput, defersetup, copyfonts.

```

4831 \def\MT@def@bool@opt#1#2{%
4832 \define@key{MT}{#1}[true]{%
4833 \def\@tempa{##1}%
4834 \MT@ifstreq\@tempa{true}\relax{%
4835 \MT@ifstreq\@tempa{false}\relax{%
4836 \MT@optwarn@admissible{##1}{#1}%

```

```

4837     \def\@tempa{false}%
4838   }%
4839   }%
4840   #2%
4841   }%
4842 }

```

Boolean options that only set the switch.

```

4843 \MT@map@clist@n{draft,selected,babel}{%
4844   \MT@def@bool@opt{#1}{\csname MT@#1\@tempa\endcsname}}
4845 \MT@def@bool@opt{auto}{\csname MT@auto\@tempa\endcsname \MT@opt@autotruer}

```

The DVIoutput option will change \pdfoutput immediately to minimise the risk of confusing other packages.

```

4846 </package>
4847 <*pdf-|lua-|xe-
4848 <lua->\MT@requires@luatex4{\let\pdfoutput\outputmode}\relax
4849 \MT@def@bool@opt{DVIoutput}{%
4850   \csname if\@tempa\endcsname
4851 <*pdf-|lua-
4852   \ifnum\pdfoutput>\z@ \MT@opt@DVIttrue \fi
4853   \pdfoutput\z@
4854   \else
4855   \ifnum\pdfoutput<\@ne \MT@opt@DVIttrue \fi
4856   \pdfoutput\@ne
4857 </pdf-|lua-
4858 <xe-> \MT@warning@n{Ignoring `DVIoutput' option}%
4859   \fi
4860 }
4861 </pdf-|lua-|xe-

```

Setting the defersetup option to false will restore the old behaviour, where the setup took place at the time when the package was loaded. This is *undocumented*, since I would like to learn about the cases where this is necessary.

The only problem with the new deferred setup I can think of is when a box is being constructed inside the preamble and this box contains a font that is not loaded before the box is being used.

```

4862 <*package>
4863 \MT@def@bool@opt{defersetup}{%
4864   \csname if\@tempa\endcsname \else
4865     \AtEndOfPackage{%
4866       \MT@setup@
4867       \let\MT@setup@\empty
4868       \let\MT@addto@setup\@firstofone
4869     }%
4870   \fi
4871 }
4872 </package>

```

copyfonts will copy all fonts before setting them up. This allows protrusion and expansion with different parameters. This options is also *undocumented* in the hope that we can always find out automatically whether it's required. It also works with LuaTeX 0.30 or newer.

```

4873 <*pdf-|lua-
4874 <pdf->\MT@requires@pdfTeX{
4875   \MT@def@bool@opt{copyfonts}{%
4876     \csname if\@tempa\endcsname
4877     \MT@gllet\MT@copy@font\MT@copy@font@
4878     \else
4879     \MT@gllet\MT@copy@font\relax
4880   \fi
4881 }

```



```

4882 <pdf->}{
4883 </pdf-|lua->
4884 <*pdf-|xe->
4885 \MT@def@bool@opt{copyfonts}{%
4886 \csname if\@tempa\endcsname
4887 \MT@error
4888 <pdf-> {The pdftex version you are using is too old\MessageBreak
4889 <pdf-> to use the `copyfonts' option}{Upgrade pdftex.}%
4890 <xe-> {The `copyfonts' option does not work with xetex}
4891 <xe-> {Use pdftex or luatex instead.}%
4892 \fi
4893 }
4894 <pdf->}{
4895 </pdf-|xe->

```

`final` is the opposite to `draft`. It's only kept for backwards compatibility.

```

4896 <*package>
4897 \MT@def@bool@opt{final}{}

```

The `disable` option replaces the `draft` option, which could be inherited from the class options. The third value `ifdraft` mimicks this behaviour.

```

4898 \define@key{MT}{disable}[true]{%
4899 \def\@tempa{#1}%
4900 \MT@ifstreq\@tempa{true}\MT@disabletrue{%
4901 \MT@ifstreq\@tempa{ifdraft}{\ifMT@draft\MT@disabletrue\fi}{%
4902 \MT@ifstreq\@tempa{false}\relax{%
4903 \MT@optwarn@admissible{#1}{disable}%
4904 }%
4905 }%
4906 }%
4907 }

```

For verbose output, we redefine `\MT@vinfo`.

```

4908 \define@key{MT}{verbose}[true]{%
4909 \let\MT@vinfo\MT@info@nl
4910 \def\@tempa{#1}%
4911 \MT@ifstreq\@tempa{true}\relax{%

```

Take problems seriously.

```

4912 \MT@ifstreq\@tempa{errors}{%
4913 \let\MT@warning \MT@warn@err
4914 \let\MT@warning@nl\MT@warn@err
4915 }{%
4916 \let\MT@vinfo\@gobble

```

Cast warnings to the winds.

```

4917 \MT@ifstreq\@tempa{silent}{%
4918 \let\MT@warning \MT@info
4919 \let\MT@warning@nl\MT@info@nl
4920 }{%
4921 \MT@ifstreq\@tempa{false}\relax{\MT@optwarn@admissible{#1}{verbose}}%
4922 }%
4923 }%
4924 }%
4925 }
4926 </package>

```

Options with numerical keys: `factor`, `stretch`, `shrink`, `step`, `letterspace`.

```

4927 <*package|letterspace>
4928 <plain>\MT@requires@latex1{
4929 \MT@map@clist@%
4930 <package> stretch,shrink,step,%
4931 letterspace}{%
4932 \define@key{MT}{#1}[\csname MT@#1@default\endcsname]{%
4933 \def\@tempa{##1 }%

```

No nonsense in \MT@factor et al.? A space terminates the number.

```

4934 \MT@ifint\@tempa
4935 {\MT@edef\MT@#1}{\@tempa}}%
4936 {\MT@optwarn@nan{##1}{#1}}%
4937 }%
4938 }
4939 \relax
4940 \ifx\MT@factor\MT@factor

```

factor will define the protrusion factor only.

```

4941 \ifx\MT@factor\MT@factor
4942 \define@key{MT}{factor}{\MT@factor@default}{%
4943 \def\@tempa{#1}%
4944 \MT@ifint\@tempa
4945 {\edef\MT@pr@factor{\@tempa}}
4946 {\MT@optwarn@nan{#1}{factor}}%
4947 }

```

Unit for protrusion codes.

```

4948 \define@key{MT}{unit}{character}{%
4949 \def\@tempa{#1}%
4950 \MT@ifstreq\@tempa{character}\relax{%
4951 \MT@ifdimen\@tempa
4952 {\let\MT@pr@unit\@tempa}%
4953 {\MT@warning@n1{`\@tempa' is not a dimension.\MessageBreak
4954 Ignoring it and setting values relative to\MessageBreak
4955 character widths}}%
4956 }%
4957 }

```

\MT@patches@list The patch and nopatch options. Remember chosen option for later (\relax means 'all', \@empty means 'none').

```

4958 \let\MT@patches@list\relax
4959 \let\MT@nopatches@list\@empty
4960 \define@key{MT}{patch}[all]{%
4961 \def\@tempa{#1}%
4962 \MT@ifstreq\@tempa{all}
4963 \relax
4964 {\MT@ifstreq\@tempa{none}
4965 {\let\MT@patches@list\@empty}
4966 {\def\MT@patches@list{#1}}}%
4967 }
4968 \define@key{MT}{nopatch}[all]{%
4969 \def\@tempa{#1}%
4970 \MT@ifstreq\@tempa{all}
4971 {\let\MT@nopatches@list\relax}
4972 {\MT@ifstreq\@tempa{none}
4973 \relax
4974 {\def\MT@nopatches@list{#1}}}%
4975 }

```

We can only apply the patches AtBeginDocument.

```

4976 \MT@addto@setup{%
4977 \ifx\MT@patches@list\relax
4978 \let\MT@patches@list\MT@patches@def
4979 \fi
4980 \ifx\MT@nopatches@list\@empty\else
4981 \ifx\MT@nopatches@list\relax
4982 \let\MT@nopatches@list\MT@patches@def
4983 \fi
4984 \MT@map@clist@{MT@nopatches@list}{%
4985 \MT@rem@from@clist{#1}\MT@patches@list}%
4986 \fi
4987 \ifx\MT@patches@list\@empty\else

```

```

4988 ^^X \MT@map@clist@MT@patches@list{\MT@apply@patch{#1}}%
4989 ^^Q \MT@warning@n1{Patches require the etex extensions. Ignoring them}%
4990 \fi
4991 }

```

### 1.4.2 Loading the definition file

Load the engine-specific code (as strewn across this file).

```

4992 \input{microtype-MT@engine tex.def}

```

### 1.4.3 Reading the configuration file

The package should just work if called without any options. Therefore, expansion will be switched off by default if output is DVI, since it isn't likely that expanded fonts are available. (This grows more important as modern T<sub>E</sub>X systems have switched to the pdfT<sub>E</sub>X engine even for DVI output, so that the user might not even be aware of the fact that she's running pdfT<sub>E</sub>X.)

```

4993 \MT@protrusiontrue
4994 </package>
4995 <*pdf-|lua->
4996 \ifnum\pdfoutput<\@ne \else

```

Also, we only enable expansion by default if pdfT<sub>E</sub>X can expand the fonts automatically.

```

4997 <pdf-> \MT@requires@pdfTeX4{
4998 \MT@expansiontrue
4999 <pdf-> \MT@autottrue
5000 <pdf-> }\relax
5001 \fi
5002 <lua->\MT@autottrue
5003 </pdf-|lua->

```

The main configuration file will be loaded before processing the package options.

However, the config option must of course be evaluated beforehand. We also have to define a no-op for the regular option processing later.

```

5004 <*package>
5005 \define@key{MT}{config}[]{\relax}
5006 \def\MT@get@config#1config=#2,#3\@nil{%
5007 \MT@ifempty{#2}%
5008 {\def\MT@config@file{\MT@MT.cfg}}%
5009 {\def\MT@config@file{#2.cfg}}%
5010 }
5011 \expandafter\expandafter\expandafter\MT@get@config
5012 \csname opt@\@currname.\@current\endcsname,config=\@nil

```

Load the file.

```

5013 \IfFileExists{\MT@config@file}{%
5014 \MT@info@n1{Loading configuration file \MT@config@file}%
5015 \MT@begin@catcodes
5016 \let\MT@begin@catcodes\relax
5017 \let\MT@end@catcodes\relax
5018 \let\MT@curr@file\MT@config@file
5019 \input{\MT@config@file}%
5020 \endgroup
5021 }{\MT@warning@n1{%
5022 Could not find configuration file \MT@config@file!\MessageBreak
5023 This will almost certainly cause undesired results.\MessageBreak
5024 Please fix your installation}%
5025 }

```

`\MT@check@active@set` We have to make sure that font sets are active. If the user didn't activate any, we use those sets declared by `\DeclareMicrotypeSetDefault` (this is done at the end of the preamble).

```

5026 \def\MT@check@active@set#1{%
5027   \MT@ifdefined@n@TF{MT@#1@setname}{%
5028     \MT@info@n{Using \@nameuse{MT@abbr@#1} set \@nameuse{MT@#1@setname}'}%
5029   }{%
5030     \MT@ifdefined@n@TF{MT@default@#1@set}{%
5031       \MT@gl@et@nn{MT@#1@setname}{MT@default@#1@set}%
5032       \MT@info@n{Using default \@nameuse{MT@abbr@#1} set \@nameuse{MT@#1@setname}'}%
5033     }{%

```

If no default font set has been declared in the main configuration file, we use the (empty, non-existent) set '@', and issue a warning.

```

5034   \MT@gdef@n{MT@#1@setname}{@}%
5035   \MT@warning@n{No \@nameuse{MT@abbr@#1} set chosen, no default set declared.
5036               \MessageBreak Using empty set}%
5037   }%
5038 }%
5039 }

```

#### 1.4.4 Hook for other packages

`\Microtype@Hook` This hook may be used by font package authors, e.g., to declare alias fonts. If it is defined, it will be executed here, i.e., after the main configuration file has been loaded, and before the package options are evaluated.

This hook was needed in versions prior to 1.9a to overcome the situation that (1) the microtype package should be loaded after all font defaults have been set up (hence, using `\ifpackageloaded` in the font package was not viable), and (2) checking `\AtBeginDocument` could be too late, since fonts might already have been loaded, and consequently set up, in the preamble. With the new deferred setup, one could live without this command, however, it remains here since it's simpler than testing whether the package was loaded both in the preamble as well as at the beginning of the document (which is what one would have to do).

Package authors should check whether the command is already defined so that existing definitions by other packages aren't overwritten. Example:

```

\def\MinionPro@MT@Hook{\DeclareMicrotypeAlias{MinionPro-LF}{MinionPro}}
\ifpackageloaded{microtype}
  \MinionPro@MT@Hook
  {\ifundefined{Microtype@Hook}
    {\let\Microtype@Hook\MinionPro@MT@Hook}
    {\g@addto@macro\Microtype@Hook{\MinionPro@MT@Hook}}}

```

`\MicroType@Hook` with a capital T (which only existed in version 1.7) is now officially deprecated.

```

5040 \MT@ifdefined@c@T\MicroType@Hook{\MT@error{%
5041   Command \string\MicroType@Hook\space is deprecated.\MessageBreak
5042   Use \string\Microtype@Hook\space instead}
5043   {You might want to inform the font package authors.}\MicroType@Hook}
5044 \MT@ifdefined@c@T\Microtype@Hook\Microtype@Hook

```

#### 1.4.5 Changing options later

`\microtypesetup` Inside the preamble, `\microtypesetup` accepts the same options as the package (unless `defersetup=false`). In the document body, it accepts the options: `protrusion`,

expansion, activate, tracking, spacing and kerning (but specifying font sets is not allowed), and patch and nopatch.

```

5045 \def\microtypesetup{\setkeys{MT}}
5046 \MT@addto@setup{\def\microtypesetup#1{\setkeys{MTX}{#1}\selectfont}}
5047 /package
5048 <*pdf-|lua-|xe-
5049 \def\MT@define@optionX#1#2{%
5050   \define@key{MTX}{#1}[true]{%
5051     \edef\@tempb{\csname MT@rbba@#1\endcsname}%
5052     \MT@map@clist@n{##1}{%
5053       \KV@esp@def\MT@val{###1}%
5054       \MT@ifempty\MT@val\relax{%
5055         \@tempcnta=\m@ne
5056         \MT@ifstreq\MT@val{true}{%

```

Enabling micro-typography in the middle of the document is not allowed if it has been disabled in the package options since fonts might already have been loaded and hence wouldn't be set up.

```

5057   \MT@checksetup{#1}{%
5058     \@tempcnta=\csname MT@\@tempb @level\endcsname
5059     \MT@vinfo{Enabling #1
5060       (level \number\csname MT@\@tempb @level\endcsname)\on@line}%
5061     }%
5062   }{%
5063     \MT@ifstreq\MT@val{false}{%
5064       \@tempcnta=\z@
5065       \MT@vinfo{Disabling #1\on@line}%
5066     }{%
5067       \MT@ifstreq\MT@val{compatibility}{%
5068         \MT@checksetup{#1}{%
5069           \@tempcnta=\@ne
5070           \MT@let@nc{MT@\@tempb @level}\@ne
5071           \MT@vinfo{Setting #1 to level 1\on@line}%
5072         }%
5073       }{%
5074         \MT@ifstreq\MT@val{nocompatibility}{%
5075           \MT@checksetup{#1}{%
5076             \@tempcnta=\tw@
5077             \MT@let@nc{MT@\@tempb @level}\tw@
5078             \MT@vinfo{Setting #1 to level 2\on@line}%
5079           }%
5080           {\MT@error{Value `~\MT@val' for key `~#1' not recognised}
5081             {Use any of `true', `false', `compatibility' or
5082              `nocompatibility'.}%
5083           }%
5084         }%
5085       }%
5086     }%
5087     \ifnum\@tempcnta>\m@ne
5088       #2\@tempcnta\relax
5089     \fi
5090   }%
5091 }%
5092 }%
5093 }

```

\MT@checksetup      Test whether the feature wasn't disabled in the package options.

```

5094 \def\MT@checksetup#1{%
5095   \csname ifMT@#1\endcsname
5096   \expandafter\@firstofone
5097   \else
5098     \MT@error{You cannot enable #1 if it was disabled\MessageBreak
5099       in the package options}{Load microtype with #1 enabled.}%
5100   \expandafter\@gobble

```

```

5101 \fi
5102 }

5103 \MT@define@optionX{protrusion}\MT@protrudechars
5104 </pdf-|lua-|xe-|
5105 *pdf-|lua-|
5106 \MT@define@optionX{expansion}\MT@adjustspacing

```

\MT@protrudechars

```

\MT@adjustspacing 5107 <*lua-|
5108 \MT@requires@luatex4{
5109 \let\pdfprotrudechars\protrudechars
5110 \let\pdfadjustspacing\adjustspacing
5111 }\relax
5112 </lua-|
5113 \let\MT@protrudechars\pdfprotrudechars
5114 \let\MT@adjustspacing\pdfadjustspacing
5115 </pdf-|lua-|
5116 *xe-|
5117 \let\MT@protrudechars\XeTeXprotrudechars
5118 \define@key{MTX}{expansion}[true]{\MT@warning{Ignoring expansion setup}}
5119 </xe-|

```

\MT@define@optionX@ The same for tracking, spacing and kerning, which do not have a compatibility level.

```

5120 <*pdf-|lua-|
5121 pdf-\MT@requires@pdftex6{
5122 lua-\MT@requires@luatex3{
5123 \def\MT@define@optionX@#1#2{%
5124 \define@key{MTX}{#1}[true]{%
5125 \MT@map@clist@n{##1}{%
5126 \KV@@sp@def\MT@val{###1}%
5127 \MT@ifempty\MT@val\relax{%
5128 \@tempcnta=\m@ne
5129 \MT@ifstreq\MT@val{true}{%
5130 \MT@checksetup{#1}{%
5131 \@tempcnta=\@ne
5132 \MT@vinfo{Enabling #1\on@line}%
5133 }%
5134 }%
5135 \MT@ifstreq\MT@val{false}{%
5136 \@tempcnta=\z@
5137 \MT@vinfo{Disabling #1\on@line}%
5138 }{\MT@error{Value `~\MT@val' for key `~#1' not recognised}
5139 {Use either `true' or `false'}}%
5140 }%
5141 }%
5142 \ifnum\@tempcnta>\m@ne
5143 #2\relax
5144 \fi
5145 }%
5146 }%
5147 }%
5148 }

```

We cannot simply let \MT@tracking relax, since this may select the already letter-spaced font instance.

```

5149 \MT@define@optionX@{tracking}{\ifnum\@tempcnta=\z@ \let\MT@tracking\MT@set@tr@zero
5150 \else \let\MT@tracking\MT@tracking@ \fi}
5151 <pdf-| \MT@define@optionX@{spacing}{\pdfadjustinterwordglue\@tempcnta}
5152 pdf-| \MT@define@optionX@{kerning}{\pdfprependkern\@tempcnta
5153 pdf-| \pdfappendkern\@tempcnta}
5154 }{
5155 </pdf-|lua-|
5156 *pdf-|lua-|xe-|

```

Disable for older pdfTeX versions and for XeTeX and LuaTeX.

```

5157 \define@key{MTX}{tracking}[true]{\MT@warning{Ignoring tracking setup}}
5158 <lua->
5159 \define@key{MTX}{kerning}[true]{\MT@warning{Ignoring kerning setup}}
5160 \define@key{MTX}{spacing}[true]{\MT@warning{Ignoring spacing setup}}
5161 <pdf->
5162 \define@key{MTX}{activate}[true]{%
5163   \setkeys{MTX}{protrusion={#1}}%
5164 <pdf-|lua-> \setkeys{MTX}{expansion={#1}}%
5165 }
5166 </pdf-|lua-|xe->

```

`\MT@saved@setupfont` Disable everything – may be used as a temporary work-around in case setting up fonts doesn't work under certain circumstances, but only until that specific problem is fixed. These options are *undocumented*, as they completely deprive us of the possibility to act – we're blind and paralysed.

```

5167 <*package>
5168 \let\MT@saved@setupfont\MT@setupfont

5169 \define@key{MTX}{deactivate}[]{%
5170   \MT@info{Deactivate `~\MT@MT' package}%
5171   \let\MT@setupfont\relax
5172 }
5173 \define@key{MTX}{reactivate}[]{%
5174   \MT@info{Reactivate `~\MT@MT' package}%
5175   \let\MT@setupfont\MT@saved@setupfont
5176 }

```

Apply or revert patches.

```

5177 \define@key{MTX}{patch}[all]{%
5178   \def\@tempa{#1}%
5179   \MT@ifstreq\@tempa{all}
5180     {\let\@tempa\MT@patches@def}
5181     {\MT@ifstreq\@tempa{none}
5182      {\let\@tempa\@empty}
5183      \relax}%
5184   \ifx\@tempa\@empty\else
5185     ^X \MT@map@clist@c\@tempa{\MT@apply@patch{##1}}%
5186     ^Q \MT@warning@nl{Patches require the etex extensions. Ignoring them}%
5187     \fi
5188 }
5189 \define@key{MTX}{nopatch}[all]{%
5190   \def\@tempa{#1}%
5191   \MT@ifstreq\@tempa{all}
5192     {\let\@tempa\MT@patches@def}
5193     {\MT@ifstreq\@tempa{none}
5194      {\let\@tempa\@empty}
5195      \relax}%
5196   \ifx\@tempa\@empty\else
5197     ^X \MT@map@clist@c\@tempa{\MT@undo@patch{##1}}%
5198     \fi
5199 }
5200 </package>

```

#### 1.4.6 Processing the options

`\MT@ProcessOptionsWithKV` Parse options.

```

5201 <*package|letterspace>
5202 <plain>\MT@requires@latex1{
5203 \def\MT@ProcessOptionsWithKV#1{%
5204   \let\@tempc\relax
5205   \let\MT@temp\@empty
5206 <plain> \MT@requires@latex2{

```

```

5207 \MT@map@clist@c\@classoptionslist{%
5208 \def\CurrentOption{##1}%
5209 \MT@ifdefined@n@T{KV@#1@{\expandafter\MT@getkey\CurrentOption=\@nil}}{%
5210 \edef\MT@temp{\MT@temp,\CurrentOption,}%
5211 \@expandtwoargs\@removeelement\CurrentOption
5212 \@unusedoptionlist\@unusedoptionlist
5213 }%
5214 }%
5215 \edef\MT@temp{\noexpand\setkeys{#1}%
5216 \MT@temp\@optionlist{\@currname.\@currentext}}}%

```

plain can handle package options.

```

5217 <plain>
5218 }{\edef\MT@temp{\noexpand\setkeys{#1}%
5219 \csname usepkg@options@usepkg@pkg\endcsname}}
5220 </plain>
5221 \MT@temp
5222 \MT@clear@options
5223 }

```

\MT@getkey For key=val in class options.

```

5224 \def\MT@getkey#1=#2\@nil{#1}
5225 \MT@ProcessOptionsWithKV{MT}
5226 <plain>\relax
5227 </package|letterspace>
5228 <package>

```

Now we can take the appropriate actions. We also tell the log file which options the user has chosen (in case it's interested).

```

5229 \MT@addto@setup{%
5230 \ifMT@disable

```

We disable most of what we've just defined in the 5230 lines above if we are running in disable (aka. draft) mode.

```

5231 \MT@warning@n1{The 'disable' option is in effect.\MessageBreak
5232 Disabling all micro-typographic extensions.\MessageBreak
5233 This might lead to different line and page breaks}%
5234 \let\MT@setupfont\relax
5235 \renewcommand*{\LoadMicrotypeFile[1]}{}%
5236 \renewcommand*\microtypesetup[1]{}%
5237 \renewcommand*\microtypecontext[1]{}%
5238 \renewcommand*\lsstyle{}%
5239 \else
5240 \MT@setup@PDF
5241 \MT@setup@copies

```

Fix the font sets.

```

5242 \MT@map@tlist@c\MT@font@sets\MT@fix@font@set
5243 \MT@setup@protrusion
5244 \MT@setup@expansion
5245 \MT@setup@tracking
5246 \MT@setup@wartracking
5247 \MT@setup@spacing
5248 \MT@setup@kerning
5249 \MT@setup@noligatures
5250 }
5251 </package>

```

\MT@setup@PDF pdfTeX can create DVI output, too. However, both the DVI viewer and dvips need to find actual fonts. Therefore, expansion will only work if the fonts for different degrees of expansion are readily available.

Some packages depend on the value of \pdfoutput and will get confused if it is changed after they have been loaded. These packages are, among others: color,



graphics, hyperref, crop, contour, pstricks and, as a matter of course, ifpdf. Instead of testing for each package (that's not our job), we only say that it was microtype that changed it. This must be sufficient!

```
5252 <pdf-|lua-|xe-|
5253 \def\MT@setup@PDF{%
5254   \MT@info@nl{Generating \ifnum\pdfoutput<\@ne DVI \else PDF \fi output%
5255             \ifMT@opt@DVI\space (changed by \MT@MT)\fi}%
5256 }
```

\MT@setup@copies Working on font copies?

```
5257 \def\MT@setup@copies{%
5258   \ifx\MT@copy@font\relax\else \MT@info@nl{Using font copies for contexts}\fi
5259 }
5260 </pdf-|lua-|xe-|
5261 <xe-|
5262 \let\MT@setup@PDF\relax
5263 \let\MT@setup@copies\relax
5264 </xe-|
```

\MT@setup@protrusion Protrusion.

```
5265 <pdf-|lua-|xe-|
5266 \def\MT@setup@protrusion{%
5267   \ifMT@protrusion
5268     \edef\MT@active@features{\MT@active@features,pr}%
5269     \MT@protrudechars\MT@pr@level
5270     \MT@info@nl{Character protrusion enabled (level \number\MT@pr@level)}%
5271     \ifnum\MT@pr@factor=\MT@factor@default \else,\MessageBreak
5272       factor: \number\MT@pr@factor\fi
5273     \ifx\MT@pr@unit@empty \else,\MessageBreak unit: \MT@pr@unit\fi}%
5274     \MT@check@active@set{pr}%
5275   \else
5276     \let\MT@protrusion\relax
5277     \MT@info@nl{No character protrusion}%
5278   \fi
5279 }
5280 </pdf-|lua-|xe-|
```

\MT@setup@expansion For DVI output, the user must have explicitly passed the expansion option to the package. Under LuaTeX, expansion works quite differently: the glyphs will be positioned as if they were transformed, without actually being transformed. Since this could still be considered a viable option, we don't disable the feature completely, but issue a warning.

```
5281 <pdf-|lua-|xe-|
5282 \def\MT@setup@expansion{%
5283   \ifnum\pdfoutput<\@ne
5284     \ifMT@opt@expansion
5285 <lua-|
5286     \ifMT@expansion
5287       \MT@requires@luatex3{%
5288         \MT@warning@nl{Font expansion doesn't work properly with luatex in\MessageBreak
5289           DVI mode: the glyphs won't be actually transformed,\MessageBreak
5290           but will only be shifted. You might want to use\MessageBreak
5291           pdflatex instead. I'll continue anyway ..}%
5292         %\MT@expansionfalse
5293       }\relax
5294     \fi
5295 </lua-|
5296   \else
5297     \MT@expansionfalse
5298   \fi
5299 \fi
5300 \ifMT@expansion
```

Set up the values for font expansion: if stretch has not been specified, we take the default value of 20.

```
5301 \ifnum\MT@stretch=\m@ne
5302 \let\MT@stretch\MT@stretch@default
5303 \fi
```

If shrink has not been specified, it will inherit the value from stretch.

```
5304 \ifnum\MT@shrink=\m@ne
5305 \let\MT@shrink\MT@stretch
5306 \fi
```

If step has not been specified, we will just set it to 1 for recent pdfTeX versions. My tests did not show much difference neither in compilation time (within the margin of error) nor in file size (less than 1% difference for microtype.pdf with step=1 compared to step=5). With older versions, we set it to  $\min(\text{stretch}, \text{shrink})/5$ , rounded off, minimum value 1.

```
5307 \ifnum\MT@step=\m@ne
5308 <pdf- \MT@requires@pdfTeX6{%
5309 \def\MT@step{1}%
5310 <*pdf-}%
5311 }{%
5312 \ifnum\MT@stretch>\MT@shrink
5313 \ifnum\MT@shrink=\z@
5314 \@tempcnta=\MT@stretch
5315 \else
5316 \@tempcnta=\MT@shrink
5317 \fi
5318 \else
5319 \ifnum\MT@stretch=\z@
5320 \@tempcnta=\MT@shrink
5321 \else
5322 \@tempcnta=\MT@stretch
5323 \fi
5324 \fi
5325 \divide\@tempcnta 5\relax
5326 \ifnum\@tempcnta=\z@ \@tempcnta=\@ne \fi
5327 \edef\MT@step{\number\@tempcnta\space}%
5328 }%
5329 </pdf- \fi
5330 \fi
5331 \ifnum\MT@step=\z@
5332 \MT@warning@n{The expansion step cannot be set to zero.\MessageBreak
5333 Setting it to one}%
5334 \def\MT@step{1}%
5335 \fi
```

`\MT@auto` Automatic expansion of the font? This new feature of pdfTeX 1.20 makes the *fi*z programme really usable. It must be either ‘autoexpand’ or empty (or ‘1000’ for older versions of pdfTeX). With LuaTeX, we just leave it empty, as there’s actually no difference – non-automatic font expansion doesn’t work anymore. In LuaTeX 1.0.6, the ‘autoexpand’ option seems to have been removed altogether and would trigger a warning.

```
5336 \let\MT@auto\empty
5337 \ifMT@auto
```

We turn off automatic expansion if output mode is DVI.

```
5338 <*pdf- \MT@requires@pdfTeX4{%
5339 \ifnum\pdfoutput<\@ne
5340 \ifMT@opt@auto
5341 \MT@error{%
5342 Automatic font expansion only works for PDF output.\MessageBreak
5343
```

```

5344         However, you are creating a DVI file}
5345     {If you have created expanded fonts instances, remove `auto' from%
5346      \MessageBreak the package options. Otherwise, you have to switch
5347      off expansion\MessageBreak completely.}%
5348     \fi
5349     \MT@autofalse
5350     \else
5351         \def\MT@auto{autoexpand}%
5352     \fi

```

Also, if pdfTeX is too old.

```

5353     }{%
5354     \MT@error{%
5355         The pdftex version you are using is too old for\MessageBreak
5356         automatic font expansion}%
5357     {If you have created expanded fonts instances, remove `auto' from\MessageBreak
5358      the package options. Otherwise, you have to switch off expansion\MessageBreak
5359      completely, or upgrade pdftex to version 1.20 or newer.}%
5360     \MT@autofalse
5361     \def\MT@auto{1000 }%
5362     }%
5363 </pdf->
5364 <lua->     \MT@requires@luatex3\relax{\def\MT@auto{autoexpand}}}%
5365     \else
5366 <pdf->

```

No automatic expansion.

```

5367     \MT@requires@pdftex4\relax{%
5368     \def\MT@auto{1000 }%
5369     }%
5370 </pdf->
5371 <*lua->
5372     \MT@requires@luatex3{%
5373     \ifMT@opt@auto
5374         \MT@error{Non-automatic font expansion does not work with\MessageBreak
5375                  luatex}{Remove `auto=false' from the package options, or use pdftex.}%
5376     \MT@autotrue
5377     \fi
5378     }\relax
5379 </lua->
5380     \fi

```

Choose the appropriate macro for selected expansion.

```

5381     \ifMT@selected
5382         \let\MT@set@ex@codes\MT@set@ex@codes@s
5383     \else
5384         \let\MT@set@ex@codes\MT@set@ex@codes@n
5385     \fi

```

Filter out stretch=0, shrink=0, since it would result in a pdfTeX error.

```

5386     \ifnum\MT@stretch=\z@
5387     \ifnum\MT@shrink=\z@
5388         \MT@warning@nl{%
5389             Both the stretch and shrink limit are set to zero.\MessageBreak
5390             Disabling font expansion}%
5391         \MT@expansionfalse
5392     \fi
5393     \fi
5394 \fi
5395 \ifMT@expansion
5396     \edef\MT@active@features{\MT@active@features,ex}%
5397     \MT@adjustspacing\MT@ex@level
5398     \MT@info@nl{\ifMT@auto A\else Non-a\fi utomatic font expansion enabled
5399                (level \number\MT@ex@level),\MessageBreak
5400                stretch: \number\MT@stretch, shrink: \number\MT@shrink,

```

```
5401 step: \number\MT@step, \ifMT@selected\else non-\fi selected}%
```

`\MT@check@step` Check whether stretch and shrink are multiples of step.

```
5402 \def\MT@check@step##1{%
5403   \@tempcnta=\csname MT@##1\endcsname
5404   \divide\@tempcnta \MT@step
5405   \multiply\@tempcnta \MT@step
5406   \ifnum\@tempcnta=\csname MT@##1\endcsname\else
5407     \MT@warning@n\{The ##1 amount is not a multiple of step.\MessageBreak
5408       The effective maximum ##1 is \the\@tempcnta\space
5409       (step \number\MT@step)}%
5410   \fi
5411 }%
5412 \MT@check@step{stretch}%
5413 \MT@check@step{shrink}%
5414 \MT@check@active@set{ex}%
```

`\showhyphens` Inside `\showhyphens`, font expansion should be disabled. (Since 2017/01/10, the  $\text{\LaTeX}$  format contains a different version for  $\text{\XeTeX}$ , but since expansion doesn't work with  $\text{\XeTeX}$ , we don't have to bother.) Since 2019/10/01, the command is robust.

```
5415 \MT@ifdefined@n@TF{showhyphens }{%
5416   \def\MT@temp##1##2{%
5417     \expandafter\CheckCommand\csname showhyphens \endcsname[1]{##1}%
5418     \DeclareRobustCommand\showhyphens[1]{##2}}%
5419   }{%
5420     \def\MT@temp##1##2{%
5421       \CheckCommand*\showhyphens[1]{##1}%
5422       \gdef\showhyphens###1{##2}}%
5423   }%
5424   \MT@temp
5425   {\setbox0\vbox{\color@begingroup
5426     \everypar{}\parfillskip\z@skip
5427     \hsize\maxdimen\normalfont\pretolerance\m@ne\tolerance\m@ne
5428     \hbadness\z@\showboxdepth\z@\ ##1\color@endgroup}}
5429   {\setbox0\vbox{\color@begingroup\pdfadjustspacing\z@
5430     \everypar{}\parfillskip\z@skip
5431     \hsize\maxdimen\normalfont\pretolerance\m@ne\tolerance\m@ne
5432     \hbadness\z@\showboxdepth\z@\ ##1\color@endgroup}}%
5433   \else
5434     \let\MT@expansion\relax
5435     \MT@info@n\{No font expansion}%
5436   \fi
5437 }
5438 (pdf-|lua-)
5439 (xe-)
5440 \def\MT@setup@expansion{%
5441   \ifMT@expansion
5442     \ifMT@opt@expansion
5443       \MT@error{Font expansion does not work with xetex}
5444       {Use pdftex or luatex instead.}%
5445     \fi
5446   \fi
5447 }
5448 (xe-)
```

`\MT@setup@tracking` Tracking, spacing and kerning.

```
5449 (pdf-|lua-)
5450 (pdf-)\MT@requires@pdftex6{%
5451 (lua-)\MT@requires@luatex3{%
5452   \def\MT@setup@tracking{%
5453     \ifMT@tracking
5454       \edef\MT@active@features{\MT@active@features,tr}%
```

```

5455 \MT@info@nl{Tracking enabled}%
5456 \MT@check@active@set{tr}%

```

Enable protrusion for compensation at the line edges.

```

5457 \ifMT@protrusion\else\MT@protrudechars\@ne\fi
5458 \else
5459 \let\MT@tracking\relax
5460 \MT@info@nl{No adjustment of tracking}%
5461 \fi
5462 }
5463 <pdf-|lua-|

```

\MT@setup@spacing

```

5464 <*pdf-|
5465 \def\MT@setup@spacing{%
5466 \ifMT@spacing
5467 \edef\MT@active@features{\MT@active@features,sp}%
5468 \pdfadjustinterwordglue\@ne
5469 \MT@info@nl{Adjustment of interword spacing enabled}%

```

The ragged2e package sets interword spaces to a fixed value without glue. microtype's modifications can therefore have undesired effects. Therefore, we issue a warning.

```

5470 \MT@with@package@T{ragged2e}{%
5471 \MT@warning@nl{You are using the `ragged2e' package.\MessageBreak
5472 Adjustment of interword spacing may lead to\MessageBreak
5473 undesired results when used with `ragged2e'.\MessageBreak
5474 In this case, disable the `spacing' option}%
5475 }%
5476 \MT@check@active@set{sp}%
5477 \else
5478 \let\MT@spacing\relax
5479 \MT@info@nl{No adjustment of interword spacing}%
5480 \fi
5481 }

```

\MT@setup@spacing@check Warning if \nonfrenchspacing is active, since space factors will be ignored with \pdfadjustinterwordglue > 0. Why 1500? Because some packages redefine \frenchspacing.<sup>5</sup>

```

5482 \def\MT@setup@spacing@check{%
5483 \ifMT@spacing
5484 \ifMT@babel\else
5485 \ifnum\scode`. > 1500
5486 \MT@ifstreq\MT@sp@context{nonfrench}\relax{%
5487 \MT@warning@nl{%
5488 \string\nonfrenchspacing\space is active. Adjustment of\MessageBreak
5489 interword spacing will disable it. You might want\MessageBreak
5490 to add \@backslashchar\MT@MT context{spacing=nonfrench}'\MessageBreak
5491 to your preamble}%
5492 }%
5493 \fi
5494 \fi
5495 \fi
5496 }

```

\MT@setup@kerning

```

5497 \def\MT@setup@kerning{%
5498 \ifMT@kerning
5499 \edef\MT@active@features{\MT@active@features,kn}%
5500 \pdfprependkern\@ne
5501 \pdfappendkern\@ne
5502 \MT@info@nl{Adjustment of character kerning enabled}%
5503 \MT@check@active@set{kn}%
5504 \else

```

5 Cf. the c.t.t. thread ‘\frenchspacing with AMS packages and babel’, started by Philipp Lehman on 16 August 2005, MID: ddtbaj\$rob\$1@online.de

```

5505     \let\MT@kerning\relax
5506     \MT@info@n{No adjustment of character kerning}%
5507     \fi
5508   }
5509 </pdf->

```

`\MT@error@doesnt@work` If pdfTeX is too old, we disable tracking, spacing and kerning, and throw an error message. We also switch the features off for LuaTeX and XeTeX.

```

5510 <pdf-|lua->{|
5511 <*lua->
5512   \def\MT@setup@tracking{%
5513     \ifMT@tracking
5514       \MT@error{The tracking feature only works with luatex 0.62\MessageBreak
5515         or newer. Switching it off}{Upgrade luatex.}%
5516       \MT@trackingfalse
5517       \MT@let@nc{MT@tracking}\relax
5518     \else
5519       \MT@info@n{No adjustment of tracking (luatex too old)}%
5520     \fi
5521   }
5522 }
5523 </lua->
5524 <*pdf-|lua-|xe->
5525   \def\MT@error@doesnt@work#1{%
5526     \csname ifMT@#1\endcsname
5527     \MT@error{The #1 feature only works with pdftex 1.40\MessageBreak
5528       or newer. Switching it off}
5529     {Upgrade pdftex.}%
5530   <pdf->
5531   <lua-|xe->
5532     {Use pdftex instead.}%
5533     \csname MT@#1false\endcsname
5534     \MT@let@nc{MT@#1}\relax
5535   \else
5536     \MT@info@n{No adjustment of #1%
5537   <pdf->
5538     \space(pdftex too old)%
5539   }%
5540   \fi
5541 }
5542 <pdf-|xe-> \def\MT@setup@tracking{\MT@error@doesnt@work{tracking}}
5543 \def\MT@setup@kerning {\MT@error@doesnt@work{kerning}}
5544 \def\MT@setup@spacing {\MT@error@doesnt@work{spacing}}
5545 <pdf->
5546 </pdf-|lua-|xe->

```

`\MT@setup@wartracking`

```

5544 <letterspace>\MT@addto@setup
5545 <pdf-|lua->\def\MT@setup@wartracking

```

`\MT@warn@tracking@DVI` With pdfTeX, we issue a warning, when letterspacing in DVI mode, since it will probably not work. We also switch on protrusion if it isn't already, to compensate for the letterspacing kerns.

```

5546 <*pdf-|lua-|letterspace>
5547 {%
5548 <*pdf-|letterspace>
5549   \ifnum\pdfoutput<\@ne
5550     \def\MT@warn@tracking@DVI{%
5551 <letterspace>
5552       \MT@pdf@or@lua{%
5553         \MT@warning@n{
5554           You are using tracking/letterspacing in DVI mode.\MessageBreak
5555           This will probably not work, unless the post-\MessageBreak
5556           processing program (dvips, dvi2pdf(x), ...) is\MessageBreak
5557           able to create the virtual fonts on the fly}%
5558 <letterspace>
5559       }\relax
5560       \MT@glet\MT@warn@tracking@DVI\relax
5561     }%

```

```

5560 \else
5561 </pdf-|letterspace>
5562 \def\MT@warn@tracking@DVI{%
5563 \ifnum\pdfprotrudechars<\@ne \global\pdfprotrudechars\@ne \fi
5564 \MT@gl@et\MT@warn@tracking@DVI\relax
5565 }%
5566 <pdf-|letterspace> \fi
5567 \ifnum\MT@letterspace=\m@ne
5568 \let\MT@letterspace\MT@letterspace@default
5569 \else
5570 \MT@ls@too@large\MT@letterspace
5571 \fi
5572 }
5573 </pdf-|lua-|letterspace>
5574 <xe->\let\MT@setup@warntracking\relax

```

`\MT@setup@noligatures` `\DisableLigatures` is only admissible in the preamble, therefore we can now disable the corresponding macro, if it was never called.

```

5575 <*pdf-|lua->
5576 \def\MT@setup@noligatures{%
5577 <pdf-|lua-> \MT@requires@pdfTeX5{%
5578 \ifMT@noligatures \else
5579 \let\MT@noligatures\relax
5580 \fi
5581 <pdf-|lua-> }\relax
5582 }
5583 </pdf-|lua->
5584 <xe->\let\MT@setup@noligatures\relax

```

Remove the leading comma in `\MT@active@features`, and set the document switch to true.

```

5585 <*package>
5586 \MT@addto@setup{%
5587 \ifx\MT@active@features\@empty \else
5588 \edef\MT@active@features{\expandafter\@gobble\MT@active@features}%
5589 \fi
5590 \MT@documenttrue
5591 }

```

`\MT@set@babel@context` Interaction with babel.

```

5592 \def\MT@set@babel@context#1{%
5593 \MT@ifdefined@n@TF{MT@babel@#1}{%
5594 \MT@vinfo{*** Changing to language context `#1'\MessageBreak\on@line}%
5595 \expandafter\MT@exp@one@n\expandafter\microtypecontext
5596 \csname MT@babel@#1\endcsname
5597 }{%
5598 \microtypecontext{protrusion=,expansion=,spacing=,kerning=}%
5599 }%
5600 }

```

`\MT@shorthandoff` Active characters can only be switched off if babel isn't loaded after microtype.

```

5601 \@ifpackageloaded{babel}{
5602 \def\MT@shorthandoff#1#2{%
5603 \MT@info@n1{Switching off #1 babel's active characters (#2)}%
5604 \shorthandoff{#2}}
5605 }{
5606 \def\MT@shorthandoff#1#2{%
5607 \MT@error{You must load `babel' before `~\MT@MT'}
5608 {Otherwise, `~\MT@MT' cannot switch off #1 babel's\MessageBreak
5609 active characters.}}
5610 }

```

We patch the language switching commands to enable language-dependent setup.

```

5611 \MT@addto@setup{%

```

```

5612 \ifMT@babel
5613 \ifpackageloaded{babel}{%
5614 \MT@info@n{Redefining babel's language switching commands}%
5615 \let\MT@orig@select@language\select@language
5616 \def\select@language#1{%
5617 \MT@orig@select@language{#1}%
5618 \MT@set@babel@context{#1}%
5619 }%
5620 \let\MT@orig@foreign@language\foreign@language
5621 \def\foreign@language#1{%
5622 \MT@orig@foreign@language{#1}%
5623 \MT@set@babel@context{#1}%
5624 }%
5625 \ifMT@kerning

```

Disable French babel's active characters.

```

5626 \MT@if@false
5627 \MT@with@babel@and@T{french} \MT@if@true
5628 \MT@with@babel@and@T{frenchb} \MT@if@true
5629 \MT@with@babel@and@T{français}\MT@if@true
5630 \MT@with@babel@and@T{canadien}\MT@if@true
5631 \MT@with@babel@and@T{acadian} \MT@if@true
5632 \ifMT@if@MT@shorthandoff{French}{;!?}\fi

```

Disable Turkish babel's active characters.

```

5633 \MT@if@false
5634 \MT@with@babel@and@T{turkish} \MT@if@true
5635 \ifMT@if@MT@shorthandoff{Turkish}{:=}\fi
5636 \fi

```

In case babel was loaded before microtype:

```

5637 \MT@set@babel@context\language
5638 }{%
5639 \MT@warning@n{You did not load the babel package.\MessageBreak
5640 The `babel' option won't have any effect}%
5641 }%
5642 \fi
5643 }

```

Now we close the \fi from \ifMT@disable.

```

5644 \MT@addto@setup{\fi

```

Set up the current font, most likely the normal font. This has to come after all of the setup (including anything from the preamble) has been dealt with.

```

5645 \selectfont}

```

\MT@curr@file This is the current file (hopefully with the correct extension).

```

5646 \edef\MT@curr@file{\jobname.tex}
5647 </package>

```

Finally, execute the setup macro at the end of the preamble, and empty it (the combine class calls it repeatedly).

```

5648 <*package|letterspace>
5649 <plain>\MT@requires@latex1{
5650 \AtBeginDocument{\MT@setup@ \MT@glet\MT@setup@\@empty}
5651 <plain>}\relax
5652 </package|letterspace>

```

Must come at the very, very end.

```

5653 <package>\MT@ifdefined@c@T\MT@setup@spacing@check
5654 <package> {\AtBeginDocument{\MT@setup@spacing@check}}

```

Restore catcodes.

```

5655 <package|letterspace>\MT@restore@catcodes

```



That was that.

## 2 Configuration files

Let's now write the font configuration files.

```
5656 (*config)
5657
```

### 2.1 Font sets

We first declare some sets in the main configuration file.

```
5658 (*m-t)
5659 %%% -----
5660 %%% FONT SETS
5661
5662 \DeclareMicrotypeSet{all}
5663 { }
5664
5665 \DeclareMicrotypeSet{allmath}
5666 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU,TS1,OML,OMS,U} }
5667
5668 \DeclareMicrotypeSet{alltext}
5669 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU} }
5670
5671 \DeclareMicrotypeSet{allmath-nott}
5672 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU,TS1,OML,OMS,U},
5673   family   = {rm*,sf*}
5674 }
5675
5676 \DeclareMicrotypeSet{alltext-nott}
5677 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
5678   family   = {rm*,sf*}
5679 }
5680
5681 \DeclareMicrotypeSet{basicmath}
5682 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU,OML,OMS},
5683   family   = {rm*,sf*},
5684   series    = {md*},
5685   size      = {normalsize,footnotesize,small,large}
5686 }
5687
5688 \DeclareMicrotypeSet{basictext}
5689 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU},
5690   family   = {rm*,sf*},
5691   series    = {md*},
5692   size      = {normalsize,footnotesize,small,large}
5693 }
5694
5695 \DeclareMicrotypeSet{smallcaps}
5696 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
5697   shape     = {sc*,si,scit}
5698 }
5699
5700 \DeclareMicrotypeSet{footnotesize}
5701 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
5702   size      = {-small}
5703 }
5704
5705 \DeclareMicrotypeSet{scriptsize}
5706 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
```

```

5707     size      = {-footnotesize}
5708   }
5709
5710 \DeclareMicrotypeSet{normal font}
5711   { font = */*/*/*/ }
5712

```

The default sets.

```

5713 %%% -----
5714 %%% DEFAULT SETS
5715
5716 \DeclareMicrotypeSetDefault[protrusion]{alltext}
5717 \DeclareMicrotypeSetDefault[expansion]{alltext-nott}
5718 \DeclareMicrotypeSetDefault[spacing]{alltext-nott}
5719 \DeclareMicrotypeSetDefault[kerning]{alltext}
5720 \DeclareMicrotypeSetDefault[tracking]{smallcaps}
5721

```

## 2.2 Font variants and aliases

These are the variants I happen to be using (expert encoding, oldstyle numerals, swashes, alternative, display, inferior and superior numerals): Additionally, we add the now common variants for Lining, Tabular, Oldstyle, and Tabular Oldstyle numbers.

```

5722 %%% -----
5723 %%% FONT VARIANTS AND ALIASES
5724
5725 \DeclareMicrotypeVariants{x,j,w,a,d,0,1,-LF,-TLF,-OsF,-TosF}

```

Other candidates: 2 (proportional digits), e (engraved), f (Fraktur), g (small text), h (shadow), l (outline), n (informal), p (ornaments), r (roman), s (sans serif), t (typewriter). I've omitted them since they seem hardly be used and/or they are actually more than just a variant, i.e., they shouldn't share a file.

Fonts that are 'the same': The fontspec package will set lmr as the default font, whose declarations for EU1/EU2/TU encoding are in mt-LatinModernRoman.cfg. Since 2016/12/03, the default encoding with Xe<sub>La</sub>TeX and Lua<sub>La</sub>TeX in the L<sup>A</sup>T<sub>E</sub>X format is TU, even if fontspec is not loaded.

```

5726
5727 \MT@if@false
5728 \ifx\UnicodeEncodingName\undefined\else
5729   \MT@if@fstreq{\encodingdefault}{\UnicodeEncodingName}\MT@if@true\relax
5730 \fi
5731 \ifMT@fontspec\MT@if@true\fi
5732 \ifMT@if@
5733 % -- Computer/Latin Modern Roman
5734 \DeclareMicrotypeAlias{lrm}{Latin Modern Roman}
5735   \else
5736 \DeclareMicrotypeAlias{lrm}{cmr} % lmodern
5737 \fi

```

The Latin Modern fonts, the virtual fonts from the ae and zefonts and the eco and hfoldsty packages (oldstyle numerals), as well as mllmodern, all inherit the (basic) settings from Computer Modern Roman. Some of them are in part overwritten later. We mustn't forget the Latin Modern math fonts.

```

5738 \DeclareMicrotypeAlias{lmsy}{cmsy} % "
5739 \DeclareMicrotypeAlias{lmm}{cmm} % "
5740 \DeclareMicrotypeAlias{aer}{cmr} % ae
5741 \DeclareMicrotypeAlias{zer}{cmr} % zefonts

```

```

5742 \DeclareMicrotypeAlias{cmor}{cmr}          % eco
5743 \DeclareMicrotypeAlias{hfor}{cmr}           % hfoldsty
5744 \DeclareMicrotypeAlias{mlmr}{cmr}           % mlmodern
5745 \DeclareMicrotypeAlias{mlmsy}{cmsy}         % "
5746 \DeclareMicrotypeAlias{mlmm}{cmm}           % "

```

Another, new Computer Modern extension. The `newcomputermodern` package loads it by file name.

```

5747 \DeclareMicrotypeAlias{NewCM10-Book.otf}    {New Computer Modern}
5748 \DeclareMicrotypeAlias{NewCM10-Regular.otf} {New Computer Modern}

```

CMU Serif can use the settings from New Computer Modern too.

```

5749 \DeclareMicrotypeAlias{CMU Serif}           {New Computer Modern}

```

The packages `pxfonts` and `txfonts` fonts inherit Palatino and Times settings respectively, also the TeX Gyre fonts Pagella and Termes (formerly: `qfonts`).

```

5750 %% -- Palatino
5751 \DeclareMicrotypeAlias{pxr}{ppl}             % pxfonts
5752 \DeclareMicrotypeAlias{qpl}{ppl}             % TeX Gyre Pagella (formerly: qfonts/QuasiPalatino)

```

The ‘FPL Neu’ fonts, a ‘re-implementation’ of Palatino.

```

5753 \DeclareMicrotypeAlias{fp9x}{pplx}         % FPL Neu
5754 \DeclareMicrotypeAlias{fp9j}{pplj}         % "

```

The `newpx` package, a replacement for `pxfonts`.

```

5755 \DeclareMicrotypeAlias{zpllf}{pplx}         % newpxtext
5756 \DeclareMicrotypeAlias{zplosf}{pplj}        % "
5757 \DeclareMicrotypeAlias{zpltlf}{pplx}        % "
5758 \DeclareMicrotypeAlias{zpltosf}{pplj}       % "

```

The `domitian` package.

```

5759 \DeclareMicrotypeAlias{Domitian-TLF}{pplx}% domitian
5760 \DeclareMicrotypeAlias{Domitian-T0sF}{pplj}% "

```

The OpenType versions:

```

5761 \DeclareMicrotypeAlias{Palatino Linotype}{Palatino}
5762 \DeclareMicrotypeAlias{Palatino LT Std}{Palatino}
5763 \DeclareMicrotypeAlias{TeX Gyre Pagella}{Palatino}
5764 \DeclareMicrotypeAlias{Domitian}{Palatino}
5765 \DeclareMicrotypeAlias{Asana Math}{Palatino}
5766 %% -- Times New Roman
5767 \DeclareMicrotypeAlias{txr}{ptm}             % txfonts

```

The `newtx` package, a replacement for `txfonts`.

```

5768 \DeclareMicrotypeAlias{ntxlf}{ptmx}         % newtxtext
5769 \DeclareMicrotypeAlias{ntxosf}{ptmj}        % "
5770 \DeclareMicrotypeAlias{ntxtlf}{ptmx}        % "
5771 \DeclareMicrotypeAlias{ntxtosf}{ptmj}       % "

```

The `tempora` package.

```

5772 \DeclareMicrotypeAlias{Tempora-TLF}{ptmx} % tempora
5773 \DeclareMicrotypeAlias{Tempora-T0sF}{ptmj} % "
5774 \DeclareMicrotypeAlias{qtm}{ptm}           % TeX Gyre Termes (formerly: qfonts/QuasiTimes)

```

The `step` package.

```

5775 \DeclareMicrotypeAlias{STEP-TLF}{ptmx}      % step
5776 \DeclareMicrotypeAlias{STEP-T0sF}{ptmj}     % "

```

The `stix` and `stix2` packages (the latter has departed a bit from being a Times clone, but still seems close enough).

```

5777 \DeclareMicrotypeAlias{stix}{ptm}           % stix
5778 \DeclareMicrotypeAlias{stix2}{ptm}          % stix2

```

More Times variants, to be checked: pns, mns (TimesNewRomanPS); mnt (TimesNewRomanMT, TimesNRSevenMT), mtm (TimesSmallTextMT); pte (TimesEuropa); ptt (TimesTen); TimesEighteen; TimesModernEF.

MicroPress's Charter version (chmath).

```
5779 %% -- Charter
5780 \DeclareMicrotypeAlias{chr}{bch} % CH Math
```

The XCharter package extends the Charter fonts.

```
5781 \DeclareMicrotypeAlias{XCharter-TLF}{bch} % XCharter
5782 \DeclareMicrotypeAlias{XCharter-T0sF}{bch} % "
```

The mathdesign package provides math fonts matching Bitstream Charter and URW Garamond.

```
5783 \DeclareMicrotypeAlias{mdbch}{bch} % mathdesign/Charter
5784 %% -- Garamond
5785 \DeclareMicrotypeAlias{mdugm}{ugm} % mathdesign/URW Garamond
```

The garamondx package, an extension of URW Garamond, providing small caps and oldstyle figures.

```
5786 \DeclareMicrotypeAlias{zgmX}{ugm} % garamondx
5787 \DeclareMicrotypeAlias{zgmj}{ugm} % "
5788 \DeclareMicrotypeAlias{zgmI}{ugm} % "
5789 \DeclareMicrotypeAlias{zgmq}{ugm} % "
```

Because a configuration file for Adobe Garamond wouldn't be permitted for TeX Live distribution, we use EB Garamond as the base font.

```
5790 \DeclareMicrotypeAlias{pad}{EBGaramond-LF}% Adobe Garamond
5791 \DeclareMicrotypeAlias{padx}{EBGaramond-TLF}% "
5792 \DeclareMicrotypeAlias{padj}{EBGaramond-T0sF}% "
5793 %% --
```

URW Letter Gothic is similar enough to Bitstream Letter Gothic to share the configuration.

```
5794 \DeclareMicrotypeAlias{ulg}{blg} % URW LetterGothic -> Bitstream LetterGothic12Pitch
```

The eulervm package virtually extends the Euler fonts.

```
5795 \DeclareMicrotypeAlias{zeur}{eur} % Euler VM
5796 \DeclareMicrotypeAlias{zeus}{eus} % "
```

Euro symbol fonts, to save some files.

```
5797 \DeclareMicrotypeAlias{zpeus}{zpeu} % Adobe Euro sans -> serif
5798 \DeclareMicrotypeAlias{eurosans}{zpeu} % Adobe Euro sans -> serif
```

The Lato and Fontin fonts (and many, many more...) only contain a basic set of glyphs. We alias them here to the basic settings (see 3.1.5) to prevent lots of warning messages from the inheritance settings; they will still receive protrusion settings from the default (T1) configuration.

```
5799 \DeclareMicrotypeAlias{Lato}{TU-basic}
5800 \DeclareMicrotypeAlias{Lato-Regular}{TU-basic}
5801 \DeclareMicrotypeAlias{Fontin}{TU-basic}
5802 \DeclareMicrotypeAlias{Fontin-Regular}{TU-basic}
5803 \DeclareMicrotypeAlias{Bergamo Std}{TU-basic}
```

The fontawesome and fontawesome5 packages are aliased to empty settings (see 3.1.6 and 3.2.6).

```
5804 \DeclareMicrotypeAlias{FontAwesome}{TU-empty} % fontawesome
5805 \DeclareMicrotypeAlias{fontawesomefree}{TU-empty} % fontawesome5
5806 \DeclareMicrotypeAlias{fontawesomepro}{TU-empty}
5807 \DeclareMicrotypeAlias{fontawesomebrands}{TU-empty}
5808
```

## 2.3 Interaction with babel

Contexts that are to be set when switching to a language.

```

5809 %%% -----
5810 %%% INTERACTION WITH THE `babel' PACKAGE
5811
5812 \DeclareMicrotypeBabelHook
5813   {english,UKenglish,british,USenglish,american}
5814   {kerning=, spacing=nonfrench}
5815
5816 \DeclareMicrotypeBabelHook
5817   {french,français,acadian,canadien}
5818   {kerning=french, spacing=}
5819
5820 \DeclareMicrotypeBabelHook
5821   {turkish}
5822   {kerning=turkish, spacing=}
5823

```

## 2.4 Note on admissible characters

All printable ASCII characters are allowed in the settings, with the following exceptions (on the left hand side, the replacements on the right):

```

\ : \textbackslash
{ : \textbraceleft
} : \textbraceright
^ : \textasciicircum
% : \%
# : \#

```

Comma and equal sign must be guarded with braces ('{,}', '{=}') to keep keyval happy.

Character commands are allowed as far as they have been defined in the proper  $\text{\LaTeX}$  way, that is, when they have been assigned a slot in the font encoding with `\DeclareTextSymbol` or `\DeclareTextComposite`. Characters defined via `\chardef` are also possible.

Ligatures and `\mathchardef`'ed symbols have to be specified numerically. Of course, numerical identification is possible in any other case, too.

8-bit characters are also admissible, provided they have been declared in the input encoding file. They should, however, only be used in private configuration files, where the proper input encoding is guaranteed, or else in combination with the 'inputenc' key.

With  $\text{\XeTeX}$  or  $\text{\LuaTeX}$ , in contrast, it is advisable to use the proper Unicode characters, or the font-specific glyph names prefixed with '/' (cf. section 3).

## 2.5 Character inheritance

First the lists of inheriting characters. We only declare those characters that are the same on *both* sides, i.e., not Œ for O.

```

5824 </m-t>
5825 <*m-t|ebg|zpeu|mvs>
5826 %%% -----
5827 %%% CHARACTER INHERITANCE
5828

```

```

5829 </m-t|ebg|zpeu|mvs>
5830 <*m-t>

```

### 2.5.1 OT1

Glyphs that should possibly inherit settings on one side only: 012 (‘fi’ ligature), 013 (‘fl’), 014 (‘ffi’), 015 (‘ffl’), Æ, æ, Œ, œ.

```

5831 \DeclareCharacterInheritance
5832 { encoding = OT1 }
5833 { f = {011}, % ff
5834   i = {\i},
5835   j = {\j},
5836   O = {\O},
5837   o = {\o}
5838 }
5839

```

### 2.5.2 T1

Candidates here: 028 (‘fi’), 029 (‘fl’), 030 (‘ffi’), 031 (‘ffl’), 156 (‘IJ’ ligature, since L<sup>A</sup>T<sub>E</sub>X 2005/12/01 accessible as \IJ), 188 (‘ij’, \ij), Æ, æ, Œ, œ.

```

5840 \DeclareCharacterInheritance
5841 { encoding = T1 }
5842 { A = {\`A,\^A,\^A,\~A,\^A,\r A,\k A,\u A},
5843   a = {\`a,\^a,\^a,\~a,\^a,\r a,\k a,\u a},
5844   C = {\`C,\c C,\v C},
5845   c = {\`c,\c c,\v c},
5846   D = {\v D,\DH},
5847   d = {\v d,\dj},
5848   E = {\`E,\^E,\^E,\^E,\k E,\v E},
5849   e = {\`e,\^e,\^e,\^e,\k e,\v e},
5850   f = {027}, % ff
5851   G = {\u G},
5852   g = {\u g},
5853   I = {\`I,\^I,\^I,\^I,\^I,\^I},
5854   i = {\`i,\^i,\^i,\^i,\^i,\^i},
5855   j = {\j},
5856   L = {\L,\^L,\v L},
5857   l = {\l,\^l,\v l},
5858   N = {\`N,\~N,\v N},
5859   n = {\`n,\~n,\v n},
5860   O = {\O,\^O,\^O,\^O,\^O,\^O,\^O,\^O},
5861   o = {\o,\^o,\^o,\^o,\^o,\^o,\^o,\^o},
5862   R = {\`R,\v R},
5863   r = {\`r,\v r},
5864   S = {\`S,\c S,\v S,\SS},
5865   s = {\`s,\c s,\v s},
5866   T = {\c T,\v T},
5867   t = {\c t,\v t},
5868   U = {\`U,\^U,\^U,\^U,\^U,\^U,\^U,\^U},
5869   u = {\`u,\^u,\^u,\^u,\^u,\^u,\^u,\^u},
5870   Y = {\`Y,\^Y},
5871   y = {\`y,\^y},
5872   Z = {\`Z,\^Z,\v Z},
5873   z = {\`z,\^z,\v z}

```

The ‘soft hyphen’ often has reduced right side bearing so that it may already be protruded, hence no inheritance.

```

5874 % - = {127},
5875 }
5876

```

### 2.5.3 LY1

More characters: 008 ('fl'), 012 ('fi'), 014 ('ffi'), 015 ('ffl'), Æ, æ, Œ, œ.

```

5877 \DeclareCharacterInheritance
5878   { encoding = LY1 }
5879   { A = {\`A,\`A,\^A,\~A,\"A,\r A},
5880     a = {\`a,\`a,\^a,\~a,\"a,\r a},
5881     C = {\c C},
5882     c = {\c c},
5883     D = {\DH},
5884     E = {\`E,\`E,\^E,\"E},
5885     e = {\`e,\`e,\^e,\"e},
5886     f = {011}, % ff
5887     I = {\`I,\`I,\^I,\"I},
5888     i = {\`i,\`i,\^i,\"i,\"i},
5889     L = {\L},
5890     l = {\l},
5891     N = {\~N},
5892     n = {\~n},
5893     O = {\`O,\`O,\^O,\~O,\"O,\"O},
5894     o = {\`o,\`o,\^o,\~o,\"o,\"o},
5895     S = {\v S},
5896     s = {\v s},
5897     U = {\`U,\`U,\^U,\"U},
5898     u = {\`u,\`u,\^u,\"u},
5899     Y = {\`Y,\"Y},
5900     y = {\`y,\"y},
5901     Z = {\v Z},
5902     z = {\v z}
5903   }
5904
```

### 2.5.4 OT4

The Polish OT1 extension. More interesting characters here: 009 ('fk'), 012 ('fi'), 013 ('fl'), 014 ('ffi'), 015 ('ffl'), Æ, æ, Œ, œ.

```

5905 \DeclareCharacterInheritance
5906   { encoding = OT4 }
5907   { A = {\k A},
5908     a = {\k a},
5909     C = {\`C},
5910     c = {\`c},
5911     E = {\k E},
5912     e = {\k e},
5913     f = {011}, % ff
5914     i = {\i},
5915     j = {\j},
5916     L = {\L},
5917     l = {\l},
5918     N = {\`N},
5919     n = {\`n},
5920     O = {\O,\"O},
5921     o = {\o,\"o},
5922     S = {\`S},
5923     s = {\`s},
5924     Z = {\`Z,\"Z},
5925     z = {\`z,\"z},
5926     \textquotedblleft = "FF
5927   }
5928
```



### 2.5.5 QX

The Central European QX encoding.<sup>6</sup> Ligatures: 009 ('fk'), 012 ('fi'), 013 ('fl'), 014 ('ffi'), 015 ('ffl'), Æ, æ, Œ, œ.

```

5929 \DeclareCharacterInheritance
5930 { encoding = QX }
5931 { A = {\`A,\'A,\^A,\~A,\"A,\k A,\AA},
5932   a = {\`a,\'a,\^a,\~a,\"a,\k a,\aa},
5933   C = {\'C,\c C},
5934   c = {\'c,\c c},
5935   D = {\DH},
5936   E = {\`E,\'E,\^E,\"E,\k E},
5937   e = {\`e,\'e,\^e,\"e,\k e},
5938   f = {011}, % ff
5939   I = {\`I,\'I,\^I,\"I,\k I},
5940   i = {\`i,\'i,\^i,\"i,\k i,\i},
5941   j = {\j},
5942   L = {\L},
5943   l = {\l},
5944   N = {\'N,\~N},
5945   n = {\'n,\~n},
5946   O = {\0,\`0,\'0,\^0,\~0,\"0},
5947   o = {\0,\`o,\'o,\^o,\~o,\"o},

```

The Romanian `\textcommabelow` accents are actually replacements for the `\c` variants, which had previously (and erroneously<sup>7</sup>) been included in QX encoding. They are still kept for backwards compatibility.

```

5948   S = {\'S,\c S,\textcommabelow S,\v S},
5949   s = {\'s,\c s,\textcommabelow s,\v s},
5950   T = {\c T,\textcommabelow T},
5951   t = {\c t,\textcommabelow t},
5952   U = {\`U,\'U,\^U,\"U,\k U},
5953   u = {\`u,\'u,\^u,\"u,\k u},
5954   Y = {\'Y,\"Y},
5955   y = {\'y,\"y},
5956   Z = {\'Z,\~Z,\v Z},
5957   z = {\'z,\~z,\v z},
5958   . = \textellipsis
5959 }
5960

```

### 2.5.6 T5

The Vietnamese encoding T5. It is so crowded with accented and double-accented characters that there is no room for any ligatures.

```

5961 \DeclareCharacterInheritance
5962 { encoding = T5 }
5963 { A = {\`A,\'A,\~A,\h A,\d A,\^A,\u A,
5964   \`Acircumflex,\'Acircumflex,\~Acircumflex,\hAcircumflex,\dAcircumflex,
5965   \`Abreve,\'Abreve,\~Abreve,\hAbreve,\dAbreve},
5966   a = {\`a,\'a,\~a,\h a,\d a,\^a,\u a,
5967   \`acircumflex,\'acircumflex,\~acircumflex,\hacircumflex,\dacircumflex,
5968   \`abreve,\'abreve,\~abreve,\h\abreve,\d\abreve},
5969   D = {\DJ},
5970   d = {\dj},
5971   E = {\`E,\'E,\~E,\h E,\d E,\^E,
5972   \`Ecircumflex,\'Ecircumflex,\~Ecircumflex,\hEcircumflex,\dEcircumflex},
5973   e = {\`e,\'e,\~e,\h e,\d e,\^e,
5974   \`ecircumflex,\'ecircumflex,\~ecircumflex,\hecircumflex,\decircumflex},

```

<sup>6</sup> Contributed by Maciej Eder.

<sup>7</sup> Cf. <http://tug.org/pipermail/tex-live/2008-August/017204.html>

```

5975 I = {\`I,\`I,\~I,\h I,\d I},
5976 i = {\`i,\`i,\~i,\h i,\d i,\i},
5977 O = {\`O,\`O,\~O,\h O,\d O,\^O,\horn O,
5978   \`Ocircumflex,\`Ocircumflex,\~Ocircumflex,\hOcircumflex,\dOcircumflex,
5979   \`Ohorn,\`Ohorn,\~Ohorn,\hOhorn,\dOhorn},
5980 o = {\`o,\`o,\~o,\h o,\d o,\^o,\horn o,
5981   \`ocircumflex,\`ocircumflex,\~ocircumflex,\hocircumflex,\docircumflex,
5982   \`ohorn,\`ohorn,\~ohorn,\hohorn,\dohorn},
5983 U = {\`U,\`U,\~U,\h U,\d U,\horn U,
5984   \`Uhorn,\`Uhorn,\~Uhorn,\hUhorn,\dUhorn},
5985 u = {\`u,\`u,\~u,\h u,\d u,\horn u,
5986   \`uhorn,\`uhorn,\~uhorn,\huhorn,\duhorn},
5987 Y = {\`Y,\`Y,\~Y,\h Y,\d Y},
5988 y = {\`y,\`y,\~y,\h y,\d y}
5989 }
5990

```

### 2.5.7 EU1, EU2, TU

The EU1 (X<sub>Y</sub>TeX), EU2 (LuaTeX), and, since fontspec version 2.5, TU encodings are not well-defined in the sense that they don't contain a fixed number of glyphs, all of which must be present. OpenType fonts may contain thousands of glyphs, but we only define those that should be present in every font (basically T1). This inheritance list should be overridden by font-specific ones.

```

5991 \DeclareCharacterInheritance
5992 { encoding = {TU,EU1,EU2} }
5993 { A = {\`A,\`A,\^A,\~A,\`A,\r A,\k A,\u A},
5994   a = {\`a,\`a,\^a,\~a,\`a,\r a,\k a,\u a},
5995   C = {\`C,\c C,\v C},
5996   c = {\`c,\c c,\v c},
5997   D = {\v D,\DH},
5998   d = {\v d,\dj},
5999   E = {\`E,\`E,\^E,\^E,\k E,\v E},
6000   e = {\`e,\`e,\^e,\^e,\k e,\v e},
6001 %   f = {/f_f}, % sometimes /f_f, sometimes /ff
6002   G = {\u G},
6003   g = {\u g},
6004   I = {\`I,\`I,\^I,\`I,\.I},
6005   i = {\`i,\`i,\^i,\`i,\.i},
6006 %   j = {\j},
6007   L = {\`L,\`L,\v L},
6008   l = {\`l,\`l,\v l},
6009   N = {\`N,\~N,\v N},
6010   n = {\`n,\~n,\v n},
6011   O = {\`O,\`O,\^O,\~O,\`O,\H O},
6012   o = {\`o,\`o,\^o,\~o,\`o,\H o},
6013   R = {\`R,\v R},
6014   r = {\`r,\v r},
6015   S = {\`S,\c S,\v S}, % \SS
6016   s = {\`s,\c s,\v s},
6017   T = {\c T,\v T},
6018   t = {\c t,\v t},
6019   U = {\`U,\`U,\^U,\`U,\H U,\r U},
6020   u = {\`u,\`u,\^u,\`u,\H u,\r u},
6021   Y = {\`Y,\`Y},
6022   y = {\`y,\`y},
6023   Z = {\`Z,\.Z,\v Z},
6024   z = {\`z,\.z,\v z}
6025 }
6026
6027 </m-t>

```

### 2.5.8 LGR

The Greek LGR encoding. EB Garamond contains some more glyphs.

```

6028 <*-t|ebg>
6029 \DeclareCharacterInheritance
6030 { encoding = LGR,
6031 <ebg> family = {EBGaramond-OsF,EBGaramond-TOsF,EBGaramond-LF,EBGaramond-TLF}
6032 }
6033 {
6034 <m-t> A = {012},
6035 <ebg> A = {009,012,253},
6036 <ebg> (1)E = {199},
6037 <ebg> H = {010},
6038 <ebg> (1)H = {159},
6039 I = {219},
6040 <ebg> (1)I = {155},
6041 O = J,
6042 <ebg> (1)O = {151},
6043 U = {013,223},
6044 W = {011},
6045 a = {014,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,
6046 144,145,146,148,149,150,248},
6047 e = {224,225,226,227,232,233,234,235},
6048 h = {152,153,154,156,157,158,160,161,162,163,164,165,166,167,168,169,170,
6049 171,172,173,174,175,249},
6050 <m-t> i = {200,201,202,203,208,209,210,211,216,217,218,240,241,242,243},
6051 <ebg> i = {008,200,201,202,203,208,209,210,211,216,217,218,240,241,242,243},
6052 o = {228,229,230,231,236,237,238,239},
6053 r = {251,252},
6054 u = {015,204,205,206,207,212,213,214,215,220,221,222,244,245,246,247},
6055 w = {176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,
6056 193,194,196,197,198,250},
6057 <ebg> \textstigma = \textvarstigma,
6058 . = {059} % ano teleia
6059 }
6060
6061 </m-t|ebg>

```

### 2.5.9 Euro symbols

Make Euro symbols settings simpler.

```

6062 <*-zpeu>
6063 \DeclareCharacterInheritance
6064 { encoding = U,
6065 family = {zpeu,zpeus,eurosans} }
6066 { E = 128 }
6067
6068 </zpeu>
6069 <*-mvs>

```

Since 2006/05/11 (that is, one week after I've added these settings, after the package had been dormant for six years!), marvosym's encoding is (correctly) U instead of OT1.

```

6070 \DeclareCharacterInheritance
6071 { encoding = {OT1,U},
6072 family = mvs }
6073 { 164 = {099,100,101} } % \EURhv,\EURcr,\EURtm
6074
6075 </mvs>

```

## 2.6 Tracking

By default, we only disable the ‘f\*’ ligatures, for those fonts that have any. Thus, ligatures and especially kerning for all other characters will be retained.

```
6076 <*m-t>
6077 %%% -----
6078 %%% TRACKING/LETTERSPACING
6079
6080 \SetTracking
6081 [ name = default,
6082   no ligatures = {f} ]
6083 { encoding = {OT1,T1,T2A,LY1,OT4,QX,EU2,TU} }
6084 { }
6085
```

## 2.7 Font expansion

These are Hàn Thế Thành’s original expansion settings. They are used for all fonts (until somebody shows mercy and creates font-specific settings).

```
6086 %%% -----
6087 %%% EXPANSION
6088
6089 \SetExpansion
6090 [ name = default ]
6091 { encoding = {OT1,OT4,QX,T1,LY1} }
6092 {
6093   A = 500,      a = 700,
6094   \AE = 500,    \ae = 700,
6095   B = 700,      b = 700,
6096   C = 700,      c = 700,
6097   D = 500,      d = 700,
6098   E = 700,      e = 700,
6099   F = 700,
6100   G = 500,      g = 700,
6101   H = 700,      h = 700,
6102   K = 700,      k = 700,
6103   M = 700,      m = 700,
6104   N = 700,      n = 700,
6105   O = 500,      o = 700,
6106   \OE = 500,    \oe = 700,
6107   P = 700,      p = 700,
6108   Q = 500,      q = 700,
6109   R = 700,
6110   S = 700,      s = 700,
6111   U = 700,      u = 700,
6112   W = 700,      w = 700,
6113   Z = 700,      z = 700,
6114   2 = 700,
6115   3 = 700,
6116   6 = 700,
6117   8 = 700,
6118   9 = 700
6119 }
6120
```

Settings for Cyrillic T2A encoding.<sup>8</sup>

```
6121 \SetExpansion
6122 [ name = T2A ]
6123 { encoding = T2A }
6124 {
6125   A = 500,      a = 700,
```

---

<sup>8</sup> Contributed by *Karl Karlsson*.

```

6126     B = 700,      b = 700,
6127     C = 700,      c = 700,
6128     D = 500,      d = 700,
6129     E = 700,      e = 700,
6130     F = 700,
6131     G = 500,      g = 700,
6132     H = 700,      h = 700,
6133     K = 700,      k = 700,
6134     M = 700,      m = 700,
6135     N = 700,      n = 700,
6136     O = 500,      o = 700,
6137     P = 700,      p = 700,
6138     Q = 500,      q = 700,
6139     R = 700,
6140     S = 700,      s = 700,
6141     U = 700,      u = 700,
6142     W = 700,      w = 700,
6143     Z = 700,      z = 700,
6144     2 = 700,
6145     3 = 700,
6146     6 = 700,
6147     8 = 700,
6148     9 = 700,
6149     \CYRA = 500,    \cyra = 700,
6150     \CYRB = 700,    \cyrb = 700,
6151     \CYRV = 700,    \cyrv = 700,
6152     \CYRG = 700,    \cyrg = 700,
6153     \CYRD = 700,    \cyrd = 700,
6154     \CYRE = 700,    \cyre = 700,
6155     \CYRZH = 700,   \cyrzh = 700,
6156     \CYRZ = 700,    \cyrz = 700,
6157     \CYRI = 700,    \cyri = 700,
6158     \CYRISHRT = 700, \cyrishrt = 700,
6159     \CYRK = 700,    \cyrk = 700,
6160     \CYRL = 700,    \cyrl = 700,
6161     \CYRM = 700,    \cyrm = 700,
6162     \CYRN = 700,    \cyrn = 700,
6163     \CYRO = 500,    \cyro = 700,
6164     \CYRP = 700,    \cyrp = 700,
6165     \CYRR = 700,    \cyrr = 700,
6166     \CYRS = 700,    \cyrs = 700,
6167     \CYRT = 700,    \cyrt = 700,
6168     \CYRU = 700,    \cyru = 700,
6169     \CYRF = 700,    \cyrf = 700,
6170     \CYRH = 700,    \cyrh = 700,
6171     \CYRC = 700,    \cyrc = 700,
6172     \CYRCH = 700,   \cyrch = 700,
6173     \CYRSH = 700,   \cyrsh = 700,
6174     \CYRSHCH = 700, \cyrshch = 700,
6175     \CYRHRSN = 700, \cyrhrdsn = 700,
6176     \CYRERY = 700,  \cyrery = 700,
6177     \CYRSFTSN = 700, \cyrsftsn = 700,
6178     \CYREREV = 700, \cyrerev = 700,
6179     \CYRYU = 700,   \cyryu = 700,
6180     \CYRYA = 700,   \cyrya = 700
6181 }
6182

```

T5 encoding does not contain \AE, \ae, \OE and \oe.

```

6183 \SetExpansion
6184 [ name      = T5 ]
6185 { encoding = T5 }
6186 {
6187     A = 500,      a = 700,
6188     B = 700,      b = 700,

```

```

6189 C = 700, c = 700,
6190 D = 500, d = 700,
6191 E = 700, e = 700,
6192 F = 700,
6193 G = 500, g = 700,
6194 H = 700, h = 700,
6195 K = 700, k = 700,
6196 M = 700, m = 700,
6197 N = 700, n = 700,
6198 O = 500, o = 700,
6199 P = 700, p = 700,
6200 Q = 500, q = 700,
6201 R = 700,
6202 S = 700, s = 700,
6203 U = 700, u = 700,
6204 W = 700, w = 700,
6205 Z = 700, z = 700,
6206 2 = 700,
6207 3 = 700,
6208 6 = 700,
6209 8 = 700,
6210 9 = 700
6211 }
6212
6213 </m-t>

```

## 2.8 Character protrusion

```

6214 %%% -----
6215 %%% PROTRUSION
6216

```

For future historians, Hàn Thế Thành's original settings (from `protcode.tex`, converted to `microtype` notation).

```

\SetProtrusion
[ name = thanh ]
{ encoding = OT1 }
{
  A = {50,50},
  F = { ,50},
  J = {50, },
  K = { ,50},
  L = { ,50},
  T = {50,50},
  V = {50,50},
  W = {50,50},
  X = {50,50},
  Y = {50,50},
  k = { ,50},
  r = { ,50},
  t = { ,50},
  v = {50,50},
  w = {50,50},
  x = {50,50},
  y = {50,50},
  . = { ,700}, {,}= { ,700},
  : = { ,500}, ; = { ,500},
  ! = { ,200}, ? = { ,200},
  ( = {50, }, ) = { ,50},
  - = { ,700},
  \textendash = { ,300}, \textemdash = { ,200},
  \textquoteleft = {700, }, \textquoteright = { ,700},
  \textquotedblleft = {500, }, \textquotedblright = { ,500}
}

```

### 2.8.1 Normal

The default settings always use the most moderate value.

```
6217 <*cfg-t>
6218 \SetProtrusion
6219 <m-t> [ name = default ]
```

We also create configuration files for the fonts

- Bitstream Charter (NFSS code bch)

```
6220 <bch> [ name = bch-default ]
```

- Bitstream Letter Gothic (blg)

```
6221 <blg> [ name = blg-default ]
```

- Computer Modern Roman (cmr)

```
6222 <cmr> [ name = cmr-default ]
```

- EB Garamond

```
6223 <ebg> [ name = EBGaramond-default ]
```

- Minion<sup>9</sup> (pmnx, pmnj)

```
6224 <pmn> [ name = pmnj-default ]
```

- Palatino (ppl, pplx, pplj)

```
6225 <ppl> [ name = ppl-default ]
```

- Times (ptm, ptmx, ptmj)

```
6226 <ptm> [ name = ptm-default ]
```

- URW Garamond (ugm)

```
6227 <ugm> [ name = ugm-default ]
6228 <m-t|cmr|pmn|ebg> { }
6229 <bch|blg|ugm> { encoding = OT1,
6230 <ppl|ptm> { encoding = {OT1,OT4},
6231 <bch> family = bch }
6232 <blg> family = blg }
6233 <ppl> family = {ppl,pplx,pplj} }
6234 <ptm> family = {ptm,ptmx,ptmj} }
6235 <ugm> family = ugm }
6236 {
6237 <m-t|bch|blg|cmr|ebg|pmn|ppl|ptm> A = {50,50},
6238 <ugm> A = {50,100},
6239 <ebg|ptm> \AE = {50, },
6240 <ugm> \AE = {150,50},
6241 <ugm> B = { ,50},
6242 <bch|ebg|pmn|ugm> C = {50, },
6243 <bch|ebg|pmn> D = { ,50},
6244 <ugm> D = { ,70},
6245 <ugm> E = { ,50},
6246 <m-t|bch|cmr|ebg|pmn|ptm> F = { ,50},
6247 <ugm> F = { ,70},
6248 <bch|ebg|pmn> G = {50, },
6249 <ugm> G = {50,50},
6250 <blg> I = {150,150},
6251 <m-t|cmr|ebg|pmn|ppl|ptm|ugm> J = {50, },
6252 <bch|blg> J = {100, },
```

---

9 Contributed by Harald Harders and Karl Karlsson.

```

6253 <!blg>      K = { ,50},
6254 <blg>        K = {50, },
6255 <m-t|bch|cmr|ebg|pmn|ppl>      L = { ,50},
6256 <blg>        L = { ,150},
6257 <ptm>        L = { ,80},
6258 <ugm>        L = { ,120},
6259 <bch|ebg|pmn|ugm>      0 = {50,50},
6260 <ebg>        \OE = {50, },
6261 <ugm>        \OE = {50,50},
6262 <blg>        P = { ,100},
6263 <ugm>        P = { ,50},
6264 <bch|ebg|pmn>      Q = {50,70},
6265 <ugm>        Q = {50,50},
6266 <bch>        R = { ,50},
6267 <ugm|ebg>      R = { ,70},
6268 <m-t|bch|cmr|pmn|ppl|ptm>      T = {50,50},
6269 <blg>        T = {100,100},
6270 <ebg|ugm>      T = {70,70},
6271 <m-t|bch|cmr|ebg|pmn|ppl|ptm>      V = {50,50},
6272 <blg|ugm>      V = {70,70},
6273 <m-t|bch|cmr|ebg|pmn|ppl|ptm>      W = {50,50},
6274 <ugm>        W = {70,70},
6275 <m-t|bch|cmr|ebg|pmn|ppl|ptm>      X = {50,50},
6276 <ugm>        X = {50,70},
6277 <m-t|bch|cmr|ebg|pmn|ppl>      Y = {50,50},
6278 <blg|ptm|ugm>      Y = {80,80},
6279 <ugm>        Z = {50,50},
6280 <blg>        f = {150,100},
6281 <blg>        i = {150,150},
6282 <blg>        j = {100,100},
6283 <m-t|bch|cmr|ebg|pmn|ppl|ptm>      k = { ,50},
6284 <ugm>        k = { ,70},
6285 <blg>        l = {150,150},
6286 <pmn>        l = { , -50},
6287 <ppl>        p = {50,50},
6288 <ebg|ugm>      p = { ,50},
6289 <ebg|ppl>      q = {50, },
6290 <!blg>        r = { ,50},
6291 <blg>        r = {100, 80},
6292 <cmr|ebg|pmn>      t = { ,70},
6293 <bch>        t = { ,50},
6294 <blg>        t = {150, 80},
6295 <ugm>        t = { ,100},
6296 <m-t|bch|cmr|ebg|pmn|ppl|ptm>      v = {50,50},
6297 <blg>        v = {100,100},
6298 <ugm>        v = {50,70},
6299 <m-t|bch|cmr|ebg|pmn|ppl|ptm>      w = {50,50},
6300 <ugm>        w = {50,70},
6301 <!blg>        x = {50,50},
6302 <blg>        x = {100,100},
6303 <m-t|bch|ebg|pmn>      y = { ,50},
6304 <blg>        y = { 50,100},
6305 <cmr|ppl|ptm>      y = {50,70},
6306 <ugm>        y = { ,70},

6307 <cmr>        0 = { ,50},
6308 <m-t>        1 = {50,50},
6309 <bch|blg|ptm|ugm>      1 = {150,150},
6310 <cmr>        1 = {100,200},
6311 <pmn>        1 = { ,50},
6312 <ppl>        1 = {100,100},
6313 <bch|cmr|ugm>      2 = {50,50},
6314 <blg>        2 = { ,100},
6315 <bch|pmn>      3 = {50, },
6316 <cmr|ugm>      3 = {50,50},
6317 <blg>        3 = {100, },

```



```

6318 <m-t>      4 = {50,50},
6319 <bch>      4 = {100,50},
6320 <blg>      4 = {100, },
6321 <cmr|ugm>  4 = {70,70},
6322 <pmn>      4 = {50, },
6323 <ptm>      4 = {70, },
6324 <cmr>      5 = { ,50},
6325 <bch>      6 = {50, },
6326 <cmr>      6 = { ,50},
6327 <m-t>      7 = {50,50},
6328 <bch|pmn|ugm> 7 = {50,80},
6329 <blg>      7 = {100,100},
6330 <cmr|ptm>  7 = {50,100},
6331 <ppl>      7 = { ,50},
6332 <cmr>      8 = { ,50},
6333 <bch>      9 = {50,50},
6334 <cmr>      9 = { ,50},
6335 <m-t|cmr|pmn|ppl|ptm|ugm> . = { ,700},
6336 <bch|ebg> . = { ,600},
6337 <blg> . = {400,500},
6338 <!blg> {,}= { ,500},
6339 <blg> {,}= {300,400},
6340 <m-t|cmr|pmn|ppl|ptm|ugm> : = { ,500},
6341 <bch|ebg> : = { ,400},
6342 <blg> : = {300,400},
6343 <m-t|bch|ebg|pmn|ptm> ; = { ,300},
6344 <blg> ; = {200,300},
6345 <cmr|ppl> ; = { ,500},
6346 <ugm> ; = { ,400},
6347 <!blg> ! = { ,100},
6348 <blg> ! = {200,200},
6349 <m-t|ebg|pmn|ptm> ? = { ,100},
6350 <bch|cmr|ppl|ugm> ? = { ,200},
6351 <blg> ? = {150,150},
6352 <pmn> " = {300,300},
6353 <m-t|bch|cmr|ebg|pmn|ppl> @ = {50,50},
6354 <ptm> @ = {100,100},
6355 <m-t|bch|blg|cmr|ebg|pmn|ppl|ptm> ~ = {200,250},
6356 <ugm> ~ = {300,350},
6357 <ebg|ppl|ptm> & = {50,100},
6358 <ugm> & = { ,100},
6359 <m-t|cmr|ebg|pmn> \% = {50,50},
6360 <bch> \% = { ,50},
6361 <ppl|ptm> \% = {100,100},
6362 <ugm> \% = {50,100},
6363 <blg> \# = {100,100},
6364 <m-t|ppl|ptm|ugm> * = {200,200},
6365 <bch|pmn> * = {200,300},
6366 <blg> * = {150,200},
6367 <cmr|ebg> * = {300,300},
6368 <m-t|cmr|ebg|ppl|ptm> + = {250,250},
6369 <bch> + = {150,250},
6370 <blg|pmn> + = {150,200},
6371 <ugm> + = {250,300},
6372 <blg|ugm> {=}= {200,200},
6373 <m-t|ebg|pmn|ptm> ( = {100, }, ) = { ,200},
6374 <bch|ugm> ( = {200, }, ) = { ,200},
6375 <cmr|blg> ( = {300, }, ) = { ,300},
6376 <ppl> ( = {100, }, ) = { ,300},
6377 <bch|pmn> [ = {100, }, ] = { ,100},
6378 <blg> [ = {300,100}, ] = { ,300},

6379 <m-t|ebg|pmn|ptm> / = {100,200},
6380 <bch> / = { ,200},
6381 <blg> / = {300,300},
6382 <cmr|ppl> / = {200,300},

```

```

6383 <ugm> / = {100,300},
6384 <m-t|ptm> - = {500,500},
6385 <bch|cmr|ppl> - = {400,500},
6386 <blg> - = {300,400},
6387 <ebg> - = {300,500},
6388 <pmn> - = {200,400},
6389 <ugm> - = {500,600},
6390 <blg> <= {200,100}, >= {100,200},
6391 <blg> _ = {150,250},
6392 <blg> | = {250,250},
6393 <m-t|pmn> \textendash = {200,200}, \textendash = {150,150},
6394 <bch> \textendash = {200,300}, \textendash = {150,250},
6395 <cmr> \textendash = {400,300}, \textendash = {300,200},
6396 <ebg|ppl|ptm> \textendash = {300,300}, \textendash = {200,200},
6397 <ugm> \textendash = {250,300}, \textendash = {250,250},

```

Why settings for left *and* right quotes? Because in some languages they might be used like that (see the csquotes package for examples).

```

6398 <m-t|bch|pmn> \textquoteleft = {300,400}, \textquoteright = {300,400},
6399 <blg> \textquoteleft = {400,600}, \textquoteright = {400,600},
6400 <cmr> \textquoteleft = {500,700}, \textquoteright = {500,600},
6401 <ebg> \textquoteleft = {300,500}, \textquoteright = {400,400},
6402 <ppl> \textquoteleft = {500,700}, \textquoteright = {500,700},
6403 <ptm> \textquoteleft = {500,500}, \textquoteright = {300,500},
6404 <ugm> \textquoteleft = {300,600}, \textquoteright = {300,600},
6405 <m-t|ebg|bch|pmn> \textquotedblleft = {300,300}, \textquotedblright = {300,300}
6406 <blg> \textquotedblright = {300,400}
6407 <cmr> \textquotedblleft = {500,300}, \textquotedblright = {200,600}
6408 <ppl|ptm> \textquotedblleft = {300,400}, \textquotedblright = {300,400}
6409 <ugm> \textquotedblleft = {400,400}, \textquotedblright = {400,400}
6410 }
6411

```

Greek uppercase letters are in OT1 encoding only.

```

6412 <*m-t|cmr|ebg|pmn>
6413 \SetProtrusion
6414 <m-t> [ name = OT1-default,
6415 <cmr> [ name = cmr-OT1,
6416 <ebg> [ name = EBGaramond-OT1,
6417 <pmn> [ name = pmnj-OT1,
6418 <m-t> load = default ]
6419 <cmr> load = cmr-default ]
6420 <ebg> load = EBGaramond-default ]
6421 <pmn> load = pmnj-default ]
6422 <m-t> { encoding = OT1 }
6423 <cmr> { encoding = {OT1,OT4},
6424 <pmn> { encoding = OT1,
6425 <cmr> family = cmr }
6426 <pmn> family = pmnj }
6427 <ebg> { }
6428 {
6429 <m-t|cmr> \AE = {50, },
6430 <pmn> \OE = {50, }
6431 <*cmr|ebg>
6432 "00 = { ,150}, % \Gamma
6433 "01 = {100,100}, % \Delta
6434 "02 = { 50, 50}, % \Theta
6435 "03 = {100,100}, % \Lambda
6436 <ebg> "04 = { 50, 50}, % \Xi
6437 <cmr> "06 = { 50, 50}, % \Sigma
6438 "07 = {100,100}, % \Upsilon
6439 "08 = { 50, 50}, % \Phi
6440 "09 = { 50, 50}, % \Psi
6441 <ebg> "0A = { 50, 50}, % \Omega
6442 <ebg> 138 = { , 50}, % \L

```

Remaining slots can be found in the source file.

```
6443 </cmr|ebg>
6444 }
6445
```

Settings for figure variants.

```
6446 <*ebg>
6447 \SetProtrusion
6448 [ name = EBGaramond-OT1-LF,
6449 load = EBGaramond-OT1 ]
6450 { encoding = OT1,
6451 family = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF} }
6452 {
6453 1 = {50,50},
6454 2 = {50,50},
6455 4 = {50,50},
6456 7 = {50,50},
6457 }
6458
6459 \SetProtrusion
6460 [ name = EBGaramond-OT1-T0sF,
6461 load = EBGaramond-OT1 ]
6462 { encoding = OT1,
6463 family = {EBGaramond-T0sF} }
6464 {
6465 1 = {150,150},
6466 2 = {50,50},
6467 3 = {50,50},
6468 4 = {50,50},
6469 5 = {50,50},
6470 6 = {50,50},
6471 7 = {50,80},
6472 8 = {50,50},
6473 9 = {50,50},
6474 }
6475
6476 </ebg>
6477 </m-t|cmr|ebg|pmn>
```

T1 and LY1 encodings contain some more characters. The default list will be loaded first. For X<sub>Y</sub>TeX (EU1) and LuaTeX (EU2) we simply use the T1 list as default (for now).

```
6478 \SetProtrusion
6479 <m-t> [ name = T1-default,
6480 <bch> [ name = bch-T1,
6481 <blg> [ name = blg-T1,
6482 <cmr> [ name = cmr-T1,
6483 <ebg> [ name = EBGaramond-T1,
6484 <pmn> [ name = pmnj-T1,
6485 <ppl> [ name = ppl-T1,
6486 <ptm> [ name = ptm-T1,
6487 <ugm> [ name = ugm-T1,
6488 <m-t> load = default ]
6489 <bch> load = bch-default ]
6490 <blg> load = blg-default ]
6491 <cmr> load = cmr-default ]
6492 <ebg> load = EBGaramond-default ]
6493 <pmn> load = pmnj-default ]
6494 <ppl> load = ppl-default ]
6495 <ptm> load = ptm-default ]
6496 <ugm> load = ugm-default ]
6497 <m-t> { encoding = {T1,LY1,EU1,EU2,TU} }
6498 <bch|cmr|pmn|ppl> { encoding = {T1,LY1},
6499 <blg|ptm|ugm> { encoding = {T1},
```

```

6500 <ebg> { encoding = {LY1},
6501 <bch> family = bch }
6502 <blg> family = blg }
6503 <cmr> family = cmr }
6504 <ebg> family = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OfF,EBGaramond-TOsF} }
6505 <pmn> family = pmnj }
6506 <ppl> family = {ppl,pplx,pplj} }
6507 <ptm> family = {ptm,ptmx,ptmj} }
6508 <ugm> family = ugm }
6509 {
6510 <m-t|cmr> \AE = {50, },
6511 <bch|pmn> \OE = {50, },
6512 <pmn> \TH = { ,50},
6513 <blg> \v L = { ,250},
6514 <blg> \v d = { ,250},
6515 <blg> \v l = { ,250},
6516 <blg> \v t = { ,250},
6517 <blg> 127 = {300,400},
6518 <blg> 156 = {100, }, % IJ
6519 <blg> 188 = { 80, 80}, % ij
6520 <m-t|bch|ebg|pmn|ppl|ptm> _ = {100,100},
6521 <cmr> _ = {200,200},
6522 <ugm> _ = {100,200},
6523 <m-t|ebg|pmn|ptm> \textbackslash = {100,200},
6524 <bch> \textbackslash = {150,200},
6525 <blg> \textbackslash = {250,300},
6526 <cmr|ppl> \textbackslash = {200,300},
6527 <ugm> \textbackslash = {100,300},
6528 <ugm> \textbar = {200,200},
6529 <blg> \textendash = {300,300}, \textemdash = {150,150},
6530 <blg> \textquotedbl = {300,400}, \textquotedblleft = {300,400},
6531 <cmr> \textquotedbl = {300,300}, \textquotedblleft = {200,600},

```

The EC fonts do something weird: they insert an implicit kern between quote and boundary character. Therefore, we must override the settings from OT1.

```

6532 <m-t|cmr|ebg|ppl|ptm|ugm> \quotesinglbase = {400,400}, \quotedblbase = {400,400},
6533 <blg> \quotesinglbase = {400,400}, \quotedblbase = {300,400},
6534 <bch|pmn> \quotesinglbase = {400,400}, \quotedblbase = {300,300},
6535 <m-t|bch|pmn> \guilsinglleft = {400,300}, \guilsingright = {300,400},
6536 <blg> \guilsinglleft = {300,500}, \guilsingright = {300,500},
6537 <cmr|ebg|ppl|ptm> \guilsinglleft = {400,400}, \guilsingright = {300,500},
6538 <ugm> \guilsinglleft = {400,400}, \guilsingright = {300,600},
6539 <m-t> \guillemotleft = {200,200}, \guillemotright = {200,200},
6540 <cmr> \guillemotleft = {300,200}, \guillemotright = {100,400},
6541 <bch|pmn> \guillemotleft = {200,200}, \guillemotright = {150,300},
6542 <blg|ppl|ptm> \guillemotleft = {300,300}, \guillemotright = {200,400},
6543 <ebg> \guillemotleft = {300,300}, \guillemotright = {200,300},
6544 <ugm> \guillemotleft = {300,400}, \guillemotright = {300,400},
6545 <m-t|bch|cmr|ebg|pmn|ppl|ugm> \textexclamdown = {100, }, \textquestiondown = {100, },
6546 <blg> \textexclamdown = {200, }, \textquestiondown = {100, },
6547 <ptm> \textexclamdown = {200, }, \textquestiondown = {200, },
6548 <m-t|cmr|ebg|ppl|ptm|ugm> \textbraceleft = {400,200}, \textbraceright = {200,400},
6549 <bch|blg|pmn> \textbraceleft = {200, }, \textbraceright = { ,300},
6550 <m-t|bch|cmr|ebg|ppl|ptm|ugm> \textless = {200,100}, \textgreater = {100,200}
6551 <pmn> \textless = {100, }, \textgreater = { ,100},
6552 <pmn> \textvisiblespace = {100,100} % not in LY1
6553 }
6554

```

The lmodern fonts used to restore the original settings from OT1 fonts. Now, they require even other settings, though.

```

6555 (*cmr)
6556 \SetProtrusion
6557 [ name = lmr-T1,

```

```

6558     load      = cmr-T1 ]
6559     { encoding = {T1,LY1},
6560       family   = lmr      }
6561     {
6562       \textquotedblleft = {300,400}, \textquotedblright = {300,400}
6563     }
6564
6565     </cmr>
6566     <*ebg>
6567     \SetProtrusion
6568     [ name      = EBGaramond-T1-LF,
6569       load      = EBGaramond-T1 ]
6570     { encoding = T1,
6571       family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF} }
6572     {
6573       1 = {50,50},
6574       2 = {50,50},
6575       4 = {50,50},
6576       7 = {50,50},
6577     }
6578
6579     \SetProtrusion
6580     [ name      = EBGaramond-T1-T0sF,
6581       load      = EBGaramond-T1 ]
6582     { encoding = T1,
6583       family   = {EBGaramond-T0sF} }
6584     {
6585       1 = {150,150},
6586       2 = {50,50},
6587       3 = {50,50},
6588       4 = {50,50},
6589       5 = {50,50},
6590       6 = {50,50},
6591       7 = {50,80},
6592       8 = {50,50},
6593       9 = {50,50},
6594     }
6595
6596     </ebg>

```

Settings for the T2A encoding (generic, Computer Modern Roman, and Minion).<sup>10</sup>

```

6597     <*m-t|cmr|pmn>
6598     \SetProtrusion
6599     <m-t> [ name      = T2A-default,
6600     <cmr> [ name      = cmr-T2A,
6601     <pmn> [ name      = pmnj-T2A,
6602     <m-t>   load      = default   ]
6603     <cmr>   load      = cmr-default ]
6604     <pmn>   load      = pmnj-default ]
6605     { encoding = T2A,
6606     <m-t>   }
6607     <cmr>   family   = cmr }
6608     <pmn>   family   = pmnj }
6609     {
6610       \CYRA = {50,50},
6611       \CYRG = { ,50},
6612       \CYRK = { ,50},
6613       \CYRT = {50,50},
6614       \CYRH = {50,50},
6615       \CYRU = {50,50},
6616     <pmn>   \CYRS = {50, },
6617     <pmn>   \CYRO = {50,50},
6618       \cyrk = { ,50},
6619       \cyrp = { ,50},

```

---

<sup>10</sup> Contributed by Karl Karlsson.

```

6620 \cyrh = {50,50},
6621 <m-t|pmn> \cyru = {50,50},
6622 <cmr> \cyru = {50,70},
6623 <m-t> _ = {100,100},
6624 <cmr> _ = {200,200},
6625 <m-t> \textbackslash = {100,200}, \quotedblbase = {400,400},
6626 <cmr> \textbackslash = {200,300}, \quotedblbase = {400,400},
6627 <pmn> \textbackslash = {100,200}, \quotedblbase = {300,300},
6628 <cmr> \textquotedbl = {300,300}, \textquotedblleft = {200,600},
6629 <m-t> \guillemotleft = {200,200}, \guillemotright = {200,200},
6630 <cmr> \guillemotleft = {300,200}, \guillemotright = {100,400},
6631 <pmn> \guillemotleft = {200,200}, \guillemotright = {150,300},
6632 <m-t|cmr> \textbraceleft = {400,200}, \textbraceright = {200,400},
6633 <pmn> \textbraceleft = {200, }, \textbraceright = { ,300},
6634 <m-t|cmr> \textless = {200,100}, \textgreater = {100,200}
6635 <pmn> \textless = {100, }, \textgreater = { ,100}
6636 }
6637
6638 </m-t|cmr|pmn>

```

Settings for the QX encoding (generic and Times).<sup>11</sup> It also includes some glyphs otherwise in TS1.

```

6639 <*m-t|ptm>
6640 \SetProtrusion
6641 <m-t> [ name = QX-default,
6642 <ptm> [ name = ptm-QX,
6643 <m-t> load = default ]
6644 <ptm> load = ptm-default ]
6645 <m-t> { encoding = QX }
6646 <ptm> { encoding = QX,
6647 <ptm> family = {ptm,ptmx,ptmj} }
6648 {
6649 \AE = {50, },
6650 <ptm> * = {200,200},
6651 {=} = {100,100},
6652 \textunderscore = {100,100},
6653 \textbackslash = {100,200},
6654 \quotedblbase = {400,400},
6655 <m-t> \guillemotleft = {200,200}, \guillemotright = {200,200},
6656 <ptm> \guillemotleft = {300,300}, \guillemotright = {200,400},
6657 \textexclamdown = {100, }, \textquestiondown = {100, },
6658 <m-t> \textbraceleft = {400,200}, \textbraceright = {200,400},
6659 <ptm> \textbraceleft = {200,200}, \textbraceright = {200,300},
6660 \textless = {200,100}, \textgreater = {100,200},
6661 \textminus = {200,200}, \textdegree = {300,300},
6662 <m-t> \copyright = {100,100}, \textregistered = {100,100}
6663 <ptm> \copyright = {100,150}, \textregistered = {100,150},
6664 <ptm> \textxgeq = { ,100}, \textxleq = {100, },
6665 <ptm> \textalpha = { , 50}, \textDelta = { 70, 70},
6666 <ptm> \textpi = { 50, 80}, \textSigma = { , 70},
6667 <ptm> \textmu = { , 80}, \texteuro = { 50, 50},
6668 <ptm> \textellipsis = {150,200}, \textasciitilde = { 80, 80},
6669 <ptm> \textapprox = { 50, 50}, \textinfty = {100,100},
6670 <ptm> \textdagger = {150,150}, \textdaggerdbl = {100,100},
6671 <ptm> \textdiv = { 50,150}, \textsection = { 80, 80},
6672 <ptm> \texttimes = {100,150}, \textpm = { 50, 80},
6673 <ptm> \textbullet = {150,150}, \textperiodcentered = {300,300},
6674 <ptm> \textquotesingle = {500,500}, \textquotedbl = {300,300},
6675 <ptm> \textperthousand = { ,50}
6676 }
6677
6678 </m-t|ptm>

```

T5 is based on OT1; it shares some but not all extra characters of T1. All accented

<sup>11</sup> Contributed by Maciej Eder.

characters are already taken care of by the inheritance list.

```

6679 <*cmr|bch>
6680 \SetProtrusion
6681 <cmr> [ name      = cmr-T5,
6682 <cmr>   load      = cmr-default ]
6683 <bch> [ name      = bch-T5,
6684 <bch>   load      = bch-default ]
6685 { encoding = T5,
6686 <cmr>   family   = cmr }
6687 <bch>   family   = bch }
6688 {
6689 <bch>   _ = {100,100},
6690 <bch>   \textbackslash = {150,200},
6691 <cmr>   \textbackslash = {200,300},
6692 <cmr>   \textquotedblleft = {200,600},
6693 <cmr>   \textquotedbl = {300,300},
6694 <bch>   \quotesinglbase = {400,400}, \quotedblbase = {300,300},
6695 <cmr>   \quotesinglbase = {400,400}, \quotedblbase = {400,400},
6696 <bch>   \guilsinglleft = {400,300}, \guilsinglright = {300,400},
6697 <cmr>   \guilsinglleft = {400,400}, \guilsinglright = {300,500},
6698 <bch>   \guillemotleft = {200,200}, \guillemotright = {150,300},
6699 <cmr>   \guillemotleft = {300,200}, \guillemotright = {100,400},
6700 <bch>   \textbraceleft = {200, }, \textbraceright = { ,300},
6701 <cmr>   \textbraceleft = {400,200}, \textbraceright = {200,400},
6702   \textless = {200,100}, \textgreater = {100,200}
6703 }
6704
6705 </cmr|bch>

```

Minion with lining numbers.

```

6706 <*pmn>
6707 \SetProtrusion
6708 [ name      = pmnx-OT1,
6709   load      = pmnj-default ]
6710 { encoding = OT1,
6711   family   = pmnx }
6712 {
6713   1 = {230,180}
6714 }
6715
6716 \SetProtrusion
6717 [ name      = pmnx-T1,
6718   load      = pmnj-T1 ]
6719 { encoding = {T1,LY1},
6720   family   = pmnx }
6721 {
6722   1 = {230,180}
6723 }
6724
6725 \SetProtrusion
6726 [ name      = pmnx-T2A,
6727   load      = pmnj-T2A ]
6728 { encoding = {T2A},
6729   family   = pmnx }
6730 {
6731   1 = {230,180}
6732 }
6733
6734 </pmn>

```

Times is the default font for LY1, therefore we provide settings for the additional characters in this encoding, too.

```

6735 <*ptm>
6736 \SetProtrusion
6737 [ name      = ptm-LY1,

```

```

6738     load      = ptm-T1 ]
6739     { encoding = LY1,
6740       family   = {ptm,ptmx,ptmj} }
6741     {
6742         _                = {100,100},
6743         \texttrademark   = {100,100},
6744         \textregistered  = {100,100},
6745         \textcopyright    = {100,100},
6746         \textdegree       = {300,300},
6747         \textminus        = {200,200},
6748         \textellipsis     = {150,200},
6749 %    \texteuro           = { , }, % ?
6750         \textcent         = {100,100},
6751         \textquotesingle  = {500,500},
6752         \textflorin       = { 50, 70},
6753         \textdagger       = {150,150},
6754         \textdaggerdbl    = {100,100},
6755         \textperthousand  = { , 50},
6756         \textbullet       = {150,150},
6757         \textonesuperior  = {100,100},
6758         \texttwosuperior  = { 50, 50},
6759         \textthreesuperior = { 50, 50},
6760         \textperiodcentered = {300,300},
6761         \textplusminus    = { 50, 80},
6762         \textmultiply     = {100,100},
6763         \textdivide       = { 50,150}

```

Remaining slots in the source file.

```

6764     }
6765
6766 </ptm>

```

For the Greek LGR encoding.

```

6767 <*ebg>
6768 \SetProtrusion
6769 [ name = EBGaramond-LGR ]
6770 { }
6771 {
6772     A = {50,50},
6773     D = {100,100},
6774     F = {50,50},
6775     G = { ,150},
6776     K = { ,50},
6777     L = {100,100},
6778     O = {50,50},
6779     U = {100,100},
6780     T = {50,50},
6781     W = { ,50},
6782     Y = {50,50},
6783     . = { ,600},
6784     {,} = { ,500},
6785     : = { ,400},
6786     ; = { ,300},
6787     ! = { ,100},
6788     ? = { ,100},
6789     ~ = {200,250},
6790     \% = {50,50},
6791     * = {300,300},
6792     + = {250,250},
6793     {=} = { 50, 50},
6794     ( = {100, }, ) = { ,200},
6795     / = {100,200},
6796     - = {300,500},
6797     \texteuro = { 50,100},
6798     \textendash = {300,300}, \textemdash = {200,200},

```



```

6799 \textquoteleft = {300,500}, \textquoteright = {400,400},
6800 \guillemotleft = {300,300}, \guillemotright = {200,400},
6801 }
6802
6803 \SetProtrusion
6804 [ name = EBGaramond-LGR-LF,
6805 load = EBGaramond-LGR ]
6806 { encoding = LGR,
6807 family = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF} }
6808 {
6809 1 = {50,50},
6810 2 = {50,50},
6811 4 = {50,50},
6812 7 = {50,50},
6813 }
6814
6815 \SetProtrusion
6816 [ name = EBGaramond-LGR-T0sF,
6817 load = EBGaramond-LGR ]
6818 { encoding = LGR,
6819 family = {EBGaramond-T0sF} }
6820 {
6821 1 = {150,150},
6822 2 = {50,50},
6823 3 = {50,50},
6824 4 = {50,50},
6825 5 = {50,50},
6826 6 = {50,50},
6827 7 = {50,80},
6828 8 = {50,50},
6829 9 = {50,50},
6830 }
6831
6832 </ebg>

```

## 2.8.2 Italics

To find default settings for italic is difficult, since the character shapes and their behaviour at the beginning or end of line may be wildly different for different fonts. In the generic settings we therefore omit the letters, and only set up the punctuation characters.

The italic glyphs of Computer Modern Roman feature a lot of side bearing, therefore almost all of them have to protrude.<sup>12</sup>

```

6833 \SetProtrusion
6834 <m-t> [ name = OT1-it ]
6835 <bch> [ name = bch-it ]
6836 <blg> [ name = blg-it,
6837 load = blg-default ]
6838 <cmr> [ name = cmr-it ]
6839 <ebg> [ name = EBGaramond-it ]
6840 <pmn> [ name = pmn-it ]
6841 <ppl> [ name = ppl-it ]
6842 <ptm> [ name = ptm-it ]
6843 <ugm> [ name = ugm-it ]
6844 <m-t|bch|blg|ugm> { encoding = OT1,
6845 <ppl|ptm> { encoding = {OT1,OT4},
6846 <bch> family = bch,
6847 <blg> family = blg,
6848 <ppl> family = {ppl,pplx,pplj},
6849 <ptm> family = {ptm,ptmx,ptmj},

```

---

<sup>12</sup> Settings contributed by *Hendrik Vogt*.

```

6850 <ugm>      family   = ugm,
6851 <m-t|bch|ppl|ptm>      shape   = {it,sl} }
6852 <blg|ugm>      shape   = it }
6853 <cmr|ebg|pmn>      { }
6854 {
6855 <cmr>      A = {100,100},
6856 <ptm>      A = {100,50},
6857 <ebg|pmn>      A = {50, },
6858 <ugm>      A = { ,150},
6859 <ppl>      A = {50,50},
6860 <ptm>      \AE = {100, },
6861 <ebg|ppl>      \AE = {50, },
6862 <cmr>      B = {83,-40},
6863 <ebg|ppl|ptm>      B = {50, },
6864 <pmn>      B = {20,-50},
6865 <bch|ppl|ptm|ugm>      C = {50, },
6866 <cmr>      C = {165,-75},
6867 <ebg>      C = {100, },
6868 <pmn>      C = {50,-50},
6869 <cmr>      D = {75, -28},
6870 <ebg|ppl|ptm>      D = {50,50},
6871 <pmn>      D = {20, },
6872 <cmr>      E = {80,-55},
6873 <ebg|ppl|ptm>      E = {50, },
6874 <pmn>      E = {20,-50},
6875 <cmr>      F = {85,-80},
6876 <ebg|ptm>      F = {100, },
6877 <pmn>      F = {10, },
6878 <ppl>      F = {50, },
6879 <bch|ppl|ptm|ugm>      G = {50, },
6880 <cmr>      G = {153,-15},
6881 <ebg>      G = {100, },
6882 <pmn>      G = {50,-50},
6883 <cmr>      H = {73,-60},
6884 <ebg|ppl|ptm>      H = {50, },
6885 <cmr>      I = {140,-120},
6886 <ebg|ptm>      I = {50, },
6887 <pmn>      I = {20,-50},
6888 <cmr>      J = {135,-80},
6889 <ebg>      J = {50, },
6890 <pmn>      J = {20, },
6891 <ptm>      J = {100, },
6892 <cmr>      K = {70,-30},
6893 <ebg|ppl|ptm>      K = {50, },
6894 <pmn>      K = {20, },
6895 <cmr>      L = {87, 40},
6896 <ebg|ppl|ptm>      L = {50, },
6897 <pmn>      L = {20,50},
6898 <ugm>      L = { ,100},
6899 <cmr>      M = {67,-45},
6900 <pmn>      M = { , -30},
6901 <ptm>      M = {50, },
6902 <cmr>      N = {75,-55},
6903 <pmn>      N = { , -30},
6904 <ptm>      N = {50, },
6905 <bch|pmn|ppl|ptm>      O = {50, },
6906 <cmr>      O = {150,-30},
6907 <ebg>      O = {100, },
6908 <ugm>      O = {70,50},
6909 <ppl|ptm>      \OE = {50, },
6910 <ebg>      \OE = {100, },
6911 <cmr>      P = {82,-50},
6912 <ebg|ppl|ptm>      P = {50, },
6913 <pmn>      P = {20,-50},
6914 <bch|pmn|ppl|ptm>      Q = {50, },

```

```

6915 <cmr>      Q = {150,-30},
6916 <ebg>      Q = {100, },
6917 <ugm>      Q = {70,50},
6918 <cmr>      R = {75, 15},
6919 <ebg|ppl|ptm> R = {50, },
6920 <pmn>      R = {20, },
6921 <bch|ebg|ppl|ptm> S = {50, },
6922 <cmr>      S = {90,-65},
6923 <pmn>      S = {20,-30},
6924 <bch|ebg|ppl|ptm> $ = {50, },
6925 <cmr>      $ = {100,-20},
6926 <pmn>      $ = {20,-30},
6927 <bch|pmn|ugm> T = {70, },
6928 <cmr>      T = {220,-85},
6929 <ebg|ppl|ptm> T = {100, },
6930 <cmr>      U = {230,-55},
6931 <ebg|ppl|ptm> U = {50, },
6932 <pmn>      U = {50,-50},
6933 <cmr>      V = {260,-60},
6934 <ebg|pmn|ugm> V = {100, },
6935 <ppl|ptm>   V = {100,50},
6936 <cmr>      W = {185,-55},
6937 <ebg|pmn|ugm> W = {100, },
6938 <ppl>      W = {50, },
6939 <ptm>      W = {100,50},
6940 <cmr>      X = {70,-30},
6941 <ppl|ptm>   X = {50, },
6942 <cmr>      Y = {250,-60},
6943 <pmn>      Y = {50, },
6944 <ppl>      Y = {100,50},
6945 <ptm>      Y = {100, },
6946 <cmr>      Z = {90,-60},
6947 <pmn>      Z = { , -50},
6948 <cmr>      a = {150,-10},
6949 <cmr>      b = {170, },
6950 <cmr>      c = {173,-10},
6951 <cmr>      d = {150,-55},
6952 <pmn>      d = { , -50},
6953 <cmr>      e = {180, },
6954 <cmr>      f = { , -250},
6955 <ebg|pmn>   f = { , -100},
6956 <cmr>      g = {150,-10},
6957 <cmr>      h = {100, },
6958 <cmr>      i = {210, },
6959 <pmn>      i = { , -30},
6960 <cmr>      j = { , -40},
6961 <pmn>      j = { , -30},
6962 <cmr>      k = {110,-50},
6963 <cmr>      l = {240,-110},
6964 <pmn>      l = { , -100},
6965 <cmr>      m = {80, },
6966 <cmr>      n = {115, },
6967 <bch>      o = {50,50},
6968 <cmr>      o = {155, },
6969 <bch>      p = { , 50},
6970 <pmn>      p = {-50, },
6971 <bch>      q = {50, },
6972 <cmr>      q = {170,-40},
6973 <cmr>      r = {155,-40},
6974 <pmn>      r = { , 50},
6975 <cmr>      s = {130, },
6976 <bch>      t = { , 50},
6977 <cmr>      t = {230,-10},
6978 <cmr>      u = {120, },
6979 <cmr>      v = {140,-25},

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6980 <pmn|ugm>      v = {50, },
6981 <bch>           w = { ,50},
6982 <cmr>           w = {98,-20},
6983 <pmn|ugm>      w = {50, },
6984 <cmr>           x = {65,-40},
6985 <bch>           y = { ,50},
6986 <cmr>           y = {130,-20},
6987 <cmr>           z = {110,-80},
6988 <cmr>           0 = {170,-85},
6989 <bch|ptm>       1 = {150,100},
6990 <cmr>           1 = {230,110},
6991 <ebg>           1 = {150, },
6992 <pmn>           1 = {50, },
6993 <ppl>           1 = {100, },
6994 <ugm>           1 = {150,150},
6995 <cmr>           2 = {130,-70},
6996 <ebg|ppl|ptm>  2 = {50, },
6997 <pmn>           2 = {-50, },
6998 <bch>           3 = {50, },
6999 <cmr>           3 = {140,-70},
7000 <pmn>           3 = {-100, },
7001 <ptm>           3 = {100,50},
7002 <bch>           4 = {100, },
7003 <cmr>           4 = {130,80},
7004 <ebg>           4 = {150, },
7005 <ppl|ptm>       4 = {50, },
7006 <cmr>           5 = {160, },
7007 <ptm>           5 = {50, },
7008 <bch>           6 = {50, },
7009 <cmr>           6 = {175,-30},
7010 <bch|ebg|ptm>   7 = {100, },
7011 <cmr>           7 = {250,-150},
7012 <pmn>           7 = {20, },
7013 <ppl>           7 = {50, },
7014 <cmr>           8 = {130,-40},
7015 <cmr>           9 = {155,-80},
7016 <m-t|cmr|ebg|pmn|ppl> . = { ,500},
7017 <blg>           . = {400,600},
7018 <bch|ptm|ugm>   . = { ,700},
7019 <blg>           {,}= {300,500},
7020 <m-t|ebg|pmn|ppl> {,}= { ,500},
7021 <cmr>           {,}= { ,450},
7022 <bch|ugm>       {,}= { ,600},
7023 <ptm>           {,}= { ,700},
7024 <m-t|cmr|ebg|ppl> : = { ,300},
7025 <bch|ugm>       : = { ,400},
7026 <pmn>           : = { ,200},
7027 <ptm>           : = { ,500},
7028 <m-t|cmr|ebg|ppl> ; = { ,300},
7029 <bch|ugm>       ; = { ,400},
7030 <pmn>           ; = { ,200},
7031 <ptm>           ; = { ,500},
7032 <ptm>           ! = { ,100},
7033 <bch>           ? = { ,200},
7034 <ptm>           ? = { ,100},
7035 <ppl>           ? = { ,300},
7036 <pmn>           " = {400,200},
7037 <m-t|ebg|pmn|ppl|ptm> & = {50,50},
7038 <bch>           & = { ,80},
7039 <cmr>           & = {130,30},
7040 <ugm>           & = {50,100},
7041 <m-t|ebg|pmn>   \% = {100, },
7042 <cmr>           \% = {180,50},
7043 <bch>           \% = {50,50},
7044 <ppl|ptm>       \% = {100,100},

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7045 <ugm> \% = {100,50},
7046 <m-t|pmn|ppl> * = {200,200},
7047 <bch> * = {300,200},
7048 <cmr> * = {380,20},
7049 <ebg> * = {500,100},
7050 <ptm|ugm> * = {400,200},
7051 <m-t|pmn|ppl> + = {150,200},
7052 <cmr> + = {180,200},
7053 <bch|ugm> + = {250,250},
7054 <ebg|ptm> + = {250,200},
7055 <m-t|ebg|pmn|ppl> @ = {50,50},
7056 <bch> @ = {80,50},
7057 <cmr> @ = {180,10},
7058 <ptm> @ = {150,150},
7059 <m-t|bch|ugm> ~ = {150,150},
7060 <cmr|ebg|pmn|ppl|ptm> ~ = {200,150},
7061 <ugm> {=} = {200,200},
7062 <m-t|bch|ebg|pmn|ppl|ptm|ugm> ( = {200, }, ) = { ,200},
7063 <cmr> ( = {300, }, ) = { ,70},
7064 <m-t|ebg|ppl|ptm|ugm> / = {100,200},
7065 <cmr> / = {100,100},
7066 <bch> / = { ,150},
7067 <pmn> / = {100,150},
7068 <m-t> - = {300,300},
7069 <bch|ebg> - = {300,400},
7070 <pmn> - = {200,300},
7071 <cmr> - = {500,300},
7072 <ppl> - = {300,500},
7073 <ptm> - = {500,500},
7074 <ugm> - = {400,700},
7075 <blg> - = {0,300},
7076 <m-t|pmn> \textendash = {200,200}, \textendash = {150,150},
7077 <bch> \textendash = {200,300}, \textendash = {150,200},
7078 <cmr> \textendash = {500,300}, \textendash = {400,170},
7079 <ebg|ppl|ptm|ugm> \textendash = {300,300}, \textendash = {200,200},
7080 <m-t|bch|pmn|ugm> \textquoteleft = {400,200}, \textquoteright = {400,200},
7081 <blg> \textquoteleft = {400,400}, \textquoteright = {400,400},
7082 <cmr> \textquoteleft = {800,200}, \textquoteright = {800,-20},
7083 <ebg> \textquoteleft = {800,200}, \textquoteright = {800,200},
7084 <ppl> \textquoteleft = {700,400}, \textquoteright = {700,400},
7085 <ptm> \textquoteleft = {800,500}, \textquoteright = {800,500},
7086 <m-t|bch|pmn> \textquotedblleft = {400,200}, \textquotedblright = {400,200}
7087 <blg> \textquotedblright = {300,300}
7088 <cmr> \textquotedblleft = {540,100}, \textquotedblright = {500,100}
7089 <ebg> \textquotedblleft = {700,200}, \textquotedblright = {700,200}
7090 <ppl> \textquotedblleft = {500,300}, \textquotedblright = {500,300}
7091 <ptm> \textquotedblleft = {700,400}, \textquotedblright = {700,400}
7092 <ugm> \textquotedblleft = {600,200}, \textquotedblright = {600,200}
7093 }
7094
7095 <*cmr|ebg|pmn>
7096 \SetProtrusion
7097 <cmr> [ name = cmr-it-OT1,
7098 <ebg> [ name = EBGaramond-it-OT1,
7099 <pmn> [ name = pmnj-it-OT1,
7100 <cmr> [ load = cmr-it ]
7101 <ebg> [ load = EBGaramond-it ]
7102 <pmn> [ load = pmnj-it ]
7103 <cmr> { encoding = {OT1,OT4},
7104 <pmn> { encoding = OT1,
7105 <cmr> family = cmr,
7106 <pmn> family = pmnj,
7107 <cmr> shape = it }
7108 <pmn> shape = {it,sl} }
7109 <ebg> { }

```

```

7110 {
7111 <cmr> \AE = {100, },
7112 <pmn> \AE = { , -50},
7113 <cmr> \OE = {100, },
7114 <pmn> \OE = {50, }
7115 <*cmr|ebg>
7116 <cmr> "00 = {200,150}, % \Gamma
7117 <ebg> "00 = { ,150}, % \Gamma
7118 <cmr> "01 = {150,100}, % \Delta
7119 <ebg> "01 = {100,100}, % \Delta
7120 <cmr> "02 = {150, 50}, % \Theta
7121 <ebg> "02 = { 50, 50}, % \Theta
7122 <cmr> "03 = {150, 50}, % \Lambda
7123 <ebg> "03 = {100,100}, % \Lambda
7124 <cmr> "04 = {100,100}, % \Xi
7125 <ebg> "04 = { 50, 50}, % \Xi
7126 <cmr> "05 = {100,100}, % \Pi
7127 <cmr> "06 = {100, 50}, % \Sigma
7128 <cmr> "07 = {200,150}, % \Upsilon
7129 <ebg> "07 = {100,100}, % \Upsilon
7130 <cmr> "08 = {150, 50}, % \Phi
7131 <ebg> "08 = { 50, 50}, % \Phi
7132 <cmr> "09 = {150,100}, % \Psi
7133 <ebg> "09 = { 50, 50}, % \Psi
7134 "0A = { 50, 50}, % \Omega
7135 <ebg> 138 = { , 50}, % \L
7136 </cmr|ebg>
7137 }
7138
7139 </cmr|ebg|pmn>
7140 <*ebg>
7141 \SetProtrusion
7142 [ name = EBGaramond-it-OT1-LF,
7143 load = EBGaramond-it-OT1 ]
7144 { encoding = OT1,
7145 family = {EBGaramond-LF,EBGaramond-TLF},
7146 shape = it }
7147 {
7148 1 = {50,50},
7149 2 = {50,50},
7150 3 = {80,50},
7151 4 = {50,50},
7152 5 = {50,50},
7153 6 = {50,50},
7154 7 = {50,50},
7155 8 = {50,50},
7156 9 = {50, },
7157 }
7158
7159 \SetProtrusion
7160 [ name = EBGaramond-it-OT1-OfF,
7161 load = EBGaramond-it-OT1 ]
7162 { encoding = OT1,
7163 family = {EBGaramond-OfF},
7164 shape = it }
7165 {
7166 1 = {50,50},
7167 2 = {50,50},
7168 3 = { ,80},
7169 4 = {50,50},
7170 7 = {50,50},
7171 }
7172
7173 \SetProtrusion
7174 [ name = EBGaramond-it-OT1-TOfF,

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7175     load      = EBGaramond-it-OT1 ]
7176     { encoding = OT1,
7177       family   = {EBGaramond-T0sF},
7178       shape    = it }
7179     {
7180       0 = {150,150},
7181       1 = {150,150},
7182       2 = {80,80},
7183       3 = {50,80},
7184       4 = {50,80},
7185       5 = {50,80},
7186       6 = {50,50},
7187       7 = {50,100},
7188       8 = {50,50},
7189       9 = {50,80},
7190     }
7191
7192 </ebg>
7193 \SetProtrusion
7194 <m-t> [ name      = T1-it-default,
7195 <bch> [ name      = bch-it-T1,
7196 <blg> [ name      = blg-it-T1,
7197 <cmr> [ name      = cmr-it-T1,
7198 <ebg> [ name      = EBGaramond-it-T1,
7199 <pmn> [ name      = pmnj-it-T1,
7200 <ppl> [ name      = ppl-it-T1,
7201 <ptm> [ name      = ptm-it-T1,
7202 <ugm> [ name      = ugm-it-T1,
7203 <m-t> load      = OT1-it ]
7204 <bch> load      = bch-it ]
7205 <blg> load      = blg-T1 ]
7206 <cmr> load      = cmr-it ]
7207 <pmn> load      = pmnj-it ]
7208 <ebg> load      = EBGaramond-it ]
7209 <ppl> load      = ppl-it ]
7210 <ptm> load      = ptm-it ]
7211 <ugm> load      = ugm-it ]
7212 <m-t|bch|cmr|pmn|ppl> { encoding = {T1,LY1},
7213 <ebg> { encoding = {LY1},
7214 <blg|ptm|ugm> { encoding = T1,
7215 <bch> family    = bch,
7216 <blg> family    = blg,
7217 <cmr> family    = cmr,
7218 <pmn> family    = pmnj,
7219 <ebg> family    = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-0sF,EBGaramond-T0sF},
7220 <ppl> family    = {ppl,pplx,pplj},
7221 <ptm> family    = {ptm,ptmx,ptmj},
7222 <ugm> family    = ugm,
7223 <m-t|bch|pmn|ppl|ptm> shape    = {it,sl} }
7224 <blg|cmr|ebg|ugm> shape    = it }
7225 {
7226 <m-t|bch|pmn> _ = { ,100},
7227 <blg> _ = {0,300},
7228 <cmr|ugm> _ = {100,200},
7229 <ebg|ppl|ptm> _ = {100,100},
7230 <blg> . = {400,600},
7231 <blg> {,}= {300,500},
7232 <cmr> \AE = {100, },
7233 <pmn> \AE = { , -50},
7234 <bch|pmn> \OE = { 50, },
7235 <cmr> \OE = {100, },
7236 <pmn> 031 = { , -100}, % ffi
7237 <cmr|ptm> 156 = {100, }, % IJ
7238 <ebg> 156 = {50, }, % IJ
7239 <pmn> 156 = {20, }, % IJ

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7240 <pmn> 188 = { , -30}, % ij
7241 <pmn> \v t = { , 100},
7242 <m-t|ebg|ppl|ptm> \textbackslash = {100,200},
7243 <cmr|ugm> \textbackslash = {300,300},
7244 <bch> \textbackslash = {150,150},
7245 <pmn> \textbackslash = {100,150},
7246 <ugm> \textbar = {200,200},
7247 <cmr> \textquotedblleft = {500,300},
7248 <blg> \textquoteleft = {400,400}, \textquoteright = {400,400},
7249 <blg> \textquotedbl = {300,300}, \textquotedblleft = {300,300},
7250 <blg> \textquotedblright = {300,300}, \quotedblbase = {200,600},
7251 <m-t|ptm> \quotesinglbase = {300,700}, \quotedblbase = {400,500},
7252 <cmr> \quotesinglbase = {300,700}, \quotedblbase = {200,600},
7253 <bch|pmn> \quotesinglbase = {200,500}, \quotedblbase = {150,500},
7254 <ebg|ppl> \quotesinglbase = {500,500}, \quotedblbase = {400,400},
7255 <ugm> \quotesinglbase = {300,700}, \quotedblbase = {300,500},
7256 <m-t|ppl|ptm> \guilsinglleft = {400,400}, \guilsinglright = {300,500},
7257 <bch|pmn> \guilsinglleft = {300,400}, \guilsinglright = {200,500},
7258 <cmr> \guilsinglleft = {500,300}, \guilsinglright = {400,400},
7259 <ebg> \guilsinglleft = {500,400}, \guilsinglright = {300,500},
7260 <ugm> \guilsinglleft = {400,400}, \guilsinglright = {300,600},
7261 <m-t|ppl> \guillemotleft = {300,300}, \guillemotright = {300,300},
7262 <bch|pmn> \guillemotleft = {200,300}, \guillemotright = {150,400},
7263 <cmr> \guillemotleft = {400,100}, \guillemotright = {200,300},
7264 <ebg> \guillemotleft = {300,300}, \guillemotright = {200,400},
7265 <ptm> \guillemotleft = {300,400}, \guillemotright = {200,400},
7266 <ugm> \guillemotleft = {300,400}, \guillemotright = {300,400},
7267 <m-t|ebg|ppl|ugm> \textexclamdown = {100, }, \textquestiondown = {200, },
7268 <cmr|ptm> \textexclamdown = {200, }, \textquestiondown = {200, },
7269 <pmn> \textexclamdown = {-50, }, \textquestiondown = {-50, },
7270 <m-t|ppl|ugm> \textbraceleft = {200,100}, \textbraceright = {200,200},
7271 <bch|pmn> \textbraceleft = {200, }, \textbraceright = { ,200},
7272 <cmr|ebg|ptm> \textbraceleft = {400,100}, \textbraceright = {200,200},
7273 <bch|pmn> \textless = {100, }, \textgreater = { ,100},
7274 <cmr|ebg|ppl|ptm> \textless = {300,100}, \textgreater = {200,100}
7275 <pmn> \textvisiblespace = {100,100}
7276 }
7277
7278 <*ebg>
7279 \SetProtrusion
7280 [ name = EBGaramond-it-T1-LF,
7281 load = EBGaramond-it-T1 ]
7282 { encoding = T1,
7283 family = {EBGaramond-LF,EBGaramond-TLF},
7284 shape = it }
7285 {
7286 1 = {50,50},
7287 2 = {50,50},
7288 3 = {80,50},
7289 4 = {50,50},
7290 5 = {50,50},
7291 6 = {50,50},
7292 7 = {50,50},
7293 8 = {50,50},
7294 9 = {50, },
7295 }
7296
7297 \SetProtrusion
7298 [ name = EBGaramond-it-T1-OsF,
7299 load = EBGaramond-it-T1 ]
7300 { encoding = T1,
7301 family = {EBGaramond-OsF},
7302 shape = it }
7303 {
7304 1 = {50,50},

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7305     2 = {50,50},
7306     3 = { ,80},
7307     4 = {50,50},
7308     7 = {50,50},
7309 }
7310
7311 \SetProtrusion
7312 [ name      = EBGaramond-it-T1-T0sF,
7313   load      = EBGaramond-it-T1 ]
7314 { encoding = T1,
7315   family   = {EBGaramond-T0sF},
7316   shape     = it }
7317 {
7318   0 = {150,150},
7319   1 = {150,150},
7320   2 = {80,80},
7321   3 = {50,80},
7322   4 = {50,80},
7323   5 = {50,80},
7324   6 = {50,50},
7325   7 = {50,100},
7326   8 = {50,50},
7327   9 = {50,80},
7328 }
7329
7330 (/ebg)
7331 <*m-t|cmr|pmn>
7332 \SetProtrusion
7333 <m-t> [ name      = T2A-it-default,
7334 <cmr> [ name      = cmr-it-T2A,
7335 <pmn> [ name      = pmnj-it-T2A,
7336 <m-t>   load      = OT1-it   ]
7337 <cmr>   load      = cmr-it   ]
7338 <pmn>   load      = pmnj-it  ]
7339 { encoding = T2A,
7340 <cmr>   family   = cmr,
7341 <pmn>   family   = pmnj,
7342 <m-t|pmn> shape   = {it,sl} }
7343 <cmr>   shape    = it      }
7344 {
7345 <cmr>   \CYRA = {100,50},
7346 <pmn>   \CYRA = {50, },
7347 <cmr>   \CYRB = {50, },
7348 <cmr>   \CYRV = {50, },
7349 <pmn>   \CYRV = {20,-50},
7350 <cmr>   \CYRG = {100, },
7351 <pmn>   \CYRG = {10, },
7352 <cmr>   \CYRD = {50, },
7353 <cmr>   \CYRE = {50, },
7354 <pmn>   \CYRE = {20,-50},
7355 <cmr>   \CYRZH = {50, },
7356 <cmr>   \CYRZ = {50, },
7357 <pmn>   \CYRZ = {20,-50},
7358 <cmr>   \CYRI = {50, },
7359 <pmn>   \CYRI = { , -30},
7360 <cmr>   \CYRISHRT = {50, },
7361 <cmr>   \CYRK = {50, },
7362 <pmn>   \CYRK = {20, },
7363 <cmr>   \CYRL = {50, },
7364 <cmr>   \CYRM = {50, },
7365 <pmn>   \CYRM = { , -30},
7366 <cmr>   \CYRN = {50, },
7367 <cmr>   \CYRO = {100, },
7368 <pmn>   \CYRO = {50, },
7369 <cmr>   \CYRP = {50, },

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7370 <cmr> \CYRR = {50, },
7371 <pmn> \CYRR = {20,-50},
7372 <cmr> \CYRS = {100, },
7373 <pmn> \CYRS = {50, },
7374 <cmr> \CYRT = {100, },
7375 <pmn> \CYRT = {70, },
7376 <cmr> \CYRU = {100, },
7377 <pmn> \CYRU = {50, },
7378 <cmr> \CYRF = {100, },
7379 <cmr> \CYRH = {50, },
7380 <cmr> \CYRC = {50, },
7381 <cmr> \CYRCH = {100, },
7382 <cmr> \CYRSH = {50, },
7383 <cmr> \CYRSHCH = {50, },
7384 <cmr> \CYRHRDSN = {100, },
7385 <cmr> \CYRERY = {50, },
7386 <cmr> \CYRSFTSN = {50, },
7387 <cmr> \CYREREV = {50, },
7388 <cmr> \CYRYU = {50, },
7389 <cmr> \CYRYA = {50, },
7390 <pmn> \CYRYA = { ,20},
7391 <pmn> \cyrr = {-50, },
7392 <m-t|pmn> _ = { ,100},
7393 <cmr> _ = {100,200},
7394 <pmn> 031 = { , -100}, % ff1
7395 <pmn> \v t = { ,100},
7396 <m-t> \textbackslash = {100,200}, \quotedblbase = {400,500},
7397 <cmr> \textbackslash = {300,300}, \quotedblbase = {200,600},
7398 <pmn> \textbackslash = {100,150}, \quotedblbase = {150,500},
7399 <m-t> \guillemotleft = {300,300}, \guillemotright = {300,300},
7400 <cmr> \guillemotleft = {400,100}, \guillemotright = {200,300},
7401 <pmn> \guillemotleft = {200,300}, \guillemotright = {150,400},
7402 <m-t> \textbraceleft = {200,100}, \textbraceright = {200,200},
7403 <cmr> \textbraceleft = {400,100}, \textbraceright = {200,200},
7404 <pmn> \textbraceleft = {200, }, \textbraceright = { ,200},
7405 <cmr> \textquotedblleft = {500,300},
7406 <cmr> \textless = {300,100}, \textgreater = {200,100}
7407 <pmn> \textless = {100, }, \textgreater = { ,100}
7408 }
7409
7410 </m-t|cmr|pmn>
7411 <*m-t|ptm>
7412 \SetProtrusion
7413 <m-t> [ name = QX-it-default,
7414 <ptm> [ name = ptm-it-QX,
7415 <m-t> load = OT1-it ]
7416 <ptm> load = ptm-it ]
7417 { encoding = {QX},
7418 <ptm> family = {ptm,ptmx,ptmj},
7419 shape = {it,sl} }
7420 {
7421 <ptm> 009 = { , 50}, % fk
7422 {=} = {100,100},
7423 <m-t> \textunderscore = {100,100},
7424 <ptm> \textunderscore = {100,150},
7425 \textbackslash = {100,200},
7426 \quotedblbase = {300,400},
7427 <m-t> \guillemotleft = {300,300}, \guillemotright = {300,300},
7428 <ptm> \guillemotleft = {200,400}, \guillemotright = {200,400},
7429 \textexclamdown = {200, }, \textquestiondown = {200, },
7430 \textbraceleft = {200,100}, \textbraceright = {200,200},
7431 \textless = {100,100}, \textgreater = {100,100},
7432 \textminus = {200,200}, \textdegree = {300,150},
7433 <m-t> \copyright = {100,100}, \textregistered = {100,100}
7434 <ptm> \textregistered = {100,150}, \copyright = {100,150},

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7435 <ptm> \textDelta = { 70, }, \textdelta = { , 50},
7436 <ptm> \textpi = { 50, 80}, \textmu = { , 80},
7437 <ptm> \texteuro = {200, }, \textellipsis = {100,200},
7438 <ptm> \textquoteleft = {500,400}, \textquoteright = {500,400},
7439 <ptm> \textquotedblleft = {500,300}, \textquotedblright = {400,400},
7440 <ptm> \textapprox = { 50, 50}, \textinfty = {100,100},
7441 <ptm> \textdagger = {150,150}, \textdaggerdbl = {100,100},
7442 <ptm> \textdiv = {150,150}, \textasciitilde = { 80, 80},
7443 <ptm> \texttimes = {100,150}, \textpm = { 50, 80},
7444 <ptm> \textbullet = {300,100}, \textperiodcentered = {300,300},
7445 <ptm> \textquotesingle = {500,500}, \textquotedbl = {300,300},
7446 <ptm> \textperthousand = { ,50}
7447 }
7448
7449 </m-t|ptm>
7450 <*cmr|bch>
7451 \SetProtrusion
7452 <cmr> [ name = cmr-it-T5,
7453 <cmr> load = cmr-it ]
7454 <bch> [ name = bch-it-T5,
7455 <bch> load = bch-it ]
7456 { encoding = T5,
7457 <bch> family = bch,
7458 <cmr> family = cmr,
7459 shape = it }
7460 {
7461 <bch> _ = { ,100},
7462 <cmr> _ = {100,200},
7463 <bch> \textbackslash = {150,150},
7464 <cmr> \textbackslash = {300,300},
7465 <bch> \quotesinglbase = {200,500}, \quotedblbase = {150,500},
7466 <cmr> \quotesinglbase = {300,700}, \quotedblbase = {200,600},
7467 <bch> \guilsinglleft = {300,400}, \guilsinglright = {200,500},
7468 <cmr> \guilsinglleft = {500,300}, \guilsinglright = {400,400},
7469 <bch> \guillemotleft = {200,300}, \guillemotright = {150,400},
7470 <cmr> \guillemotleft = {400,100}, \guillemotright = {200,300},
7471 <bch> \textbraceleft = {200, }, \textbraceright = { ,200},
7472 <cmr> \textbraceleft = {400,100}, \textbraceright = {200,200},
7473 <bch> \textless = {100, }, \textgreater = { ,100}
7474 <cmr> \textless = {300,100}, \textgreater = {200,100}
7475 }
7476
7477 </cmr|bch>

```

Slanted is very similar to italic.

```

7478 <*cmr>
7479 \SetProtrusion
7480 [ name = cmr-sl,
7481 load = cmr-it-OT1 ]
7482 { encoding = {OT1,OT4},
7483 family = cmr,
7484 shape = sl }
7485 {
7486 L = { ,50},
7487 f = { , -50},
7488 - = {300, },
7489 \textendash = {400, }, \textemdash = {300, }
7490 }
7491
7492 \SetProtrusion
7493 [ name = cmr-sl-T1,
7494 load = cmr-it-T1 ]
7495 { encoding = {T1,LY1},
7496 family = cmr,
7497 shape = sl }

```

```

7498 {
7499   L = { ,50},
7500   f = { ,-50},
7501   - = {300, },
7502   \textendash = {400, }, \textemdash = {300, }
7503 }
7504
7505 \SetProtrusion
7506 [ name = cmr-sl-T2A,
7507   load = cmr-it-T2A ]
7508 { encoding = T2A,
7509   family = cmr,
7510   shape = sl }
7511 {
7512   L = { ,50},
7513   f = { ,-50},
7514   - = {300, },
7515   \textendash = {400, }, \textemdash = {300, }
7516 }
7517
7518 \SetProtrusion
7519 [ name = cmr-sl-T5,
7520   load = cmr-it-T5 ]
7521 { encoding = T5,
7522   family = cmr,
7523   shape = sl }
7524 {
7525   L = { ,50},
7526   f = { ,-50},
7527   - = {300, },
7528   \textendash = {400, }, \textemdash = {300, }
7529 }
7530
7531 \SetProtrusion
7532 [ name = lmr-it-T1,
7533   load = cmr-it-T1 ]
7534 { encoding = {T1,LY1},
7535   family = lmr,
7536   shape = {it,sl} }
7537 {
7538   \textquotedblleft = { ,200}, \textquotedblright = { ,200},
7539   \quotesinglbase = { ,400}, \quotedblbase = { ,500}
7540 }
7541

```

Oldstyle numerals are slightly different.

```

7542 \SetProtrusion
7543 [ name = cmr(oldstyle)-it,
7544   load = cmr-it-T1 ]
7545 { encoding = T1,
7546   family = {hfor,cmor},
7547   shape = {it,sl} }
7548 {
7549   1 = {250, 50},
7550   2 = {150,-100},
7551   3 = {100,-50},
7552   4 = {150,150},
7553   6 = {200, },
7554   7 = {200, 50},
7555   8 = {150,-50},
7556   9 = {100, 50}
7557 }
7558
7559 </cmr>
7560 <*pmn>

```

```

7561 \SetProtrusion
7562 [ name = pmnx-it,
7563   load = pmnj-it ]
7564 { encoding = OT1,
7565   family = pmnx,
7566   shape = {it,s1} }
7567 {
7568   1 = {100,150}
7569 }
7570
7571 \SetProtrusion
7572 [ name = pmnx-it-T1,
7573   load = pmnj-it-T1 ]
7574 { encoding = {T1,LY1},
7575   family = pmnx,
7576   shape = {it,s1} }
7577 {
7578   1 = {100,150}
7579 }
7580
7581 \SetProtrusion
7582 [ name = pmnx-it-T2A,
7583   load = pmnj-it-T2A ]
7584 { encoding = {T2A},
7585   family = pmnx,
7586   shape = {it,s1} }
7587 {
7588   1 = {100,150}
7589 }
7590
7591 /pmn
7592 *ptm
7593 \SetProtrusion
7594 [ name = ptm-it-LY1,
7595   load = ptm-it-T1 ]
7596 { encoding = {LY1},
7597   family = {ptm,ptmx,ptmj},
7598   shape = {it,s1} }
7599 {
7600   - = {100,100},
7601   \texttrademark = {100,100},
7602   \textregistered = {100,100},
7603   \textcopyright = {100,100},
7604   \textdegree = {300,100},
7605   \textminus = {200,200},
7606   \textellipsis = {100,200},
7607   \% \texteuro = { , }, % ?
7608   \textcent = {100,100},
7609   \textquotesingle = {500, },
7610   \textflorin = {100, 70},
7611   \textdagger = {150,150},
7612   \textdaggerdbl = {100,100},
7613   \textbullet = {150,150},
7614   \textonesuperior = {150,100},
7615   \texttwosuperior = {150, 50},
7616   \textthreesuperior = {150, 50},
7617   \textparagraph = {100, },
7618   \textperiodcentered = {500,300},
7619   \textonequarter = { 50, },
7620   \textonehalf = { 50, },
7621   \textplusminus = {100,100},
7622   \textmultiply = {150,150},
7623   \textdivide = {150,150}
7624 }
7625

```

7626 *</ptm>*

### 2.8.3 Small caps

Small caps should inherit the values from their big brothers. Since values are relative to character width, we don't need to adjust them any further (but we have to reset some characters).

```

7627 <*(blg|ugm)>
7628 \SetProtrusion
7629 <m-t> [ name = OT1-sc,
7630 <bch> [ name = bch-sc,
7631 <cmr> [ name = cmr-sc-OT1,
7632 <ebg> [ name = EBGaramond-sc-OT1-Prop,
7633 <pmn> [ name = pmnj-sc,
7634 <ppl> [ name = ppl-sc,
7635 <ptm> [ name = ptm-sc,
7636 <m-t> load = default ]
7637 <bch> load = bch-default ]
7638 <cmr> load = cmr-OT1 ]
7639 <ebg> load = EBGaramond-OT1-LF ]
7640 <pmn> load = pmnj-default ]
7641 <ppl> load = ppl-default ]
7642 <ptm> load = ptm-default ]
7643 <m-t|bch|ebg|pmn> { encoding = OT1,
7644 <cmr|ppl|ptm> { encoding = {OT1,OT4},
7645 <bch> family = bch,
7646 <cmr> family = cmr,
7647 <ebg> family = {EBGaramond-LF,EBGaramond-OfF},
7648 <pmn> family = pmnj,
7649 <ppl> family = {ppl,pplx,pplj},
7650 <ptm> family = {ptm,ptmx,ptmj},
7651 shape = sc }
7652 {
7653 a = {50,50},
7654 <cmr|ebg|ppl|ptm> \ae = {50, },
7655 <bch|pmn> c = {50, },
7656 <bch|ebg|pmn> d = { ,50},
7657 <m-t|bch|cmr|ebg|pmn|ptm> f = { ,50},
7658 <bch|ebg|pmn> g = {50, },
7659 <m-t|cmr|ebg|pmn|ppl|ptm> j = {50, },
7660 <bch> j = {100, },
7661 <m-t|bch|cmr|ebg|pmn|ppl> l = { ,50},
7662 <ptm> l = { ,80},
7663 <m-t|bch|cmr|pmn|ppl> o13 = { ,50}, % fl
7664 <ptm> o13 = { ,80}, % fl
7665 <bch|ebg|pmn> o = {50,50},
7666 <ebg|pmn> \oe = {50, },
7667 <ppl> p = { 0, 0},
7668 <bch|ebg|pmn> q = {50,70},
7669 <ppl> q = { 0, },
7670 <m-t|cmr|ebg|pmn|ppl|ptm> r = { , 0},
7671 t = {50,50},
7672 <m-t|bch|cmr|ebg|pmn|ppl> y = {50,50}
7673 <ptm> y = {80,80}
7674 }
7675
7676 <*ebg>
7677 \SetProtrusion
7678 [ name = EBGaramond-sc-OT1-Tab,
7679 load = EBGaramond-OT1-TOfF ]
7680 { encoding = OT1,
7681 family = {EBGaramond-TLF,EBGaramond-TOfF},
7682 shape = sc }

```

```

7683 {
7684     a = {50,50},
7685     \ae = {50, },
7686     d = { ,50},
7687     f = { ,50},
7688     g = {50, },
7689     j = {50, },
7690     l = { ,50},
7691     o = {50,50},
7692     \oe = {50, },
7693     q = {50,70},
7694     r = { , 0},
7695     t = {50,50},
7696     y = {50,50}
7697 }
7698
7699 </ebg>
7700 \SetProtrusion
7701 <m-t> [ name      = Tl-sc,
7702 <bch> [ name      = bch-sc-Tl,
7703 <cmr> [ name      = cmr-sc-Tl,
7704 <ebg> [ name      = EBGaramond-sc-Tl,
7705 <pmn> [ name      = pmnj-sc-Tl,
7706 <ppl> [ name      = ppl-sc-Tl,
7707 <ptm> [ name      = ptm-sc-Tl,
7708 <m-t>   load      = Tl-default ]
7709 <bch>   load      = bch-Tl      ]
7710 <cmr>   load      = cmr-Tl      ]
7711 <ebg>   load      = EBGaramond-Tl      ]
7712 <pmn>   load      = pmnj-Tl     ]
7713 <ppl>   load      = ppl-Tl      ]
7714 <ptm>   load      = ptm-Tl     ]
7715 <!ebg> { encoding = {Tl,LYl},
7716 <ebg> { encoding = {LYl},
7717 <bch>   family    = bch,
7718 <cmr>   family    = cmr,
7719 <ebg>   family    = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OfF,EBGaramond-TOfF},
7720 <pmn>   family    = pmnj,
7721 <ppl>   family    = {ppl,pplx,pplj},
7722 <ptm>   family    = {ptm,ptmx,ptmj},
7723     shape      = sc }
7724 {
7725     a = {50,50},
7726     <cmr|ebg|ppl|ptm> \ae = {50, },
7727     <bch|pmn>         c = {50, },
7728     <bch|ebg|pmn>     d = { ,50},
7729     <m-t|bch|cmr|ebg|pmn|ptm> f = { ,50},
7730     <bch|ebg|pmn>     g = {50, },
7731     <m-t|cmr|ebg|pmn|ppl|ptm> j = {50, },
7732     <bch>             j = {100, },
7733     <m-t|bch|cmr|ebg|pmn|ppl> l = { ,50},
7734     <ptm>             l = { ,80},
7735     <m-t|bch|cmr|pmn|ppl> 029 = { ,50}, % fl
7736     <ptm>             029 = { ,80}, % fl
7737     <bch|ebg|pmn>     o = {50,50},
7738     <bch|ebg|pmn>     \oe = {50, },
7739     <ppl>             p = { 0, 0},
7740     <bch|ebg|pmn>     q = {50,70},
7741     <ppl>             q = { 0, },
7742     <m-t|cmr|ebg|pmn|ppl|ptm> r = { , 0},
7743     t = {50,50},
7744     <m-t|bch|cmr|ebg|pmn|ppl> y = {50,50}
7745     <ptm>             y = {80,80}
7746 }
7747

```

```

7748 </(big|ugm)>
7749 <*m-t|cmr>
7750 \SetProtrusion
7751 <m-t> [ name      = T2A-sc,
7752 <cmr>  [ name      = cmr-sc-T2A,
7753 <m-t>   load      = T2A-default ]
7754 <cmr>   load      = cmr-T2A   ]
7755 { encoding = T2A,
7756 <cmr>   family   = cmr,
7757   shape   = sc }
7758 {
7759   \cyra = {50,50},
7760   \cyrg = { ,50},
7761   \cyrt = {50,50},
7762   \cyry = { ,50}
7763 }
7764
7765 </m-t|cmr>
7766 <*m-t>
7767 \SetProtrusion
7768 [ name      = QX-sc,
7769   load      = QX-default ]
7770 { encoding = QX,
7771   shape     = sc }
7772 {
7773   a = {50,50},
7774   f = { ,50},
7775   j = {50, },
7776   l = { ,50},
7777   013 = { ,50}, % fl
7778   r = { , 0},
7779   t = {50,50},
7780   y = {50,50}
7781 }
7782
7783 </m-t>
7784 <*cmr|bch>
7785 \SetProtrusion
7786 <bch> [ name      = bch-sc-T5,
7787 <bch>  [ load      = bch-T5 ]
7788 <cmr> [ name      = cmr-sc-T5,
7789 <cmr>  [ load      = cmr-T5 ]
7790 { encoding = T5,
7791 <bch>   family   = bch,
7792 <cmr>   family   = cmr,
7793   shape   = sc }
7794 {
7795   a = {50,50},
7796 <bch>   c = {50, },
7797 <bch>   d = { ,50},
7798   f = { ,50},
7799 <bch>   g = {50, },
7800 <bch>   j = {100, },
7801 <cmr>   j = {50, },
7802   l = { ,50},
7803 <bch>   o = {50,50},
7804 <bch>   q = { 0, },
7805 <cmr>   r = { , 0},
7806   t = {50,50},
7807   y = {50,50}
7808 }
7809
7810 </cmr|bch>
7811 <*ebg>
7812 \SetProtrusion

```



```

7813 [ name      = EBGaramond-sc-T1-Prop,
7814     load      = EBGaramond-T1-LF ]
7815 { encoding = T1,
7816   family   = {EBGaramond-LF,EBGaramond-OfF},
7817   shape     = sc }
7818 {
7819   a = {50,50},
7820   \ae = {50, },
7821   d = { ,50},
7822   f = { ,50},
7823   g = {50, },
7824   j = {50, },
7825   l = { ,50},
7826   o = {50,50},
7827   \oe = {50, },
7828   q = {50,70},
7829   r = { , 0},
7830   t = {50,50},
7831   y = {50,50}
7832 }
7833
7834 \SetProtrusion
7835 [ name      = EBGaramond-sc-T1-Tab,
7836     load      = EBGaramond-T1-TOfF ]
7837 { encoding = T1,
7838   family   = {EBGaramond-TLF,EBGaramond-TOfF},
7839   shape     = sc }
7840 {
7841   a = {50,50},
7842   \ae = {50, },
7843   d = { ,50},
7844   f = { ,50},
7845   g = {50, },
7846   j = {50, },
7847   l = { ,50},
7848   o = {50,50},
7849   \oe = {50, },
7850   q = {50,70},
7851   r = { , 0},
7852   t = {50,50},
7853   y = {50,50}
7854 }
7855
7856 </ebg>
7857 < *pmn>
7858 \SetProtrusion
7859 [ name      = pmnx-sc,
7860     load      = pmnj-sc ]
7861 { encoding = OT1,
7862   family   = pmnx,
7863   shape     = sc }
7864 {
7865   l = {230,180}
7866 }
7867
7868 \SetProtrusion
7869 [ name      = pmnx-sc-T1,
7870     load      = pmnj-sc-T1 ]
7871 { encoding = {T1,LY1},
7872   family   = pmnx,
7873   shape     = sc }
7874 {
7875   l = {230,180}
7876 }
7877

```

## 2.8.4 Italic small caps

Minion provides real small caps in italics. The `slantsc` package calls them `scit`, Philipp Lehman's `fontinstallationguide` suggests `si`.

```

7878 \SetProtrusion
7879 [ name      = pmnj-scit,
7880   load      = pmnj-it   ]
7881 { encoding = OT1,
7882   family   = pmnj,
7883   shape     = {scit,si} }
7884 {
7885   a = {50, },
7886   \ae = { , -50},
7887   b = {20, -50},
7888   c = {50, -50},
7889   d = {20, 0},
7890   e = {20, -50},
7891   f = {10, 0},
7892   012 = {10, -50}, % fi
7893   013 = {10, -50}, % fl
7894   014 = {10, -50}, % ffi
7895   015 = {10, -50}, % ffl
7896   g = {50, -50},
7897   i = {20, -50},
7898   j = {20, 0},
7899   k = {20, },
7900   l = {20, 50},
7901   m = { , -30},
7902   n = { , -30},
7903   o = {50, },
7904   \oe = {50, -50},
7905   p = {20, -50},
7906   q = {50, },
7907   r = {20, 0},
7908   s = {20, -30},
7909   t = {70, },
7910   u = {50, -50},
7911   v = {100, },
7912   w = {100, },
7913   y = {50, },
7914   z = { , -50}
7915 }
7916
7917 \SetProtrusion
7918 [ name      = pmnj-scit-T1,
7919   load      = pmnj-it-T1   ]
7920 { encoding = {T1,LY1},
7921   family   = pmnj,
7922   shape     = {scit,si}    }
7923 {
7924   a = {50, },
7925   \ae = { , -50},
7926   b = {20, -50},
7927   c = {50, -50},
7928   d = {20, 0},
7929   e = {20, -50},
7930   f = {10, 0},
7931   028 = {10, -50}, % fi
7932   029 = {10, -50}, % fl
7933   030 = {10, -50}, % ffi
7934   031 = {10, -50}, % ffl
7935   g = {50, -50},
7936   i = {20, -50},
7937   188 = {20, 0}, % ij
7938   j = {20, 0},

```

```

7939     k = {20, },
7940     l = {20,50},
7941     m = { , -30},
7942     n = { , -30},
7943     o = {50, },
7944     \oe = {50,-50},
7945     p = {20,-50},
7946     q = {50, },
7947     r = {20, 0},
7948     s = {20,-30},
7949     t = {70, },
7950     u = {50,-50},
7951     v = {100, },
7952     w = {100, },
7953     y = {50, },
7954     z = { , -50}
7955 }
7956
7957 \SetProtrusion
7958 [ name    = pmnx-scit,
7959   load    = pmnj-scit ]
7960 { encoding = OT1,
7961   family   = pmnx,
7962   shape    = {scit,si} }
7963 {
7964   l = {100,150}
7965 }
7966
7967 \SetProtrusion
7968 [ name    = pmnx-scit-T1,
7969   load    = pmnj-scit-T1 ]
7970 { encoding = {T1,LY1},
7971   family   = pmnx,
7972   shape    = {scit,si} }
7973 {
7974   l = {100,150}
7975 }
7976
7977 </pmn>
7978 <*ebg>

```

For small caps italics, we copy the definitions from the small caps settings, except that we first load the italics settings.

```

7979 \SetProtrusion
7980 [ name    = EBGaramond-scit-OT1-Prop,
7981   load    = EBGaramond-it-OT1-LF ]
7982 { encoding = OT1,
7983   family   = {EBGaramond-LF,EBGaramond-0sF},
7984   shape    = scit }
7985 {
7986   a = {50,50},
7987   \ae = {50, },
7988   d = { , 50},
7989   f = { , 50},
7990   g = {50, },
7991   j = {50, },
7992   l = { , 50},
7993   o = {50,50},
7994   \oe = {50, },
7995   q = {50,70},
7996   r = { , 0},
7997   t = {50,50},
7998   y = {50,50}
7999 }
8000

```

```
8001 \SetProtrusion
8002 [ name      = EBGaramond-scit-OT1-Tab,
8003   load      = EBGaramond-it-OT1-T0sF ]
8004 { encoding = OT1,
8005   family   = {EBGaramond-TLF,EBGaramond-T0sF},
8006   shape     = scit }
8007 {
8008   a = {50,50},
8009   \ae = {50, },
8010   d = { ,50},
8011   f = { ,50},
8012   g = {50, },
8013   j = {50, },
8014   l = { ,50},
8015   o = {50,50},
8016   \oe = {50, },
8017   q = {50,70},
8018   r = { , 0},
8019   t = {50,50},
8020   y = {50,50}
8021 }
8022
8023 \SetProtrusion
8024 [ name      = EBGaramond-scit-T1-Prop,
8025   load      = EBGaramond-it-T1-LF ]
8026 { encoding = T1,
8027   family   = {EBGaramond-LF,EBGaramond-0sF},
8028   shape     = scit }
8029 {
8030   a = {50,50},
8031   \ae = {50, },
8032   d = { ,50},
8033   f = { ,50},
8034   g = {50, },
8035   j = {50, },
8036   l = { ,50},
8037   o = {50,50},
8038   \oe = {50, },
8039   q = {50,70},
8040   r = { , 0},
8041   t = {50,50},
8042   y = {50,50}
8043 }
8044
8045 \SetProtrusion
8046 [ name      = EBGaramond-scit-T1-Tab,
8047   load      = EBGaramond-it-T1-T0sF ]
8048 { encoding = T1,
8049   family   = {EBGaramond-TLF,EBGaramond-T0sF},
8050   shape     = scit }
8051 {
8052   a = {50,50},
8053   \ae = {50, },
8054   d = { ,50},
8055   f = { ,50},
8056   g = {50, },
8057   j = {50, },
8058   l = { ,50},
8059   o = {50,50},
8060   \oe = {50, },
8061   q = {50,70},
8062   r = { , 0},
8063   t = {50,50},
8064   y = {50,50}
8065 }
```

8066  
8067 */ebg*

### 2.8.5 Text companion

Finally the TS1 encoding. Still quite incomplete for Times and especially Palatino.  
Anybody?

```

8068 \SetProtrusion
8069 m-t [ name = textcomp ]
8070 bch [ name = bch-textcomp ]
8071 blg [ name = blg-textcomp ]
8072 cmr [ name = cmr-textcomp ]
8073 ebg [ name = EBGaramond-textcomp ]
8074 pmn [ name = pmn-textcomp ]
8075 ppl [ name = ppl-textcomp ]
8076 ptm [ name = ptm-textcomp ]
8077 ugm [ name = ugm-textcomp ]
8078 m-t { encoding = TS1 }
8079 !m-t { encoding = TS1,
8080 bch family = bch }
8081 blg family = blg }
8082 cmr family = cmr }
8083 ebg family = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OfF,EBGaramond-TOsF} }
8084 pmn family = {pmnx,pmnj} }
8085 ppl family = {ppl,pplx,pplj} }
8086 ptm family = {ptm,ptmx,ptmj} }
8087 ugm family = ugm }
8088 {
8089 blg \textquotestraightbase = {400,500},
8090 cmr \textquotestraightbase = {300,300},
8091 ebg|pmn \textquotestraightbase = {400,400},
8092 blg \textquotestraightdblbase = {300,400},
8093 cmr|pmn \textquotestraightdblbase = {300,300},
8094 ebg \textquotestraightdblbase = {400,400},
8095 bch|cmr|ebg|pmn|ugm \texttwelvewardash = {200,200},
8096 bch|cmr|ebg|pmn \textthreequartersemdash = {150,150},
8097 ugm \textthreequartersemdash = {200,200},
8098 blg \textquotesingle = {500,600},
8099 cmr|pmn \textquotesingle = {300,400},
8100 ebg \textquotesingle = {400,500},
8101 ptm \textquotesingle = {500,500},
8102 ugm \textquotesingle = {300,500},
8103 bch|cmr|pmn \textasteriskcentered = {200,300},
8104 blg \textasteriskcentered = {150,200},
8105 ebg \textasteriskcentered = {300,300},
8106 ugm \textasteriskcentered = {100,200},
8107 pmn \textfactionsolidus = {-200,-200},
8108 cmr \textoneoldstyle = {100,100},
8109 pmn \textoneoldstyle = { , 50},
8110 cmr \textthreeoldstyle = { , 50},
8111 ebg|pmn \textthreeoldstyle = { 50, },
8112 cmr \textfouroldstyle = { 50, 50},
8113 ebg|pmn \textfouroldstyle = { 50, },
8114 cmr|ebg|pmn \textsevenoldstyle = { 50, 80},
8115 cmr \textlangle = {400, },
8116 cmr \textrangle = { ,400},
8117 m-t|bch|pmn|ptm \textminus = {200,200},
8118 cmr|ebg|ppl \textminus = {300,300},
8119 blg|ugm \textminus = {250,300},
8120 bch|ebg|pmn \textlbrackdbl = {100, },
8121 blg \textlbrackdbl = {200, },
8122 bch|ebg|pmn \textrbrackdbl = { ,100},
8123 blg \textrbrackdbl = { ,200},
8124 pmn \textasciigrave = {200,500},

```

```

8125 <bch|blg|cmr|ebg|pmn> \texttildelow = {200,250},
8126 <pmn> \textasciibreve = {300,400},
8127 <pmn> \textasciicaron = {300,400},
8128 <pmn> \textacutedbl = {200,300},
8129 <pmn> \textgravedbl = {150,300},
8130 <bch|pmn|ugm> \textdagger = { 80, 80},
8131 <blg> \textdagger = {200,200},
8132 <cmr|ebg> \textdagger = {100,100},
8133 <ptm> \textdagger = {150,150},
8134 <blg> \textdaggerdbl = {150,150},
8135 <cmr|ebg|pmn> \textdaggerdbl = { 80, 80},
8136 <ptm> \textdaggerdbl = {100,100},
8137 <bch> \textbardbl = {100,100},
8138 <blg|ugm> \textbardbl = {150,150},
8139 <bch> \textbullet = {200,200},
8140 <blg> \textbullet = {400,500},
8141 <cmr|ebg|pmn> \textbullet = { ,100},
8142 <ptm> \textbullet = {150,150},
8143 <ugm> \textbullet = { 50,100},
8144 <bch|cmr|pmn> \textcelsius = { 50, },
8145 <ebg> \textcelsius = { 80, },
8146 <bch> \textflorin = { 50, 50},
8147 <blg> \textflorin = {100,100},
8148 <ebg|ugm> \textflorin = { ,100},
8149 <pmn> \textflorin = { 50,100},
8150 <ptm> \textflorin = { 50, 70},
8151 <cmr> \textcolonmonetary = { , 50},
8152 <ebg|pmn> \textcolonmonetary = { 50, },
8153 <pmn> \textinterrobang = { ,100},
8154 <pmn> \textinterrobangdown = {100, },
8155 <m-t|ebg|ptm> \texttrademark = {100,100},
8156 <bch> \texttrademark = {150,150},
8157 <blg|cmr|ppl> \texttrademark = {200,200},
8158 <pmn> \texttrademark = { 50, 50},
8159 <ugm> \texttrademark = {100,150},
8160 <bch|ugm> \textcent = { 50, },
8161 <ptm> \textcent = {100,100},
8162 <bch> \textsterling = { 50, },
8163 <ugm> \textsterling = { , 50},
8164 <bch> \textbrokenbar = {200,200},
8165 <blg> \textbrokenbar = {250,250},
8166 <ugm> \textbrokenbar = {200,300},
8167 <pmn> \textasciidieresis = {300,400},
8168 <m-t|bch|cmr|ebg|ptm|ugm> \textcopyright = {100,100},
8169 <pmn> \textcopyright = {100,150},
8170 <ppl> \textcopyright = {200,200},
8171 <bch|cmr|ugm> \textordfeminine = {100,200},
8172 <ebg|pmn> \textordfeminine = {200,200},
8173 <bch|cmr|ebg|pmn|ugm> \textlnot = {200, },
8174 <blg> \textlnot = {200,100},
8175 <m-t|bch|cmr|ebg|ptm|ugm> \textregistered = {100,100},
8176 <pmn> \textregistered = { 50,150},
8177 <ppl> \textregistered = {200,200},
8178 <pmn> \textasciimacron = {150,200},
8179 <m-t|ppl|ptm> \textdegree = {300,300},
8180 <bch> \textdegree = {150,200},
8181 <blg|ugm> \textdegree = {200,200},
8182 <cmr|ebg> \textdegree = {400,400},
8183 <pmn> \textdegree = {150,400},
8184 <bch|cmr|ebg|pmn|ugm> \textpm = {150,200},
8185 <blg> \textpm = {100,100},
8186 <ptm> \textpm = { 50, 80},
8187 <bch|blg|ugm> \texttwosuperior = {100,200},
8188 <cmr> \texttwosuperior = { 50,100},
8189 <ebg|pmn> \texttwosuperior = {200,200},

```

```

8190 <ptm> \texttwosuperior = { 50, 50},
8191 <bch|blg|ugm> \textthreesuperior = {100,200},
8192 <cmr> \textthreesuperior = { 50,100},
8193 <ebg|pmn> \textthreesuperior = {200,200},
8194 <ptm> \textthreesuperior = { 50, 50},
8195 <pmn> \textasciicute = {300,400},
8196 <bch|ugm> \textmu = { ,100},
8197 <bch|ebg|pmn> \textparagraph = { ,100},
8198 <bch|cmr|ebg|pmn> \textperiodcentered = {300,400},
8199 <blg> \textperiodcentered = {400,500},
8200 <ptm> \textperiodcentered = {300,300},
8201 <ugm> \textperiodcentered = {200,500},
8202 <bch|blg|ugm> \textonesuperior = {200,300},
8203 <cmr|ebg|pmn> \textonesuperior = {200,200},
8204 <ptm> \textonesuperior = {100,100},
8205 <bch|ebg|pmn|ugm> \textordmasculine = {200,200},
8206 <blg|cmr> \textordmasculine = {100,200},
8207 <bch|cmr|pmn> \texteuro = {100, },
8208 <ebg> \texteuro = { 50,100},
8209 <bch> \texttimes = {200,200},
8210 <blg|ptm> \texttimes = {100,100},
8211 <cmr> \texttimes = {150,250},
8212 <ebg> \texttimes = {100,150},
8213 <pmn> \texttimes = { 70,100},
8214 <ugm> \texttimes = {200,300},
8215 <bch|ebg|pmn> \textdiv = {150,200}
8216 <blg> \textdiv = {100,100}
8217 <cmr> \textdiv = {150,250}
8218 <ptm> \textdiv = { 50,100},
8219 <ugm> \textdiv = {200,300},
8220 <ptm> \textperthousand = { ,50}
8221 <ugm> \textsection = { ,100},
8222 <ugm> \textonehalf = { 50,100},
8223 <ugm> \textonequarter = { 50,100},
8224 <ugm> \textthreequarters = { 50,100},
8225 <ugm> \textsurd = { ,100}

```

Remaining slots in the source file.

```

8226 }
8227
8228 <*cmr|ebg|pmn|ugm>
8229 \SetProtrusion
8230 <cmr> [ name = cmr-textcomp-it ]
8231 <ebg> [ name = EBGaramond-textcomp-it ]
8232 <pmn> [ name = pmn-textcomp-it ]
8233 <ugm> [ name = ugm-textcomp-it ]
8234 { encoding = TS1,
8235 <cmr> family = cmr,
8236 <ebg> family = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OfF,EBGaramond-TOfF},
8237 <pmn> family = {pmnx,pmnj},
8238 <ugm> family = ugm,
8239 <cmr|pmn> shape = {it,sl} }
8240 <ebg|ugm> shape = it }
8241 {
8242 <cmr> \textquotestraightbase = {300,600},
8243 <ebg|pmn> \textquotestraightbase = {400,400},
8244 <cmr> \textquotestraightdblbase = {300,600},
8245 <ebg> \textquotestraightdblbase = {300,400},
8246 <pmn> \textquotestraightdblbase = {300,300},
8247 \texttwelveudash = {200,200},
8248 <cmr|ebg|pmn> \textthreequartersemdash = {150,150},
8249 <ugm> \textthreequartersemdash = {200,200},
8250 <cmr> \textquotesingle = {600,300},
8251 <ebg> \textquotesingle = {800,100},
8252 <pmn> \textquotesingle = {300,200},

```

```

8253 <ugm> \textquotesingle = {500,500},
8254 <cmr> \textasteriskcentered = {300,200},
8255 <ebg> \textasteriskcentered = {500,100},
8256 <pmn> \textasteriskcentered = {200,300},
8257 <ugm> \textasteriskcentered = {300,150},
8258 <pmn> \textfractionsolidus = {-200,-200},
8259 <cmr> \textoneoldstyle = {100, 50},
8260 <ebg> \textoneoldstyle = {100, },
8261 <pmn> \textoneoldstyle = { 50, },
8262 <ebg> \texttwooldstyle = { 50, },
8263 <pmn> \texttwooldstyle = {-50, },
8264 <cmr> \textthreeoldstyle = {100, 50},
8265 <pmn> \textthreeoldstyle = {-100, },
8266 <cmr> \textfouroldstyle = { 50, 50},
8267 <ebg> \textfouroldstyle = { 50,100},
8268 <cmr> \textsevenoldstyle = { 50, 80},
8269 <ebg> \textsevenoldstyle = { 50, },
8270 <pmn> \textsevenoldstyle = { 20, },
8271 <cmr> \textlangle = {400, },
8272 <cmr> \textrangle = { ,400},
8273 <cmr|ebg> \textminus = {300,300},
8274 <pmn> \textminus = {200,200},
8275 <ugm> \textminus = {250,300},
8276 <ebg|pmn> \textlbrackdbl = {100, },
8277 <ebg|pmn> \textrbrackdbl = { ,100},
8278 <pmn> \textasciigrave = {300,300},
8279 <cmr|ebg|pmn> \texttildebelow = {200,250},
8280 <pmn> \textasciibreve = {300,300},
8281 <pmn> \textasciicaron = {300,300},
8282 <pmn> \textacutedbl = {200,300},
8283 <pmn> \textgravedbl = {150,300},
8284 <cmr> \textdagger = {100,100},
8285 <ebg> \textdagger = {200,100},
8286 <pmn> \textdagger = { 80, 50},
8287 <ugm> \textdagger = { 80, 80},
8288 <cmr|ebg> \textdaggerdbl = { 80, 80},
8289 <pmn> \textdaggerdbl = { 80, 50},
8290 <ugm> \textbardbl = {150,150},
8291 <cmr> \textbullet = {200,100},
8292 <ebg> \textbullet = {300, },
8293 <pmn> \textbullet = { 30, 70},
8294 <ugm> \textbullet = { 50,100},
8295 <cmr> \textcelsius = {100, },
8296 <ebg> \textcelsius = {200, },
8297 <pmn> \textcelsius = { 50,-50},
8298 <ebg> \textflorin = {100, },
8299 <pmn> \textflorin = { 50,100},
8300 <ugm> \textflorin = { ,100},
8301 <cmr> \textcolonmonetary = {150, },
8302 <ebg> \textcolonmonetary = {100, },
8303 <pmn> \textcolonmonetary = { 50,-50},
8304 <cmr|ebg> \texttrademark = {200, },
8305 <pmn> \texttrademark = { 50,100},
8306 <ugm> \texttrademark = {150, 50},
8307 <ugm> \textcent = { 50, },
8308 <ugm> \textsterling = { , 50},
8309 <ugm> \textbrokenbar = {200,300},
8310 <pmn> \textasciidieresis = {300,200},
8311 <cmr> \textcopyright = {100, },
8312 <ebg> \textcopyright = {200,100},
8313 <pmn> \textcopyright = {100,150},
8314 <ugm> \textcopyright = {300, },
8315 <cmr> \textordfeminine = {100,100},
8316 <pmn> \textordfeminine = {200,200},
8317 <ugm> \textordfeminine = {100,200},

```



```

8318 <cmr|ebg> \textlnot = {300, },
8319 <pmn|ugm> \textlnot = {200, },
8320 <cmr> \textregistered = {100, },
8321 <ebg> \textregistered = {200,100},
8322 <pmn> \textregistered = { 50,150},
8323 <ugm> \textregistered = {300, },
8324 <pmn> \textasciimacron = {150,200},
8325 <cmr|ebg> \textdegree = {500,100},
8326 <pmn> \textdegree = {150,150},
8327 <ugm> \textdegree = {300,200},
8328 <cmr> \textpm = {150,100},
8329 <ebg> \textpm = {200,150},
8330 <pmn|ugm> \textpm = {150,200},
8331 <cmr> \textonesuperior = {400, },
8332 <ebg> \textonesuperior = {300,100},
8333 <pmn> \textonesuperior = {200,100},
8334 <ugm> \textonesuperior = {300,300},
8335 <cmr> \texttwosuperior = {400, },
8336 <ebg> \texttwosuperior = {300, },
8337 <pmn> \texttwosuperior = {200,100},
8338 <ugm> \texttwosuperior = {300,200},
8339 <cmr> \textthreesuperior = {400, },
8340 <ebg> \textthreesuperior = {300, },
8341 <pmn> \textthreesuperior = {200,100},
8342 <ugm> \textthreesuperior = {300,200},
8343 <ugm> \textmu = { ,100},
8344 <pmn> \textasciicute = {300,200},
8345 <cmr> \textparagraph = {200, },
8346 <pmn> \textparagraph = { ,100},
8347 <cmr> \textperiodcentered = {500,500},
8348 <ebg|pmn|ugm> \textperiodcentered = {300,400},
8349 <cmr> \textordmasculine = {100,100},
8350 <pmn> \textordmasculine = {200,200},
8351 <ugm> \textordmasculine = {300,200},
8352 <cmr> \texteuro = {200, },
8353 <ebg> \texteuro = {100, },
8354 <pmn> \texteuro = {100,-50},
8355 <cmr> \texttimes = {200,200},
8356 <ebg> \texttimes = {200,100},
8357 <pmn> \texttimes = { 70,100},
8358 <ugm> \texttimes = {200,300},
8359 <cmr|ebg> \textdiv = {200,200},
8360 <pmn> \textdiv = {150,200},
8361 <ugm> \textdiv = {200,300},
8362 <ugm> \textsection = { ,200},
8363 <ugm> \textonehalf = { 50,100},
8364 <ugm> \textonequarter = { 50,100},
8365 <ugm> \textthreequarters = { 50,100},
8366 <ugm> \textsurd = { ,100}
8367 }
8368
8369 </cmr|ebg|pmn|ugm>

```

## 2.8.6 Computer Modern math

Now to the math symbols for Computer Modern Roman. Definitions have been extracted from `fontmath.ltx`. I did not spend too much time fiddling with these settings, so they can surely be improved.

The math font ‘operators’ (also used for the `\mathrm` and `\mathbf` alphabets) is OT1/cmr, which we’ve already set up above. It’s declared as:

```

\DeclareSymbolFont{operators} {OT1}{cmr}{m}{n}
\SetSymbolFont{operators}{bold}{OT1}{cmr}{bx}{n}

```

$\backslash\mathrm{it}$  (OT1/cmr/m/it) is also already set up.

There are (for the moment) no settings for  $\backslash\mathrm{mathsf}$  and  $\backslash\mathrm{mathtt}$ .

Math font ‘letters’ (also used as  $\backslash\mathrm{mathnormal}$ ) is declared as:

```
\DeclareSymbolFont{letters}    {OML}{cmm}{m}{it}
\SetSymbolFont{letters}    {bold}{OML}{cmm}{b}{it}
```

```
8370 <*cmr>
8371 \SetProtrusion
8372 [ name      = cmr-math-letters ]
8373 { encoding = OML,
8374   family   = cmm,
8375   series    = {m,b},
8376   shape     = it   }
8377 {
8378   A = {100, 50}, % \mathnormal
8379   B = { 50,   },
8380   C = { 50,   },
8381   D = { 50, 50},
8382   E = { 50,   },
8383   F = {100, 50},
8384   G = { 50, 50},
8385   H = { 50, 50},
8386   I = { 50, 50},
8387   J = {150, 50},
8388   K = { 50,100},
8389   L = { 50, 50},
8390   M = { 50,   },
8391   N = { 50,   },
8392   O = { 50,   },
8393   P = { 50,   },
8394   Q = { 50, 50},
8395   R = { 50,   },
8396   S = { 50,   },
8397   T = { 50,100},
8398   U = { 50, 50},
8399   V = {100,100},
8400   W = { 50,100},
8401   X = { 50,100},
8402   Y = {100,100},
8403   f = {100,100},
8404   h = {   ,100},
8405   i = {   , 50},
8406   j = {   , 50},
8407   k = {   , 50},
8408   r = {   , 50},
8409   v = {   , 50},
8410   w = {   , 50},
8411   x = {   , 50},
8412   "0B = { 50,100}, % \alpha
8413   "0C = { 50, 50}, % \beta
8414   "0D = {200,150}, % \gamma
8415   "0E = { 50, 50}, % \delta
8416   "0F = { 50, 50}, % \epsilon
8417   "10 = { 50,150}, % \zeta
8418   "12 = { 50,   }, % \theta
8419   "13 = {   ,100}, % \iota
8420   "14 = {   ,100}, % \kappa
8421   "15 = {100, 50}, % \lambda
8422   "16 = {   , 50}, % \mu
8423   "17 = {   , 50}, % \nu
8424   "18 = {   , 50}, % \xi
8425   "19 = { 50,100}, % \pi
8426   "1A = { 50, 50}, % \rho
8427   "1B = {   ,150}, % \sigma
```

```

8428 "1C = { 50,150}, % \tau
8429 "1D = { 50, 50}, % \upsilon
8430 "1F = { 50,100}, % \chi
8431 "20 = { 50, 50}, % \psi
8432 "21 = { , 50}, % \omega
8433 "22 = { , 50}, % \varepsilon
8434 "23 = { , 50}, % \vartheta
8435 "24 = { , 50}, % \varpi
8436 "25 = {100, }, % \varrho
8437 "26 = {100,100}, % \varsigma
8438 "27 = { 50, 50}, % \varphi
8439 "28 = {100,100}, % \leftharpoonup
8440 "29 = {100,100}, % \leftharpoondown
8441 "2A = {100,100}, % \rightharpoonup
8442 "2B = {100,100}, % \rightharpoondown
8443 "2C = {300,200}, % \lhook
8444 "2D = {200,300}, % \rhook
8445 "2E = { ,100}, % \triangleright
8446 "2F = {100, }, % \triangleleft
8447 "3A = { ,500}, % ., \ldotp
8448 "3B = { ,500}, % ,
8449 "3C = {200,100}, % <
8450 "3D = {300,400}, % /
8451 "3E = {100,200}, % >
8452 "3F = {200,200}, % \star
8453 "5B = { ,100}, % \flat
8454 "5E = {200,200}, % \smile
8455 "5F = {200,200}, % \frown
8456 "7C = {100, }, % \jmath
8457 "7D = { ,100} % \wp

```

Remaining slots in the source file.

```

8458 }
8459

```

Math font ‘symbols’ (also used for the `\mathcal` alphabet) is declared as:

```

\DeclareSymbolFont{symbols} {OMS}{cmsy}{m}{n}
\SetSymbolFont{symbols} {bold}{OMS}{cmsy}{b}{n}

```

```

8460 \SetProtrusion
8461 [ name = cmr-math-symbols ]
8462 { encoding = OMS,
8463   family = cmsy,
8464   series = {m,b},
8465   shape = n }
8466 {
8467   A = {150, 50}, % \mathcal
8468   C = { ,100},
8469   D = { , 50},
8470   F = { 50,150},
8471   I = { ,100},
8472   J = {100,150},
8473   K = { ,100},
8474   L = {100, },
8475   M = { 50, 50},
8476   N = { 50,100},
8477   P = { , 50},
8478   Q = { 50, },
8479   R = { , 50},
8480   T = { 50,150},
8481   V = { 50, 50},
8482   W = { , 50},
8483   X = {100,100},
8484   Y = {100, },
8485   Z = {100,150},

```

```

8486 "00 = {300,300}, % -
8487 "01 = { ,700}, % \cdot, \cdotp
8488 "02 = {150,250}, % \times
8489 "03 = {150,250}, % *, \ast
8490 "04 = {200,300}, % \div
8491 "05 = {150,250}, % \diamond
8492 "06 = {200,200}, % \pm
8493 "07 = {200,200}, % \mp
8494 "08 = {100,100}, % \oplus
8495 "09 = {100,100}, % \ominus
8496 "0A = {100,100}, % \otimes
8497 "0B = {100,100}, % \oslash
8498 "0C = {100,100}, % \odot
8499 "0D = {100,100}, % \bigcirc
8500 "0E = {100,100}, % \circ
8501 "0F = {100,100}, % \bullet
8502 "10 = {100,100}, % \asymp
8503 "11 = {100,100}, % \equiv
8504 "12 = {200,100}, % \subseteq
8505 "13 = {100,200}, % \supseteq
8506 "14 = {200,100}, % \leq
8507 "15 = {100,200}, % \geq
8508 "16 = {200,100}, % \preceq
8509 "17 = {100,200}, % \succeq
8510 "18 = {200,200}, % \sim
8511 "19 = {150,150}, % \approx
8512 "1A = {200,100}, % \subset
8513 "1B = {100,200}, % \supset
8514 "1C = {200,100}, % \ll
8515 "1D = {100,200}, % \gg
8516 "1E = {300,100}, % \prec
8517 "1F = {100,300}, % \succ
8518 "20 = {100,200}, % \leftarrow
8519 "21 = {200,100}, % \rightarrow
8520 "22 = {100,100}, % \uparrow
8521 "23 = {100,100}, % \downarrow
8522 "24 = {100,100}, % \leftrightarrows
8523 "25 = {100,100}, % \nearrow
8524 "26 = {100,100}, % \searrow
8525 "27 = {100,100}, % \simeq
8526 "28 = {100,100}, % \Leftarrow
8527 "29 = {100,100}, % \Rightarrow
8528 "2A = {100,100}, % \Uparrow
8529 "2B = {100,100}, % \Downarrow
8530 "2C = {100,100}, % \Leftrightarrow
8531 "2D = {100,100}, % \nrightarrow
8532 "2E = {100,100}, % \swarrow
8533 "2F = { ,100}, % \propto
8534 "30 = { ,400}, % \prime
8535 "31 = {100,100}, % \infty
8536 "32 = {150,100}, % \in
8537 "33 = {100,150}, % \ni
8538 "34 = {100,100}, % \triangle, \bigtriangleup
8539 "35 = {100,100}, % \bigtriangledown
8540 "38 = { ,100}, % \forall
8541 "39 = {100, }, % \exists
8542 "3A = {200, }, % \neg
8543 "3E = {200,200}, % \top
8544 "3F = {200,200}, % \bot, \perp
8545 "5E = {100,200}, % \wedge
8546 "5F = {100,200}, % \vee
8547 "60 = { ,300}, % \vdash
8548 "61 = {300, }, % \dashv
8549 "62 = {100,100}, % \lfloor
8550 "63 = {100,100}, % \rfloor

```

```

8551 "64 = {100,100}, % \lceil
8552 "65 = {100,100}, % \rceil
8553 "66 = {150, }, % \lbrace
8554 "67 = { ,150}, % \rbrace
8555 "68 = {400, }, % \langle
8556 "69 = { ,400}, % \rangle
8557 "6C = {100,100}, % \updownarrow
8558 "6D = {100,100}, % \Updownarrow
8559 "6E = {100,300}, % \, \backslash, \setminus
8560 "72 = {100,100}, % \nabla
8561 "79 = {200,200}, % \dagger
8562 "7A = {100,100}, % \ddagger
8563 "7B = {100, }, % \mathparagraph
8564 "7C = {100,100}, % \clubsuit
8565 "7D = {100,100}, % \diamondsuit
8566 "7E = {100,100}, % \heartsuit
8567 "7F = {100,100} % \spadesuit

```

Remaining slots in the source file.

```

8568 }
8569

```

We don't bother about 'largesymbols', since it will only be used in display math, where protrusion doesn't work anyway. It's declared as:

```
\DeclareSymbolFont{largesymbols}{OMX}{cmex}{m}{n}
```

```

8570 </cmr>
8571 </cfg-t>

```

## 2.8.7 AMS symbols

Settings for the AMS math fonts (amssymb).

```
8572 <*cfg-u>
```

Symbol font 'a'.

```

8573 <*msa>
8574 \SetProtrusion
8575 [ name = AMS-a ]
8576 { encoding = U,
8577   family = msa }
8578 {
8579   "05 = {150,250}, % \centerdot
8580   "06 = {100,100}, % \lozenge
8581   "07 = { 50, 50}, % \blacklozenge
8582   "08 = { 50, 50}, % \circlearrowright
8583   "09 = { 50, 50}, % \circlearrowleft
8584   "0A = {100,100}, % \rightleftharpoons
8585   "0B = {100,100}, % \leftrightharpoons
8586   "0D = {-50,200}, % \Vdash
8587   "0E = {-50,200}, % \Vvdash
8588   "0F = {-70,150}, % \vDash
8589   "10 = {100,150}, % \twoheadrightarrow
8590   "11 = {100,150}, % \twoheadleftarrow
8591   "12 = { 50,100}, % \leftleftarrows
8592   "13 = { 50, 80}, % \rightrightarrows
8593   "14 = {120,120}, % \upuparrows
8594   "15 = {120,120}, % \downdownarrows
8595   "16 = {200,200}, % \upharpoonright
8596   "17 = {200,200}, % \downharpoonright
8597   "18 = {200,200}, % \upharpoonleft
8598   "19 = {200,200}, % \downharpoonleft
8599   "1A = { 80,100}, % \rightarrowtail
8600   "1B = { 80,100}, % \leftarrowtail

```

```

8601 "1C = { 50, 50}, % \leftrightarrows
8602 "1D = { 50, 50}, % \rightleftarrows
8603 "1E = {250, }, % \Lsh
8604 "1F = { ,250}, % \Rsh
8605 "20 = {100,100}, % \rightsquigarrow
8606 "21 = {100,100}, % \leftrightsquigarrow
8607 "22 = {100, 50}, % \looparrowleft
8608 "23 = { 50,100}, % \looparrowright
8609 "24 = { 50, 80}, % \circeq
8610 "25 = { ,100}, % \succsim
8611 "26 = { ,100}, % \gtrsim
8612 "27 = { ,100}, % \gtrapprox
8613 "28 = {150, 50}, % \multimap
8614 "2B = {100,150}, % \doteqdot
8615 "2C = {100,150}, % \triangleq
8616 "2D = {100, 50}, % \precsim
8617 "2E = {100, 50}, % \lessim
8618 "2F = { 50, 50}, % \lessapprox
8619 "30 = {100, 50}, % \eqslantless
8620 "31 = { 50, 50}, % \eqslantgtr
8621 "32 = {100, 50}, % \curlyeqprec
8622 "33 = { 50,100}, % \curlyeqsucc
8623 "34 = {100, 50}, % \preccurlyeq
8624 "36 = { 50, }, % \leqslant
8625 "38 = { , 50}, % \backprime
8626 "39 = {250,250}, % \dabar@ : the dash bar in \dash(left,right)arrow
8627 "3C = { 50,100}, % \succcurlyeq
8628 "3E = { , 50}, % \geqslant
8629 "40 = { , 50}, % \sqsubset
8630 "41 = { 50, }, % \sqsupset
8631 "42 = { ,150}, % \vartriangleright, \rhd
8632 "43 = {150, }, % \vartriangleleft, \lhd
8633 "44 = { ,100}, % \trianglerighteq, \unrhd
8634 "45 = {100, }, % \trianglelefteq, \unlhd
8635 "46 = {100,100}, % \bigstar
8636 "48 = { 50, 50}, % \blacktriangledown
8637 "49 = { ,100}, % \blacktriangleright
8638 "4A = {100, }, % \blacktriangleleft
8639 "4B = { ,150}, % \dashrightarrow (the arrow)
8640 "4C = {150, }, % \dashleftarrow
8641 "4D = { 50, 50}, % \vartriangle
8642 "4E = { 50, 50}, % \blacktriangle
8643 "4F = { 50, 50}, % \triangledown
8644 "50 = { 50, 50}, % \eqcirc
8645 "56 = { ,150}, % \rightarrow
8646 "57 = {150, }, % \leftarrow
8647 "58 = {100,300}, % \checkmark
8648 "5C = { 50, 50}, % \angle
8649 "5D = { 50, 50}, % \measuredangle
8650 "5E = { 50, 50}, % \sphericalangle
8651 "5F = { , 50}, % \varpropto
8652 "60 = {100,100}, % \smallsmile
8653 "61 = {100,100}, % \smallfrown
8654 "62 = { 50, }, % \Subset
8655 "63 = { , 50}, % \Supset
8656 "66 = {150,150}, % \curlywedge
8657 "67 = {150,150}, % \curlyvee
8658 "68 = { 50,150}, % \leftthreetimes
8659 "69 = {100, 50}, % \rightthreetimes
8660 "6C = { 50, 50}, % \bumpeq
8661 "6D = { 50, 50}, % \Bumpeq
8662 "6E = {100, }, % \lll
8663 "6F = { ,100}, % \ggg
8664 "70 = { 50,100}, % \ulcorner
8665 "71 = {100, 50}, % \urcorner

```

```

8666 "75 = {150,200}, % \dotplus
8667 "76 = { 50,100}, % \backsim
8668 "78 = { 50,100}, % \llcorner
8669 "79 = {100, 50}, % \lrcorner
8670 "7C = {100,100}, % \intercal
8671 "7D = { 50, 50}, % \circledcirc
8672 "7E = { 50, 50}, % \circledast
8673 "7F = { 50, 50} % \circleddash

```

Remaining slots in the source file.

```

8674 }
8675
8676 </msa>

```

Symbol font ‘b’.

```

8677 <*msb>
8678 \SetProtrusion
8679 [ name      = AMS-b ]
8680 { encoding = U,
8681   family   = msb }
8682 {
8683   A = { 50, 50}, % \mathbb
8684   C = { 50, 50},
8685   G = {   , 50},
8686   L = {   , 50},
8687   P = {   , 50},
8688   R = {   , 50},
8689   T = {   , 50},
8690   V = { 50, 50},
8691   X = { 50, 50},
8692   Y = { 50, 50},
8693   "00 = { 50, 50}, % \lvertneqq
8694   "01 = { 50, 50}, % \gvertneqq
8695   "02 = { 50, 50}, % \nleq
8696   "03 = { 50, 50}, % \ngeq
8697   "04 = {100, 50}, % \nless
8698   "05 = { 50,150}, % \ngtr
8699   "06 = {100, 50}, % \nprec
8700   "07 = { 50,150}, % \nsucc
8701   "08 = { 50, 50}, % \lneqq
8702   "09 = { 50, 50}, % \gneqq
8703   "0A = {100,100}, % \nleqslant
8704   "0B = {100,100}, % \ngeqslant
8705   "0C = {100, 50}, % \lneq
8706   "0D = { 50,100}, % \gneq
8707   "0E = {100, 50}, % \npreceq
8708   "0F = { 50,100}, % \nsucceq
8709   "10 = { 50,   }, % \precnsim
8710   "11 = { 50, 50}, % \succnsim
8711   "12 = { 50, 50}, % \lnsim
8712   "13 = { 50, 50}, % \gnsim
8713   "14 = { 50, 50}, % \lneqq
8714   "15 = { 50, 50}, % \ngeqq
8715   "16 = { 50, 50}, % \precneqq
8716   "17 = { 50, 50}, % \succneqq
8717   "18 = { 50, 50}, % \precnapprox
8718   "19 = { 50, 50}, % \succnapprox
8719   "1A = { 50, 50}, % \lnapprox
8720   "1B = { 50, 50}, % \gnapprox
8721   "1C = {150,200}, % \nsim
8722   "1D = { 50, 50}, % \ncong
8723   "1E = {100,150}, % \diagup
8724   "1F = {100,150}, % \diagdown
8725   "20 = {100, 50}, % \varsubsetneq
8726   "21 = { 50,100}, % \varsupsetneq

```

```

8727 "22 = {100, 50}, % \nsubseteqq
8728 "23 = { 50,100}, % \nsupseteqq
8729 "24 = {100, 50}, % \subsetneqq
8730 "25 = { 50,100}, % \supsetneqq
8731 "26 = {100, 50}, % \varsubsetneqq
8732 "27 = { 50,100}, % \varsupsetneqq
8733 "28 = {100, 50}, % \subseteq
8734 "29 = { 50,100}, % \supseteq
8735 "2A = {100, 50}, % \subseteq
8736 "2B = { 50,100}, % \supseteq
8737 "2C = { 50,100}, % \nparallel
8738 "2D = {100,150}, % \mid
8739 "2E = {150,150}, % \shortmid
8740 "2F = {100,100}, % \shortparallel
8741 "30 = { ,150}, % \nvdash
8742 "31 = { ,150}, % \Vdash
8743 "32 = { ,100}, % \nvDash
8744 "33 = { ,100}, % \nVDash
8745 "34 = { ,100}, % \ntrianglerighteq
8746 "35 = {100, }, % \trianglelefteq
8747 "36 = {100, }, % \triangleleft
8748 "37 = { ,100}, % \triangleright
8749 "38 = {100,200}, % \leftarrow
8750 "39 = {100,200}, % \rightarrow
8751 "3A = {100,100}, % \Leftarrow
8752 "3B = { 50,100}, % \Rightarrow
8753 "3C = {100,100}, % \Leftrightarrow
8754 "3D = {100,200}, % \leftrightarrows
8755 "3E = { 50, 50}, % \divideontimes
8756 "3F = { 50, 50}, % \varnothing
8757 "60 = {200, }, % \Finv
8758 "61 = { , 50}, % \Game
8759 "68 = {100,100}, % \eqsim
8760 "69 = { 50, }, % \beth
8761 "6A = { 50, }, % \gimel
8762 "6B = {150, }, % \daleth
8763 "6C = {200, }, % \lessdot
8764 "6D = { ,200}, % \gtrdot
8765 "6E = {100,200}, % \ltimes
8766 "6F = {150,100}, % \rtimes
8767 "70 = { 50,100}, % \shortmid
8768 "71 = { 50, 50}, % \shortparallel
8769 "72 = {200,300}, % \smallsetminus
8770 "73 = {100,200}, % \thicksim
8771 "74 = { 50,100}, % \thickapprox
8772 "75 = { 50, 50}, % \approx
8773 "76 = { 50,100}, % \succapprox
8774 "77 = { 50, 50}, % \precapprox
8775 "78 = {100,100}, % \curvearrowleft
8776 "79 = { 50,150}, % \curvearrowright
8777 "7A = { 50,200}, % \digamma
8778 "7B = {100, 50}, % \varkappa
8779 "7F = {200, } % \backepsilon

```

Remaining slots in the source file.

```

8780 }
8781
8782 <msb>

```

### 2.8.8 Euler

Euler Roman font (package `euler`).

```

8783 <*eur>
8784 \SetProtrusion

```



```

8785 [ name      = euler ]
8786 { encoding = U,
8787   family   = eur  }
8788 {
8789   "01 = {100,100},
8790   "03 = {100,150},
8791   "06 = {   ,100},
8792   "07 = {100,150},
8793   "08 = {100,100},
8794   "0A = {100,100},
8795   "0B = {   , 50},
8796   "0C = {   ,100},
8797   "0D = {100,100},
8798   "0E = {   ,100},
8799   "0F = {100,100},
8800   "10 = {100,100},
8801   "13 = {   ,100},
8802   "14 = {   ,100},
8803   "15 = {   , 50},
8804   "16 = {   , 50},
8805   "17 = { 50,100},
8806   "18 = { 50,100},
8807   "1A = {   , 50},
8808   "1B = {   , 50},
8809   "1C = { 50,100},
8810   "1D = { 50,100},
8811   "1E = { 50,100},
8812   "1F = { 50,100},
8813   "20 = {   , 50},
8814   "21 = {   , 50},
8815   "22 = { 50,100},
8816   "24 = {   , 50},
8817   "27 = { 50,100},
8818   1   = {100,100},
8819   7   = { 50,100},
8820   "3A = {300,500},
8821   "3B = {200,400},
8822   "3C = {200,100},
8823   "3D = {200,200},
8824   "3E = {100,200},
8825   A   = {   ,100},
8826   D   = {   , 50},
8827   J   = { 50,   },
8828   K   = {   , 50},
8829   L   = {   , 50},
8830   Q   = {   , 50},
8831   T   = { 50,   },
8832   X   = { 50, 50},
8833   Y   = { 50,   },
8834   h   = {   , 50},
8835   k   = {   , 50}
8836 }
8837

```

Extended by the `eulervm` package.

```

8838 \SetProtrusion
8839 [ name      = euler-vm,
8840   load      = euler ]
8841 { encoding = U,
8842   family   = zeur  }
8843 {
8844   "28 = {100,200},
8845   "29 = {100,200},
8846   "2A = {100,150},
8847   "2B = {100,150},

```

```

8848     "2C = {200,300},
8849     "2D = {200,300},
8850     "2E = {    ,100},
8851     "2F = {100,   },
8852     "3F = {150,150},
8853     "5B = {    ,100},
8854     "5E = {100,100},
8855     "5F = {100,100},
8856     "80 = {    , 50},
8857     "81 = {200,250},
8858     "82 = {100,200}
8859   }
8860
8861  </eur>

```

Euler Script font (eucal).

```

8862  <(*eus)
8863  \SetProtrusion
8864    [ name      = euscript ]
8865    { encoding = U,
8866      family    = eus   }
8867    {
8868      A = {100,100},
8869      B = { 50,100},
8870      C = { 50, 50},
8871      D = { 50,100},
8872      E = { 50,100},
8873      F = { 50,   },
8874      G = { 50,   },
8875      H = {    ,100},
8876      K = {    , 50},
8877      L = {    ,150},
8878      M = {    , 50},
8879      N = {    , 50},
8880      O = { 50, 50},
8881      P = { 50, 50},
8882      T = {    ,100},
8883      U = {    , 50},
8884      V = { 50, 50},
8885      W = { 50, 50},
8886      X = { 50, 50},
8887      Y = { 50,   },
8888      Z = { 50,100},
8889      "00 = {250,250},
8890      "18 = {200,200},
8891      "3A = {200,150},
8892      "40 = {    ,100},
8893      "5E = {100,100},
8894      "5F = {100,100},
8895      "66 = { 50,   },
8896      "67 = {    , 50},
8897      "6E = {200,200}
8898    }
8899
8900  \SetProtrusion
8901    [ name      = euscript-vm,
8902      load      = euscript ]
8903    { encoding = U,
8904      family    = zeus   }
8905    {
8906      "01 = {600,600},
8907      "02 = {200,200},
8908      "03 = {200,200},
8909      "04 = {200,200},
8910      "05 = {150,150},

```

```
8911 "06 = {200,200},
8912 "07 = {200,200},
8913 "08 = {100,100},
8914 "09 = {100,100},
8915 "0A = {100,100},
8916 "0B = {100,100},
8917 "0C = {100,100},
8918 "0D = {100,100},
8919 "0E = {150,150},
8920 "0F = {100,100},
8921 "10 = {150,150},
8922 "11 = {100,100},
8923 "12 = {150,100},
8924 "13 = {100,150},
8925 "14 = {150,100},
8926 "15 = {100,150},
8927 "16 = {200,100},
8928 "17 = {100,200},
8929 "19 = {150,150},
8930 "1A = {150,100},
8931 "1B = {100,150},
8932 "1C = {100,100},
8933 "1D = {100,100},
8934 "1E = {250,100},
8935 "1F = {100,250},
8936 "20 = {150,200},
8937 "21 = {150,200},
8938 "22 = {150,150},
8939 "23 = {150,150},
8940 "24 = {100,200},
8941 "25 = {150,150},
8942 "26 = {150,150},
8943 "27 = {100,100},
8944 "28 = {100,100},
8945 "29 = {100,150},
8946 "2A = {100,100},
8947 "2B = {100,100},
8948 "2C = {100,100},
8949 "2D = {150,150},
8950 "2E = {150,150},
8951 "2F = {100,100},
8952 "30 = {100,100},
8953 "31 = {100,100},
8954 "32 = {100,100},
8955 "33 = {100,100},
8956 "34 = {100,100},
8957 "35 = {100,100},
8958 "3E = {150,150},
8959 "3F = {150,150},
8960 "60 = { ,200},
8961 "61 = {200, },
8962 "62 = {100,100},
8963 "63 = {100,100},
8964 "64 = {100,100},
8965 "65 = {100,100},
8966 "68 = {300, },
8967 "69 = { ,300},
8968 "6C = {100,100},
8969 "6D = {100,100},
8970 "6F = {100,100},
8971 "72 = {100,100},
8972 "73 = {200,100},
8973 "76 = { ,100},
8974 "77 = {100, },
8975 "78 = { 50, 50},
```

```

8976      "79 = {100,100},
8977      "7A = {100,100},
8978      "7D = {150,150},
8979      "7E = {100,100},
8980      "A8 = {100,100},
8981      "A9 = {100,100},
8982      "AB = {200,200},
8983      "BA = {    ,200},
8984      "BB = {    ,200},
8985      "BD = {200,200},
8986      "DE = {200,200}
8987    }
8988
8989 </eus>

```

Euler Fraktur font (eufrak).

```

8990 <(*euf)
8991 \SetProtrusion
8992   [ name      = mathfrak ]
8993   { encoding = U,
8994     family   = euf   }
8995   {
8996       A = {    , 50},
8997       B = {    , 50},
8998       C = { 50, 50},
8999       D = {    , 80},
9000       E = { 50,   },
9001       G = {    , 50},
9002       L = {    , 80},
9003       O = {    , 50},
9004       T = {    , 80},
9005       X = { 80, 50},
9006       Z = { 80, 50},
9007       b = {    , 50},
9008       c = {    , 50},
9009       k = {    , 50},
9010       p = {    , 50},
9011       q = { 50,   },
9012       v = {    , 50},
9013       w = {    , 50},
9014       x = {    , 50},
9015       1 = {100,100},
9016       2 = { 80, 80},
9017       3 = { 80, 50},
9018       4 = { 80, 50},
9019       7 = { 50, 50},
9020      "12 = {500,500},
9021      "13 = {500,500},
9022       ! = {    ,200},
9023       ' = {200,300},
9024       ( = {200,   },
9025       ) = {    ,200},
9026       * = {200,200},
9027       + = {200,250},
9028       - = {200,200},
9029       {,} = {300,300},
9030       . = {400,400},
9031       {=} = {200,200},
9032       : = {    ,200},
9033       ; = {    ,200},
9034       ] = {    ,200}
9035   }
9036
9037 </euf>
9038 </cfg-u>

```

### 2.8.9 Euro symbols

Settings for various Euro symbols (Adobe Euro fonts (packages eurosans, europs), ITC Euro fonts (package euroitc) and marvosym<sup>13</sup>). The euroitc settings are hidden in the package itself (1.3.7) for ‘free software’ compliance reasons. (Not quite sure whether this is what Karl really had in mind ...)

```

9039 <*cfg-e>
9040 \SetProtrusion
9041 <zpeu> { encoding = U,
9042 <mvs> { encoding = {OT1,U},
9043 <zpeu> family = zpeu }
9044 <mvs> family = mvs }
9045 {
9046 <zpeu> E = {50, }
9047 <mvs> 164 = {50,50}, % \EUR
9048 <mvs> 068 = {50,-100} % \EURdig
9049 }
9050
9051 <*zpeu>
9052 \SetProtrusion
9053 { encoding = U,
9054 family = zpeu,
9055 shape = it* }
9056 {
9057 E = {100,-50}
9058 }
9059
9060 \SetProtrusion
9061 { encoding = U,
9062 family = {zpeus,eurosans} }
9063 {
9064 E = {100,50}
9065 }
9066
9067 \SetProtrusion
9068 { encoding = U,
9069 family = {zpeus,eurosans},
9070 shape = it* }
9071 {
9072 E = {200, }
9073 }
9074
9075 </zpeu>
9076 </cfg-e>

```

## 2.9 Interword spacing

Default unit is space.

```

9077 <*m-t|cmr>
9078 %%% -----
9079 %%% INTERWORD SPACING
9080
9081 </m-t|cmr>
9082 <*m-t>
9083 \SetExtraSpacing
9084 [ name = default ]
9085 { encoding = {OT1,T1,LY1,OT4,QX,T5} }
9086 {

```

These settings are only a first approximation. The following reasoning is from a

---

13 Of course, there are many more symbols in this font. Feel free to contribute protrusion settings!

Figure 1:

Example of interword spacing (from: M. Siemoneit, *Typographisches Gestalten*, Frankfurt/M. 1989). The numbers indicate the preference for shrinking the interword space.

2      6      7      5      3              4              1

Das Aus kam in der letzten Runde, wobei
Das Aus kam in der letzten Runde, wobei
Das Aus kam in der letzten Runde, wobei
Das Aus kam in der letzten Runde, wobei
Das Aus kam in der letzten Runde, wobei

mail from *Ulrich Dirr*, who also provided the sample in figure 1. I do not claim to have coped with the task.

‘The idea is – analog to the tables for expansion and protrusion – to have tables for optical reduction/expansion of spaces in dependence of the actual character so that the distance between words is optically equal.

When reducing distances the (weighting) order is:

- after commas

9087      { , } = { , -500, 500 } ,

- in front of capitals which have optical more room on their left side, e.g., ‘A’, ‘J’, ‘T’, ‘V’, ‘W’, and ‘Y’ [this is not yet possible – RS]

- in front of capitals which have circle/oval shapes on their left side, e.g., ‘C’, ‘G’, ‘O’, and ‘Q’ [ditto – RS]

- after ‘r’ (because of the bigger optical room on the righthand side)

9088      r = { , -300, 300 } ,

- [before or] after lowercase characters with ascenders

9089      b = { , -200, 200 } ,

9090      d = { , -200, 200 } ,

9091      f = { , -200, 200 } ,

9092      h = { , -200, 200 } ,

9093      k = { , -200, 200 } ,

9094      l = { , -200, 200 } ,

9095      t = { , -200, 200 } ,

- [before or] after lowercase characters with x-height plus descender with additional optical space, e.g., ‘v’, or ‘w’

9096      c = { , -100, 100 } ,

9097      p = { , -100, 100 } ,

9098      v = { , -100, 100 } ,

9099      w = { , -100, 100 } ,

9100      z = { , -100, 100 } ,

9101      x = { , -100, 100 } ,

9102      y = { , -100, 100 } ,

- [before or] after lowercase characters with x-height plus descender without additional optical space

9103      i = { , 50, -50 } ,

9104      m = { , 50, -50 } ,

9105      n = { , 50, -50 } ,

9106      u = { , 50, -50 } ,

- after colon and semicolon

9107      : = { , 200, -200 } ,

9108      ; = { , 200, -200 } ,

- after punctuation which ends a sentence, e.g., period, exclamation mark, question mark

```
9109      . = { ,250,-250},
9110      ! = { ,250,-250},
9111      ? = { ,250,-250}
```

The order has to be reversed when enlarging is needed.’

```
9112      }
9113
9114 </m-t>
```

Questions are:

- Is the result really better?
- Is it overdone? (Try with a factor < 1000.)
- Should the first parameter also be used? (Probably.)
- What about quotation marks, parentheses etc.?

Furthermore, there seems to be a pdfTeX bug with spacing in combination with a non-zero `\spaceskip` (reported by *Axel Berger*):

```
\parfillskip0pt
\rightskip0pt plus 1em
\spaceskip\fontdimen2\font
test test\par
\pdfadjustinterwordglue2
\stbscode\font`t=-50
test test
\bye
```

Some more characters in T2A.<sup>14</sup>

```
9115 <*cmr>
9116 \SetExtraSpacing
9117   [ name    = T2A,
9118     load    = default ]
9119   { encoding = T2A,
9120     family   = cmr }
9121   {
9122     \cyrg = { , -300, 300},
9123     \cyrb = { , -200, 200},
9124     \cyrk = { , -200, 200},
9125     \cyrs = { , -100, 100},
9126     \cyrr = { , -100, 100},
9127     \cyrh = { , -100, 100},
9128     \cyru = { , -100, 100},
9129     \cyrt = { , 50, -50},
9130     \cyrp = { , 50, -50},
9131     \cyri = { , 50, -50},
9132     \cyrishrt = { , 50, -50},
9133   }
9134
```

### 2.9.1 Nonfrenchspacing

The following settings simulate `\nonfrenchspacing` (since space factors will be ignored when spacing adjustment is in effect). They may be used for English contexts.

From the TeXbook:

---

14 Contributed by *Karl Karlsson*.

‘If the space factor  $f$  is different from 1000, the interword glue is computed as follows: Take the normal space glue for the current font, and add the extra space if  $f \geq 2000$ . [...] Then the stretch component is multiplied by  $f/1000$ , while the shrink component is multiplied by  $1000/f$ .’

The ‘extra space’ (`\fontdimen 7`) for Computer Modern Roman is a third of `\fontdimen 2`, i.e., 333.

```
9135 \SetExtraSpacing
9136   [ name      = nonfrench-cmr,
9137     load       = default,
9138     context    = nonfrench ]
9139   { encoding = {OT1,T1,LY1,OT4,QX,T5},
9140     family   = cmr }
9141   {
```

`latex.ltx` has:

```
\def\nonfrenchspacing{
  \sfcode`\ . 3000
  \sfcode`\? 3000
  \sfcode`\! 3000
```

```
9142   . = {333,2000,-667},
9143   ? = {333,2000,-667},
9144   ! = {333,2000,-667},
```

```
\sfcode`\: 2000
```

```
9145   : = {333,1000,-500},
```

```
\sfcode`\; 1500
```

```
9146   ; = {    , 500,-333},
```

```
\sfcode`\, 1250
```

```
9147   {,}= {    , 250,-200}
```

```
}
```

```
9148   }
```

```
9149
```

```
9150 </cmr>
```

`fontinst`, however, which is also used to create the `psnfss` font metrics, sets `\fontdimen 7` to 240 by default. Therefore, the fallback settings use this value for the first component.

```
9151 <*-t>
9152 \SetExtraSpacing
9153   [ name      = nonfrench-default,
9154     load       = default,
9155     context    = nonfrench ]
9156   { encoding = {OT1,T1,LY1,OT4,QX,T5} }
9157   {
9158     . = {240,2000,-667},
9159     ? = {240,2000,-667},
9160     ! = {240,2000,-667},
9161     : = {240,1000,-500},
9162     ; = {    , 500,-333},
9163     {,}= {    , 250,-200}
9164   }
9165
```



Empty settings to prevent spurious warnings.

```
9166 \SetExtraSpacing
9167   [ name = empty ]
9168   { encoding = {TS1} }
9169   { }
9170
```

## 2.10 Additional kerning

Default unit is 1 em.

```
9171 %%% -----
9172 %%% ADDITIONAL KERNING
9173
```

A dummy list to be loaded when no context is active.

```
9174 \SetExtraKerning
9175   [ name = empty ]
9176   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1} }
9177   { }
9178
```

### 2.10.1 French

The ratio of `\fontdimen 2` to `\fontdimen 6` varies for different fonts, so that either the kerning of the colon (which should be a space, i.e., `\fontdimen 2`) or that of the other punctuation characters (TeX's `\thinspace`, i.e., one sixth of `\fontdimen 6`) may be inaccurate, depending on which unit we choose (space or 1em). For Times, for example, a thin space would be 665. I don't know whether French typography really wants a thin space, or rather (as it happens to turn out with CMR) half a space. (Wikipedia<sup>15</sup> claims it should be a quarter of an em, which seems too much to me; then again, it also says that this was a thin space in French typography.)

```
9179 \SetExtraKerning
9180   [ name      = french-default,
9181     context   = french,
9182     unit      = space ]
9183   { encoding = {OT1,T1,LY1} }
9184   {
9185     : = {1000,}, % = \fontdimen2
9186     ; = {500, }, % ~ \thinspace
9187     ! = {500, },
9188     ? = {500, }
9189   }
9190
```

These settings have the disadvantage that a word following a left guillemet will not be hyphenated. This might be fixed in pdfTeX.

```
9191 \SetExtraKerning
9192   [ name      = french-guillemets,
9193     context   = french-guillemets,
9194     load      = french-default,
9195     unit      = space ]
9196   { encoding = {T1,LY1} }
9197   {
9198     \guillemotleft = { ,800}, % = 0.8\fontdimen2
9199     \guillemotright = {800, }
9200   }
9201
```

---

15 [http://fr.wikipedia.org/wiki/Espace\\_typographique](http://fr.wikipedia.org/wiki/Espace_typographique), 5 July 2007.

```
9202 \SetExtraKerning
9203   [ name      = french-guillemets-OT1,
9204     context    = french-guillemets,
9205     load       = french-default,
9206     unit       = space   ]
9207   { encoding = OT1      }
9208   { }
9209
```

### 2.10.2 Turkish

```
9210 \SetExtraKerning
9211   [ name      = turkish,
9212     context    = turkish ]
9213   { encoding = {OT1,T1,LY1} }
9214   {
9215     : = {167, }, % = \thinspace
9216     ! = {167, },
9217     {=} = {167, }
9218   }
9219
9220 </m-t>
9221 </config>
```



```

9255     },
9256 <NewComputerModern> (l)I = {I, I, I, I, I, I, I, I, I}, % Greek
9257     J = {J},
9258     K = {K},
9259     K}, % Greek
9260     L = {L, L, L, L}, % L, L, L
9261     M = {M}, % Greek
9262     N = {N, N, N, N, N, N, N},
9263     N}, % Greek
9264     O = {O, O, O, O, O, O, O, O, O, O, O, O, O, O, O, O, O, O, O, O, O, O},
9265     O}, % Greek
9266 <NewComputerModern> (l)O = {O, O, O, O, O, O, O, O, O, O}, % Greek accents except O that has in-
    dep. protrusion numbers (below)
9267     P = {P}, % Greek
9268 <NewComputerModern> (l)P = {P}, % Greek accents fully protruded left
9269     R = {R, R, R, R, R, R, R},
9270     S = {S, S, S, S, S, S, S},
9271     T = {T, T, T, T, T, T},
9272     T}, % Greek
9273     U = {U, U, U, U, U, U, U, U, U, U, U, U, U, U, U, U, U, U, U, U, U, U},
9274     W = {W, W, W, W},
9275     X = {X}, % Greek
9276     Y = {Y, Y, Y, Y, Y, Y, Y},
9277 <NewComputerModern>     Y = {Y, Y, Y},
9278 <NewComputerModern> (l)Y = {Y, Y, Y, Y, Y, Y, Y, Y},
9279     Z = {Z, Z, Z, Z},
9280     Z}, % Greek
9281     a = {a, a, a, a, a, a, a, a, a, a, a, a, a, a, a, a, a, a, a, a, a, a},
9282     æ = {æ},
9283     c = {c, c, c, c, c},
9284     d = {d, d, d},
9285     e = {e, e, e, e, e, e, e, e, e, e, e, e, e, e, e, e, e, e, e, e, e, e},
9286     f = {ff}, % Unicode 64256, glyph name in Latin Modern Roman: /f_f ; in New Com-
    puter Modern: /ff
9287     g = {g, g, g, g, g, g},
9288     h = {h, h, h, h, h, h},
9289     i = {i, i, i, i, i, i, i, i, i, i, i, i, i, i, i, i},
9290     j = {j},
9291     k = {k},
9292     l = {l, l, l, l, l}, % l, l
9293     n = {n, n, n, n, n, n},
9294     o = {o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o},
9295 <NewComputerModern>     , o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o, o % Greek
9296     },
9297     r = {r, r, r, r, r, r, r},
9298     s = {s, s, s, s, s, s, s},
9299     t = {t, t, t, t, t, t}, % t
9300     u = {u, u, u, u, u, u, u, u, u, u, u, u, u, u, u, u, u, u, u, u, u, u},
9301     w = {w, w, w, w, w},
9302     y = {y, y, y, y, y, y, y},
9303     z = {z, z, z, z, z},
9304 <*NewComputerModern>
9305     α = {α, α, α, α, α, α, α, α, α, α, α, α, α, α, α, α, α, α, α, α, α, α},
9306     ε = {ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε, ε},
9307     η = {η, η, η, η, η, η, η, η, η, η, η, η, η, η, η, η, η, η, η, η, η, η},
9308     ι = {ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι, ι},
9309     ῑ = {ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ, ῑ},
9310     υ = {υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ, υ},
9311     ω = {ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω, ω},
9312 </NewComputerModern>
9313 }
9314 </LatinModernRoman|NewComputerModern>

```





[illegible]





[illegible]

```

9632   ρ = {̐,̑},
9633   υ = {̕,̖,̗,̘,̙,̚,̛,̜,̝,̞,̟,̠,̡,̢,̣,̤,̥,̦,̧,̨,̩,̪,̫,̬,̭,̮,̯,̰,̱,̲,̳,̴,̵,̶,̷,̸,̹,̺,̻,̼},
9634   ω = {̡̠,̢̠,̠̣,̠̤,̠̥,̠̦,̧̠,̨̠,̠̩,̠̪,̠̫,̠̬,̠̭,̠̮,̠̯,̠̰,̠̱,̠̲,̠̳,̴̠,̵̠,̶̠,̷̠,̸̠,̠̹,̠̺,̠̻,̠̼},
9635 % other
9636   (i) = {(2),(3),(4),(5),(6),(7),(8),(9),(10),(11),(12),(13),(14),(15),(16),(17),(18),(19),(20)},
9637   (a) = {(b),(c),(d),(e),(f),(g),(h),(i),(j),(k),(l),(m),(n),(o),(p),(q),(r),(s),(t),(u),(v),(w),(x),(y),(z)},
9638   [A] = {[B],[C],[D],[E],[F],[G],[H],[I],[J],[K],[L],[M],[N],[O],[P],[Q],[R],[S],[T],[U],[V],[W],[X],[Y],[Z]},
9639   ! = {!},
9640   ? = {??},
9641   . = {/onedotenleader},
9642   /endash = {/figuredash},
9643   }
9644 </EBGaramond>

```

### 3.1.4 Palatino

```

9645 <*Palatino>
9646 \DeclareCharacterInheritance
9647   { encoding = {TU,EU1,EU2},
9648     family = {Palatino} }

```

Unfortunately, I don't have a Palatino variant containing all of the following glyphs. The settings are typeset in T<sub>E</sub>X Gyre Pagella; missing glyphs, printed in red, are taken from Charis SIL; glyphs missing even in Charis SIL appear as '◆'. To see the real settings, consult `mt-Palatino.cfg`.

```

9649   { A = {Ā,Ă,Ȧ,Ǡ,Ȧ̅,Ȧ̆,Ȧ̇,Ȧ̈,Ȧ̉,Ȧ̊,Ȧ̋,Ȧ̌,Ȧ̍,Ȧ̎,Ȧ̏,Ȧ̐,Ȧ̑,Ȧ̒,Ȧ̓,Ȧ̔,Ȧ̕,Ȧ̖,Ȧ̗,Ȧ̘,Ȧ̙,Ȧ̚,Ȧ̛,Ȧ̜,Ȧ̝,Ȧ̞,Ȧ̟,Ȧ̠,Ȧ̡,Ȧ̢,Ạ̇,Ȧ̤,Ḁ̇,Ȧ̦,Ȧ̧,Ą̇,Ȧ̩,Ȧ̪,Ȧ̫,Ȧ̬,Ȧ̭,Ȧ̮,Ȧ̯,Ȧ̰,Ȧ̱,Ȧ̲,Ȧ̳,Ȧ̴,Ȧ̵,Ȧ̶,Ȧ̷,Ȧ̸,Ȧ̹,Ȧ̺,Ȧ̻,Ȧ̼},
9650     B = {Ḃ,Ḃ̄,Ḃ̅,Ḃ̆,Ḃ̇,Ḃ̈,Ḃ̉,Ḃ̊,Ḃ̋,Ḃ̌,Ḃ̍,Ḃ̎,Ḃ̏,Ḃ̐,Ḃ̑,Ḃ̒,Ḃ̓,Ḃ̔,Ḃ̕,Ḃ̖,Ḃ̗,Ḃ̘,Ḃ̙,Ḃ̚,Ḃ̛,Ḃ̜,Ḃ̝,Ḃ̞,Ḃ̟,Ḃ̠,Ḃ̡,Ḃ̢,Ḅ̇,Ḃ̤,Ḃ̥,Ḃ̦,Ḃ̧,Ḃ̨,Ḃ̩,Ḃ̪,Ḃ̫,Ḃ̬,Ḃ̭,Ḃ̮,Ḃ̯,Ḃ̰,Ḇ̇,Ḃ̲,Ḃ̳,Ḃ̴,Ḃ̵,Ḃ̶,Ḃ̷,Ḃ̸,Ḃ̹,Ḃ̺,Ḃ̻,Ḃ̼},
9651     C = {Ĉ,Ĉ̄,Ĉ̅,Ĉ̆,Ĉ̇,Ĉ̈,Ĉ̉,Ĉ̊,Ĉ̋,Ĉ̌,Ĉ̍,Ĉ̎,Ĉ̏,Ĉ̐,Ĉ̑,Ĉ̒,Ĉ̓,Ĉ̔,Ĉ̕,Ĉ̖,Ĉ̗,Ĉ̘,Ĉ̙,Ĉ̚,Ĉ̛,Ĉ̜,Ĉ̝,Ĉ̞,Ĉ̟,Ĉ̠,Ĉ̡,Ĉ̢,Ĉ̣,Ĉ̤,Ĉ̥,Ĉ̦,Ç̂,Ĉ̨,Ĉ̩,Ĉ̪,Ĉ̫,Ĉ̬,Ĉ̭,Ĉ̮,Ĉ̯,Ĉ̰,Ĉ̱,Ĉ̲,Ĉ̳,Ĉ̴,Ĉ̵,Ĉ̶,Ĉ̷,Ĉ̸,Ĉ̹,Ĉ̺,Ĉ̻,Ĉ̼},
9652     D = {Ḑ,Ḑ̄,Ḑ̅,Ḑ̆,Ḑ̇,Ḑ̈,Ḑ̉,Ḑ̊,Ḑ̋,Ḑ̌,Ḑ̍,Ḑ̎,Ḑ̏,Ḑ̐,Ḑ̑,Ḑ̒,Ḑ̓,Ḑ̔,Ḑ̕,Ḑ̖,Ḑ̗,Ḑ̘,Ḑ̙,Ḑ̚,Ḑ̛,Ḑ̜,Ḑ̝,Ḑ̞,Ḑ̟,Ḑ̠,Ḑ̡,Ḑ̢,Ḑ̣,Ḑ̤,Ḑ̥,Ḑ̦,Ḑ̧,Ḑ̨,Ḑ̩,Ḑ̪,Ḑ̫,Ḑ̬,Ḑ̭,Ḑ̮,Ḑ̯,Ḑ̰,Ḑ̱,Ḑ̲,Ḑ̳,Ḑ̴,Ḑ̵,Ḑ̶,Ḑ̷,Ḑ̸,Ḑ̹,Ḑ̺,Ḑ̻,Ḑ̼},
9653     E = {Ē,Ē̄,Ē̅,Ē̆,Ē̇,Ē̈,Ē̉,Ē̊,Ē̋,Ē̌,Ē̍,Ē̎,Ē̏,Ē̐,Ē̑,Ē̒,Ē̓,Ē̔,Ē̕,Ē̖,Ē̗,Ē̘,Ē̙,Ē̚,Ē̛,Ē̜,Ē̝,Ē̞,Ē̟,Ē̠,Ē̡,Ē̢,Ẹ̄,Ē̤,Ē̥,Ē̦,Ȩ̄,Ę̄,Ē̩,Ē̪,Ē̫,Ē̬,Ḙ̄,Ē̮,Ē̯,Ḛ̄,Ē̱,Ē̲,Ē̳,Ē̴,Ē̵,Ē̶,Ē̷,Ē̸,Ē̹,Ē̺,Ē̻,Ē̼},
9654     F = {Ḟ},
9655     G = {Ĝ,Ĝ̄,Ĝ̅,Ĝ̆,Ĝ̇,Ĝ̈,Ĝ̉,Ĝ̊,Ĝ̋,Ĝ̌,Ĝ̍,Ĝ̎,Ĝ̏,Ĝ̐,Ĝ̑,Ĝ̒,Ĝ̓,Ĝ̔,Ĝ̕,Ĝ̖,Ĝ̗,Ĝ̘,Ĝ̙,Ĝ̚,Ĝ̛,Ĝ̜,Ĝ̝,Ĝ̞,Ĝ̟,Ĝ̠,Ĝ̡,Ĝ̢,Ĝ̣,Ĝ̤,Ĝ̥,Ĝ̦,Ģ̂,Ĝ̨,Ĝ̩,Ĝ̪,Ĝ̫,Ĝ̬,Ĝ̭,Ĝ̮,Ĝ̯,Ĝ̰,Ĝ̱,Ĝ̲,Ĝ̳,Ĝ̴,Ĝ̵,Ĝ̶,Ĝ̷,Ĝ̸,Ĝ̹,Ĝ̺,Ĝ̻,Ĝ̼},
9656     H = {Ĥ,Ĥ̄,Ĥ̅,Ĥ̆,Ĥ̇,Ĥ̈,Ĥ̉,Ĥ̊,Ĥ̋,Ĥ̌,Ĥ̍,Ĥ̎,Ĥ̏,Ĥ̐,Ĥ̑,Ĥ̒,Ĥ̓,Ĥ̔,Ĥ̕,Ĥ̖,Ĥ̗,Ĥ̘,Ĥ̙,Ĥ̚,Ĥ̛,Ĥ̜,Ĥ̝,Ĥ̞,Ĥ̟,Ĥ̠,Ĥ̡,Ĥ̢,Ḥ̂,Ĥ̤,Ĥ̥,Ĥ̦,Ḩ̂,Ĥ̨,Ĥ̩,Ĥ̪,Ĥ̫,Ĥ̬,Ĥ̭,Ḫ̂,Ĥ̯,Ĥ̰,Ĥ̱,Ĥ̲,Ĥ̳,Ĥ̴,Ĥ̵,Ĥ̶,Ĥ̷,Ĥ̸,Ĥ̹,Ĥ̺,Ĥ̻,Ĥ̼},
9657     I = {İ,İ̇,İ̈,İ̉,İ̊,İ̋,İ̌,İ̍,İ̎,İ̏,İ̐,İ̑,İ̒,İ̓,İ̔,İ̕,İ̖,İ̗,İ̘,İ̙,İ̚,İ̛,İ̜,İ̝,İ̞,İ̟,İ̠,İ̡,İ̢,Ị̇,İ̤,İ̥,İ̦,İ̧,Į̇,İ̩,İ̪,İ̫,İ̬,İ̭,İ̮,İ̯,Ḭ̇,İ̱,İ̲,İ̳,İ̴,İ̵,İ̶,İ̷,İ̸,İ̹,İ̺,İ̻,İ̼},
9658     J = {Ĵ},
9659     K = {Ḳ,Ḳ̄,Ḳ̅,Ḳ̆,Ḳ̇,Ḳ̈,Ḳ̉,Ḳ̊,Ḳ̋,Ḳ̌,Ḳ̍,Ḳ̎,Ḳ̏,Ḳ̐,Ḳ̑,Ḳ̒,Ḳ̓,Ḳ̔,Ḳ̕,Ḳ̖,Ḳ̗,Ḳ̘,Ḳ̙,Ḳ̚,Ḳ̛,Ḳ̜,Ḳ̝,Ḳ̞,Ḳ̟,Ḳ̠,Ḳ̡,Ḳ̢,Ḳ̣,Ḳ̤,Ḳ̥,Ḳ̦,Ķ̣,Ḳ̨,Ḳ̩,Ḳ̪,Ḳ̫,Ḳ̬,Ḳ̭,Ḳ̮,Ḳ̯,Ḳ̰,Ḳ̱,Ḳ̲,Ḳ̳,Ḳ̴,Ḳ̵,Ḳ̶,Ḳ̷,Ḳ̸,Ḳ̹,Ḳ̺,Ḳ̻,Ḳ̼},
9660     L = {Ĺ,Ĺ̄,Ĺ̅,Ĺ̆,Ĺ̇,Ĺ̈,Ĺ̉,Ĺ̊,Ĺ̋,Ĺ̌,Ĺ̍,Ĺ̎,Ĺ̏,Ĺ̐,Ĺ̑,Ĺ̒,Ĺ̓,Ĺ̔,Ĺ̕,Ĺ̖,Ĺ̗,Ĺ̘,Ĺ̙,Ĺ̚,Ĺ̛,Ĺ̜,Ĺ̝,Ĺ̞,Ĺ̟,Ĺ̠,Ĺ̡,Ĺ̢,Ḷ́,Ĺ̤,Ĺ̥,Ĺ̦,Ļ́,Ĺ̨,Ĺ̩,Ĺ̪,Ĺ̫,Ĺ̬,Ḽ́,Ĺ̮,Ĺ̯,Ĺ̰,Ḻ́,Ĺ̲,Ĺ̳,Ĺ̴,Ĺ̵,Ĺ̶,Ĺ̷,Ĺ̸,Ĺ̹,Ĺ̺,Ĺ̻,Ĺ̼}, % Ḷ
9661     M = {Ḟ,Ḟ̄,Ḟ̅,Ḟ̆,Ḟ̇,Ḟ̈,Ḟ̉,Ḟ̊,Ḟ̋,Ḟ̌,Ḟ̍,Ḟ̎,Ḟ̏,Ḟ̐,Ḟ̑,Ḟ̒,Ḟ̓,Ḟ̔,Ḟ̕,Ḟ̖,Ḟ̗,Ḟ̘,Ḟ̙,Ḟ̚,Ḟ̛,Ḟ̜,Ḟ̝,Ḟ̞,Ḟ̟,Ḟ̠,Ḟ̡,Ḟ̢,Ḟ̣,Ḟ̤,Ḟ̥,Ḟ̦,Ḟ̧,Ḟ̨,Ḟ̩,Ḟ̪,Ḟ̫,Ḟ̬,Ḟ̭,Ḟ̮,Ḟ̯,Ḟ̰,Ḟ̱,Ḟ̲,Ḟ̳,Ḟ̴,Ḟ̵,Ḟ̶,Ḟ̷,Ḟ̸,Ḟ̹,Ḟ̺,Ḟ̻,Ḟ̼},
9662     N = {Ñ,Ñ̄,Ñ̅,Ñ̆,Ñ̇,Ñ̈,Ñ̉,Ñ̊,Ñ̋,Ñ̌,Ñ̍,Ñ̎,Ñ̏,Ñ̐,Ñ̑,Ñ̒,Ñ̓,Ñ̔,Ñ̕,Ñ̖,Ñ̗,Ñ̘,Ñ̙,Ñ̚,Ñ̛,Ñ̜,Ñ̝,Ñ̞,Ñ̟,Ñ̠,Ñ̡,Ñ̢,Ṇ̃,Ñ̤,Ñ̥,Ñ̦,Ņ̃,Ñ̨,Ñ̩,Ñ̪,Ñ̫,Ñ̬,Ṋ̃,Ñ̮,Ñ̯,Ñ̰,Ṉ̃,Ñ̲,Ñ̳,Ñ̴,Ñ̵,Ñ̶,Ñ̷,Ñ̸,Ñ̹,Ñ̺,Ñ̻,Ñ̼},
9663     O = {Ȫ,Ȫ̄,Ȫ̅,Ȫ̆,Ȫ̇,Ȫ̈,Ȫ̉,Ȫ̊,Ȫ̋,Ȫ̌,Ȫ̍,Ȫ̎,Ȫ̏,Ȫ̐,Ȫ̑,Ȫ̒,Ȫ̓,Ȫ̔,Ȫ̕,Ȫ̖,Ȫ̗,Ȫ̘,Ȫ̙,Ȫ̚,Ơ̈̄,Ȫ̜,Ȫ̝,Ȫ̞,Ȫ̟,Ȫ̠,Ȫ̡,Ȫ̢,Ọ̈̄,Ȫ̤,Ȫ̥,Ȫ̦,Ȫ̧,Ǫ̈̄,Ȫ̩,Ȫ̪,Ȫ̫,Ȫ̬,Ȫ̭,Ȫ̮,Ȫ̯,Ȫ̰,Ȫ̱,Ȫ̲,Ȫ̳,Ȫ̴,Ȫ̵,Ȫ̶,Ȫ̷,Ȫ̸,Ȫ̹,Ȫ̺,Ȫ̻,Ȫ̼},
9664     P = {Ṗ,Ṗ̄,Ṗ̅,Ṗ̆,Ṗ̇,Ṗ̈,Ṗ̉,Ṗ̊,Ṗ̋,Ṗ̌,Ṗ̍,Ṗ̎,Ṗ̏,Ṗ̐,Ṗ̑,Ṗ̒,Ṗ̓,Ṗ̔,Ṗ̕,Ṗ̖,Ṗ̗,Ṗ̘,Ṗ̙,Ṗ̚,Ṗ̛,Ṗ̜,Ṗ̝,Ṗ̞,Ṗ̟,Ṗ̠,Ṗ̡,Ṗ̢,Ṗ̣,Ṗ̤,Ṗ̥,Ṗ̦,Ṗ̧,Ṗ̨,Ṗ̩,Ṗ̪,Ṗ̫,Ṗ̬,Ṗ̭,Ṗ̮,Ṗ̯,Ṗ̰,Ṗ̱,Ṗ̲,Ṗ̳,Ṗ̴,Ṗ̵,Ṗ̶,Ṗ̷,Ṗ̸,Ṗ̹,Ṗ̺,Ṗ̻,Ṗ̼},
9665     R = {Ṛ,Ṝ,Ṛ̅,Ṛ̆,Ṛ̇,Ṛ̈,Ṛ̉,Ṛ̊,Ṛ̋,Ṛ̌,Ṛ̍,Ṛ̎,Ṛ̏,Ṛ̐,Ṛ̑,Ṛ̒,Ṛ̓,Ṛ̔,Ṛ̕,Ṛ̖,Ṛ̗,Ṛ̘,Ṛ̙,Ṛ̚,Ṛ̛,Ṛ̜,Ṛ̝,Ṛ̞,Ṛ̟,Ṛ̠,Ṛ̡,Ṛ̢,Ṛ̣,Ṛ̤,Ṛ̥,Ṛ̦,Ŗ̣,Ṛ̨,Ṛ̩,Ṛ̪,Ṛ̫,Ṛ̬,Ṛ̭,Ṛ̮,Ṛ̯,Ṛ̰,Ṛ̱,Ṛ̲,Ṛ̳,Ṛ̴,Ṛ̵,Ṛ̶,Ṛ̷,Ṛ̸,Ṛ̹,Ṛ̺,Ṛ̻,Ṛ̼},
9666     S = {Ŝ,Ŝ̄,Ŝ̅,Ŝ̆,Ŝ̇,Ŝ̈,Ŝ̉,Ŝ̊,Ŝ̋,Ŝ̌,Ŝ̍,Ŝ̎,Ŝ̏,Ŝ̐,Ŝ̑,Ŝ̒,Ŝ̓,Ŝ̔,Ŝ̕,Ŝ̖,Ŝ̗,Ŝ̘,Ŝ̙,Ŝ̚,Ŝ̛,Ŝ̜,Ŝ̝,Ŝ̞,Ŝ̟,Ŝ̠,Ŝ̡,Ŝ̢,Ṣ̂,Ŝ̤,Ŝ̥,Ș̂,Ş̂,Ŝ̨,Ŝ̩,Ŝ̪,Ŝ̫,Ŝ̬,Ŝ̭,Ŝ̮,Ŝ̯,Ŝ̰,Ŝ̱,Ŝ̲,Ŝ̳,Ŝ̴,Ŝ̵,Ŝ̶,Ŝ̷,Ŝ̸,Ŝ̹,Ŝ̺,Ŝ̻,Ŝ̼},
9667     T = {Ṭ,Ṭ̄,Ṭ̅,Ṭ̆,Ṭ̇,Ṭ̈,Ṭ̉,Ṭ̊,Ṭ̋,Ṭ̌,Ṭ̍,Ṭ̎,Ṭ̏,Ṭ̐,Ṭ̑,Ṭ̒,Ṭ̓,Ṭ̔,Ṭ̕,Ṭ̖,Ṭ̗,Ṭ̘,Ṭ̙,Ṭ̚,Ṭ̛,Ṭ̜,Ṭ̝,Ṭ̞,Ṭ̟,Ṭ̠,Ṭ̡,Ṭ̢,Ṭ̣,Ṭ̤,Ṭ̥,Ṭ̦,Ţ̣,Ṭ̨,Ṭ̩,Ṭ̪,Ṭ̫,Ṭ̬,Ṭ̭,Ṭ̮,Ṭ̯,Ṭ̰,Ṭ̱,Ṭ̲,Ṭ̳,Ṭ̴,Ṭ̵,Ṭ̶,Ṭ̷,Ṭ̸,Ṭ̹,Ṭ̺,Ṭ̻,Ṭ̼},
9668     U = {Ū,Ū̄,Ū̅,Ū̆,Ū̇,Ṻ,Ū̉,Ū̊,Ū̋,Ū̌,Ū̍,Ū̎,Ū̏,Ū̐,Ū̑,Ū̒,Ū̓,Ū̔,Ū̕,Ū̖,Ū̗,Ū̘,Ū̙,Ū̚,Ư̄,Ū̜,Ū̝,Ū̞,Ū̟,Ū̠,Ū̡,Ū̢,Ụ̄,Ṳ̄,Ū̥,Ū̦,Ū̧,Ų̄,Ū̩,Ū̪,Ū̫,Ū̬,Ṷ̄,Ū̮,Ū̯,Ṵ̄,Ū̱,Ū̲,Ū̳,Ū̴,Ū̵,Ū̶,Ū̷,Ū̸,Ū̹,Ū̺,Ū̻,Ū̼},
9669     V = {Ṽ,Ṽ̄,Ṽ̅,Ṽ̆,Ṽ̇,Ṽ̈,Ṽ̉,Ṽ̊,Ṽ̋,Ṽ̌,Ṽ̍,Ṽ̎,Ṽ̏,Ṽ̐,Ṽ̑,Ṽ̒,Ṽ̓,Ṽ̔,Ṽ̕,Ṽ̖,Ṽ̗,Ṽ̘,Ṽ̙,Ṽ̚,Ṽ̛,Ṽ̜,Ṽ̝,Ṽ̞,Ṽ̟,Ṽ̠,Ṽ̡,Ṽ̢,Ṿ̃,Ṽ̤,Ṽ̥,Ṽ̦,Ṽ̧,Ṽ̨,Ṽ̩,Ṽ̪,Ṽ̫,Ṽ̬,Ṽ̭,Ṽ̮,Ṽ̯,Ṽ̰,Ṽ̱,Ṽ̲,Ṽ̳,Ṽ̴,Ṽ̵,Ṽ̶,Ṽ̷,Ṽ̸,Ṽ̹,Ṽ̺,Ṽ̻,Ṽ̼},
9670     W = {Ẁ,Ẁ̄,Ẁ̅,Ẁ̆,Ẁ̇,Ẁ̈,Ẁ̉,Ẁ̊,Ẁ̋,Ẁ̌,Ẁ̍,Ẁ̎,Ẁ̏,Ẁ̐,Ẁ̑,Ẁ̒,Ẁ̓,Ẁ̔,Ẁ̕,Ẁ̖,Ẁ̗,Ẁ̘,Ẁ̙,Ẁ̚,Ẁ̛,Ẁ̜,Ẁ̝,Ẁ̞,Ẁ̟,Ẁ̠,Ẁ̡,Ẁ̢,Ẉ̀,Ẁ̤,Ẁ̥,Ẁ̦,Ẁ̧,Ẁ̨,Ẁ̩,Ẁ̪,Ẁ̫,Ẁ̬,Ẁ̭,Ẁ̮,Ẁ̯,Ẁ̰,Ẁ̱,Ẁ̲,Ẁ̳,Ẁ̴,Ẁ̵,Ẁ̶,Ẁ̷,Ẁ̸,Ẁ̹,Ẁ̺,Ẁ̻,Ẁ̼},
9671     X = {Ẋ,Ẋ̄,Ẋ̅,Ẋ̆,Ẋ̇,Ẋ̈,Ẋ̉,Ẋ̊,Ẋ̋,Ẋ̌,Ẋ̍,Ẋ̎,Ẋ̏,Ẋ̐,Ẋ̑,Ẋ̒,Ẋ̓,Ẋ̔,Ẋ̕,Ẋ̖,Ẋ̗,Ẋ̘,Ẋ̙,Ẋ̚,Ẋ̛,Ẋ̜,Ẋ̝,Ẋ̞,Ẋ̟,Ẋ̠,Ẋ̡,Ẋ̢,Ẋ̣,Ẋ̤,Ẋ̥,Ẋ̦,Ẋ̧,Ẋ̨,Ẋ̩,Ẋ̪,Ẋ̫,Ẋ̬,Ẋ̭,Ẋ̮,Ẋ̯,Ẋ̰,Ẋ̱,Ẋ̲,Ẋ̳,Ẋ̴,Ẋ̵,Ẋ̶,Ẋ̷,Ẋ̸,Ẋ̹,Ẋ̺,Ẋ̻,Ẋ̼},
9672     Y = {Ỳ,Ỳ̄,Ỳ̅,Ỳ̆,Ỳ̇,Ỳ̈,Ỳ̉,Ỳ̊,Ỳ̋,Ỳ̌,Ỳ̍,Ỳ̎,Ỳ̏,Ỳ̐,Ỳ̑,Ỳ̒,Ỳ̓,Ỳ̔,Ỳ̕,Ỳ̖,Ỳ̗,Ỳ̘,Ỳ̙,Ỳ̚,Ỳ̛,Ỳ̜,Ỳ̝,Ỳ̞,Ỳ̟,Ỳ̠,Ỳ̡,Ỳ̢,Ỵ̀,Ỳ̤,Ỳ̥,Ỳ̦,Ỳ̧,Ỳ̨,Ỳ̩,Ỳ̪,Ỳ̫,Ỳ̬,Ỳ̭,Ỳ̮,Ỳ̯,Ỳ̰,Ỳ̱,Ỳ̲,Ỳ̳,Ỳ̴,Ỳ̵,Ỳ̶,Ỳ̷,Ỳ̸,Ỳ̹,Ỳ̺,Ỳ̻,Ỳ̼},
9673     Z = {Ẑ,Ẑ̄,Ẑ̅,Ẑ̆,Ẑ̇,Ẑ̈,Ẑ̉,Ẑ̊,Ẑ̋,Ẑ̌,Ẑ̍,Ẑ̎,Ẑ̏,Ẑ̐,Ẑ̑,Ẑ̒,Ẑ̓,Ẑ̔,Ẑ̕,Ẑ̖,Ẑ̗,Ẑ̘,Ẑ̙,Ẑ̚,Ẑ̛,Ẑ̜,Ẑ̝,Ẑ̞,Ẑ̟,Ẑ̠,Ẑ̡,Ẑ̢,Ẓ̂,Ẑ̤,Ẑ̥,Ẑ̦,Ẑ̧,Ẑ̨,Ẑ̩,Ẑ̪,Ẑ̫,Ẑ̬,Ẑ̭,Ẑ̮,Ẑ̯,Ẑ̰,Ẕ̂,Ẑ̲,Ẑ̳,Ẑ̴,Ẑ̵,Ẑ̶,Ẑ̷,Ẑ̸,Ẑ̹,Ẑ̺,Ẑ̻,Ẑ̼},
9674     a = {ă,â,ă̄,ă̅,ă̆,ă̇,ă̈,ẳ,ă̊,ă̋,ă̌,ă̍,ă̎,ă̏,ă̐,ă̑,ă̒,ă̓,ă̔,ă̕,ă̖,ă̗,ă̘,ă̙,ă̚,ă̛,ă̜,ă̝,ă̞,ă̟,ă̠,ă̡,ă̢,ặ,ă̤,ḁ̆,ă̦,ă̧,ą̆,ă̩,ă̪,ă̫,ă̬,ă̭,ă̮,ă̯,ă̰,ă̱,ă̲,ă̳,ă̴,ă̵,ă̶,ă̷,ă̸,ă̹,ă̺,ă̻,ă̼}, % a°
9675     b = {ḃ,ḃ̄,ḃ̅,ḃ̆,ḃ̇,ḃ̈,ḃ̉,ḃ̊,ḃ̋,ḃ̌,ḃ̍,ḃ̎,ḃ̏,ḃ̐,ḃ̑,ḃ̒,ḃ̓,ḃ̔,ḃ̕,ḃ̖,ḃ̗,ḃ̘,ḃ̙,ḃ̚,ḃ̛,ḃ̜,ḃ̝,ḃ̞,ḃ̟,ḃ̠,ḃ̡,ḃ̢,ḅ̇,ḃ̤,ḃ̥,ḃ̦,ḃ̧,ḃ̨,ḃ̩,ḃ̪,ḃ̫,ḃ̬,ḃ̭,ḃ̮,ḃ̯,ḃ̰,ḇ̇,ḃ̲,ḃ̳,ḃ̴,ḃ̵,ḃ̶,ḃ̷,ḃ̸,ḃ̹,ḃ̺,ḃ̻,ḃ̼},
9676     c = {ç,ç̄,ç̅,ç̆,ç̇,ç̈,ç̉,ç̊,ç̋,ç̌,ç̍,ç̎,ç̏,ç̐,ç̑,ç̒,ç̓,ç̔,ç̕,ç̖,ç̗,ç̘,ç̙,ç̚,ç̛,ç̜,ç̝,ç̞,ç̟,ç̠,ç̡,ç̢,ç̣,ç̤,ç̥,ç̦,ç̧,ç̨,ç̩,ç̪,ç̫,ç̬,ç̭,ç̮,ç̯,ç̰,ç̱,ç̲,ç̳,ç̴,ç̵,ç̶,ç̷,ç̸,ç̹,ç̺,ç̻,ç̼},
9677     d = {ḏ,ḏ̄,ḏ̅,ḏ̆,ḏ̇,ḏ̈,ḏ̉,ḏ̊,ḏ̋,ḏ̌,ḏ̍,ḏ̎,ḏ̏,ḏ̐,ḏ̑,ḏ̒,ḏ̓,ḏ̔,ḏ̕,ḏ̖,ḏ̗,ḏ̘,ḏ̙,ḏ̚,ḏ̛,ḏ̜,ḏ̝,ḏ̞,ḏ̟,ḏ̠,ḏ̡,ḏ̢,ḏ̣,ḏ̤,ḏ̥,ḏ̦,ḑ̱,ḏ̨,ḏ̩,ḏ̪,ḏ̫,ḏ̬,ḏ̭,ḏ̮,ḏ̯,ḏ̰,ḏ̱,ḏ̲,ḏ̳,ḏ̴,ḏ̵,ḏ̶,ḏ̷,ḏ̸,ḏ̹,ḏ̺,ḏ̻,ḏ̼},
9678     e = {è,é,ê,ë,ē,ē̄,ē̅,ē̆,ē̇,ē̈,ē̉,ē̊,ē̋,ē̌,ē̍,ē̎,ē̏,ē̐,ē̑,ē̒,ē̓,ē̔,ē̕,ē̖,ē̗,ē̘,ē̙,ē̚,ē̛,ē̜,ē̝,ē̞,ē̟,ē̠,ē̡,ē̢,ẹ̄,ē̤,ē̥,ē̦,ȩ̄,ę̄,ē̩,ē̪,ē̫,ē̬,ḙ̄,ē̮,ē̯,ḛ̄,ē̱,ē̲,ē̳,ē̴,ē̵,ē̶,ē̷,ē̸,ē̹,ē̺,ē̻,ē̼},
9679     f = {ff},
9680     g = {ğ,ğ̄,ğ̅,ğ̆,ğ̇,ğ̈,ğ̉,ğ̊,ğ̋,ğ̌,ğ̍,ğ̎,ğ̏,ğ̐,ğ̑,ğ̒,ğ̓,ğ̔,ğ̕,ğ̖,ğ̗,ğ̘,ğ̙,ğ̚,ğ̛,ğ̜,ğ̝,ğ̞,ğ̟,ğ̠,ğ̡,ğ̢,ğ̣,ğ̤,ğ̥,ğ̦,ģ̆,ğ̨,ğ̩,ğ̪,ğ̫,ğ̬,ğ̭,ğ̮,ğ̯,ğ̰,ğ̱,ğ̲,ğ̳,ğ̴,ğ̵,ğ̶,ğ̷,ğ̸,ğ̹,ğ̺,ğ̻,ğ̼},
9681     h = {ḥ,ḥ̄,ḥ̅,ḥ̆,ḥ̇,ḥ̈,ḥ̉,ḥ̊,ḥ̋,ḥ̌,ḥ̍,ḥ̎,ḥ̏,ḥ̐,ḥ̑,ḥ̒,ḥ̓,ḥ̔,ḥ̕,ḥ̖,ḥ̗,ḥ̘,ḥ̙,ḥ̚,ḥ̛,ḥ̜,ḥ̝,ḥ̞,ḥ̟,ḥ̠,ḥ̡,ḥ̢,ḥ̣,ḥ̤,ḥ̥,ḥ̦,ḩ̣,ḥ̨,ḥ̩,ḥ̪,ḥ̫,ḥ̬,ḥ̭,ḥ̮,ḥ̯,ḥ̰,ḥ̱,ḥ̲,ḥ̳,ḥ̴,ḥ̵,ḥ̶,ḥ̷,ḥ̸,ḥ̹,ḥ̺,ḥ̻,ḥ̼},
9682     i = {ı,İ̇,İ̈,İ̉,İ̊,İ̋,İ̌,İ̍,İ̎,İ̏,İ̐,İ̑,İ̒,İ̓,İ̔,İ̕,İ̖,İ̗,İ̘,İ̙,İ̚,İ̛,İ̜,İ̝,İ̞,İ̟,İ̠,İ̡,İ̢,Ị̇,İ̤,İ̥,İ̦,İ̧,Į̇,İ̩,İ̪,İ̫,İ̬,İ̭,İ̮,İ̯,Ḭ̇,İ̱,İ̲,İ̳,İ̴,İ̵,İ̶,İ̷,İ̸,İ̹,İ̺,İ̻,İ̼},
9683     j = {ȷ},
9684     k = {ḵ,ḵ̄,ḵ̅,ḵ̆,ḵ̇,ḵ̈,ḵ̉,ḵ̊,ḵ̋,ḵ̌,ḵ̍,ḵ̎,ḵ̏,ḵ̐,ḵ̑,ḵ̒,ḵ̓,ḵ̔,ḵ̕,ḵ̖,ḵ̗,ḵ̘,ḵ̙,ḵ̚,ḵ̛,ḵ̜,ḵ̝,ḵ̞,ḵ̟,ḵ̠,ḵ̡,ḵ̢,ḵ̣,ḵ̤,ḵ̥,ḵ̦,ķ̱,ḵ̨,ḵ̩,ḵ̪,ḵ̫,ḵ̬,ḵ̭,ḵ̮,ḵ̯,ḵ̰,ḵ̱,ḵ̲,ḵ̳,ḵ̴,ḵ̵,ḵ̶,ḵ̷,ḵ̸,ḵ̹,ḵ̺,ḵ̻,ḵ̼},
9685     l = {ĺ,ĺ̄,ĺ̅,ĺ̆,ĺ̇,ĺ̈,ĺ̉,ĺ̊,ĺ̋,ĺ̌,ĺ̍,ĺ̎,ĺ̏,ĺ̐,ĺ̑,ĺ̒,ĺ̓,ĺ̔,ĺ̕,ĺ̖,ĺ̗,ĺ̘,ĺ̙,ĺ̚,ĺ̛,ĺ̜,ĺ̝,ĺ̞,ĺ̟,ĺ̠,ĺ̡,ĺ̢,ḷ́,ĺ̤,ĺ̥,ĺ̦,ļ́,ĺ̨,ĺ̩,ĺ̪,ĺ̫,ĺ̬,ḽ́,ĺ̮,ĺ̯,ĺ̰,ḻ́,ĺ̲,ĺ̳,ĺ̴,ĺ̵,ĺ̶,ĺ̷,ĺ̸,ĺ̹,ĺ̺,ĺ̻,ĺ̼}, % ḷ

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9686 m = {ṁ,m̈,m},
9687 n = {ṅ,n̈,n̊,n̋,ň,n̍,n̎}, % 'n
9688 o = {ò,ó,ô,õ,ö,ø,ō,ȯ,Ȱ,ȱ,Ȳ,ȳ,ȴ,ȵ,ȶ,ȷ,ȸ,ȹ,Ⱥ,Ȼ,ȼ,Ƚ,Ⱦ,ȿ,Ⱥ,Ȼ,ȼ,Ƚ,Ⱦ,ȿ},
9689 p = {ṗ,p̈},
9690 r = {ṙ,r̈,r̊,r̋,ř,r̍,r̎},
9691 s = {ṡ,s̈,s̊,s̋,š,s̍,s̎},
9692 t = {ṫ,ẗ,t̊,t̋,ť}, % t
9693 u = {ù,ú,û,ü,ũ,ű,ů,ȳ,ȴ,ȵ,ȶ,ȷ,ȸ,ȹ,Ⱥ,Ȼ,ȼ,Ƚ,Ⱦ,ȿ,Ⱥ,Ȼ,ȼ,Ƚ,Ⱦ,ȿ},
9694 v = {v̇,v̈},
9695 w = {ẇ,ẅ,ẘ,w̋,w̌,w̍,w̎},
9696 x = {ẋ,ẍ},
9697 y = {ẏ,ÿ,ẙ,y̋,y̌,y̍,y̎},
9698 z = {ż,z̈,z̊,z̋,ž},
9699 }
9700 </Palatino>

```

### 3.1.5 Basic glyph set

There are quite a few fonts out there that don't even fill the T1 glyph set. To prevent a plethora of warnings, they may be aliased to the surrogate font TU-basic. Examples of such fonts are: Lato, Fontin and Bergamo.

```

9701 <*TU-basic>
9702 \DeclareCharacterInheritance
9703 { encoding = {TU,EU1,EU2},
9704   family   = {TU-basic} }
9705 { A = {Ä,Å,À,Á,Â},
9706   a = {ä,å,à,á,â},
9707   C = {Ç},
9708   c = {ç},
9709   D = {Ð},
9710   E = {Ê,É,Ê,Ë},
9711   e = {è,é,ê,ë},
9712   I = {Î,Í,Î,Ï},
9713   i = {ï,í,î,ï,ı},
9714   L = {Ł},
9715   l = {ł},
9716   N = {Ñ},
9717   n = {ñ},
9718   O = {Ø,Ô,Õ,Ö,Ï},
9719   o = {ø,ò,ó,ô,õ,ö},
9720   S = {Š},
9721   s = {š},
9722   U = {Û,Ü,Û,Ü},
9723   u = {û,ü,û,ü},
9724   Y = {Ÿ,Ÿ},

```

For some reason, the **ÿ** in the next line comes out as **ß**. Don't worry, there's really a **y** diaeresis in the source.

```

9725   y = {ÿ,ß},
9726   Z = {Ž},
9727   z = {ž}
9728 }
9729 </TU-basic>

```

### 3.1.6 Empty glyph set

Other fonts, e.g., the self-professedly awesome Font Awesome font, have no meaningful glyph arsenal at all, and should therefore be aliased so that empty settings are applied.

```

9730 <*TU-empty>
9731 \DeclareCharacterInheritance

```

```

9732 { encoding = {TU,EU1,EU2},
9733       family   = {TU-empty} }
9734 { }
9735 </TU-empty>

```

## 3.2 Character protrusion

```

9736
9737 %%% -----
9738 %%% PROTRUSION
9739

```

### 3.2.1 Latin Modern Roman/New Computer Modern

```

9740 <*LatinModernRoman|NewComputerModern>
9741 \SetProtrusion
9742 <LatinModernRoman> [ name = LMR-default ]
9743 <NewComputerModern> [ name = NCM-default ]
9744 <LatinModernRoman> { encoding = {TU,EU1,EU2},
9745 <LatinModernRoman>       family   = Latin Modern Roman }
9746 <NewComputerModern> { }
9747 {
9748   A = {50,50},
9749   Æ = {50, },
9750   F = { ,50},
9751   J = {50, },
9752   K = { ,50},
9753   L = { ,50},
9754   T = {50,50},
9755   V = {50,50},
9756   W = {50,50},
9757   X = {50,50},
9758   Y = {50,50},
9759   k = { ,50},
9760   r = { ,50},
9761   t = { ,70},
9762   v = {50,50},
9763   w = {50,50},
9764   x = {50,50},
9765   y = {50,70},
9766   0 = { ,50},
9767   1 = {100,200},
9768   2 = {50,50},
9769   3 = {50,50},
9770   4 = {70,70},
9771   5 = { ,50},
9772   6 = { ,50},
9773   7 = {50,100},
9774   8 = { ,50},
9775   9 = { ,50},
9776   . = { ,700},
9777   {,}= { ,500},
9778   := { ,500},
9779   ; = { ,500},
9780   ! = { ,100},
9781   ? = { ,200},
9782   @ = {50,50},
9783   ~ = {200,250},
9784   \% = {50,50},
9785   * = {300,300},
9786   + = {250,250},
9787   - = {400,500}, % /hyphen
9788   - = {400,300}, % /endash
9789   — = {300,200}, % /emdash
9790   _ = {200,200}, % /underscore

```

```

9791 / = {200,300},
9792 /backslash = {200,300},
9793 ' = {300,400}, % /quotesingle
9794 ‘ = {300,400}, ’ = {300,400},
9795 “ = {300,300}, ” = {300,300},
9796 , = {400,400}, „ = {400,400},
9797 ‹ = {400,400}, › = {300,500},
9798 « = {300,200}, » = {100,400},
9799 ¡ = {100, }, ¿ = {100, },
9800 ( = {300, }, ) = { ,300},
9801 < = {200,100}, > = {100,200},
9802 /braceleft = {400,200}, /braceright = {200,400},
9803 /angleleft = {400, }, /angleright = { ,400},
9804 † = {100,100},
9805 ‡ = { 80, 80},
9806 • = {200,200},
9807 · = {400,450}, % / periodcentered
9808 °C = { 80, 50},
9809 ℄ = { , 50},
9810 ° = {400,400},
9811 ™ = {100,200},
9812 © = {100,100},
9813 ® = {100,100},
9814 ª = {100,200},
9815 º = {100,200},
9816 ¹ = {200,250},
9817 º = { 50,100},
9818 ³ = { 50,100},
9819 ¬ = {200, },
9820 − = {300,300},
9821 ± = {150,200},
9822 × = {150,250},
9823 ÷ = {150,250},
9824 € = {100, },
9825 < *LatinModernRoman >
9826 /one.oldstyle = {100,100},
9827 /two.oldstyle = { 50, 50},
9828 /three.oldstyle = { 30, 80},
9829 /four.oldstyle = { 50, 50},
9830 /seven.oldstyle = { 50, 80},
9831 < /LatinModernRoman >
9832 < *NewComputerModern >
9833 Α = {50,50}, % /Alphatonos
9834 Ά = {120,50}, %
9835 Ἀ = {120,50}, %
9836 Ἀ = {80,50}, %
9837 Ἀ = {220,50}, %
9838 Ἀ = {220,50}, %
9839 Ἀ = {170,50}, %
9840 Ἀ = {170,50}, %
9841 Ἀ = {190,50}, %
9842 Ἀ = {190,50}, %
9843 Ἀ = {150,50}, %
9844 Ἀ = {80,50}, %
9845 Ἀ = {220,50}, %
9846 Ἀ = {220,50}, %
9847 Ἀ = {170,50}, %
9848 Ἀ = {170,50}, %
9849 Ἀ = {210,50}, %
9850 Ἀ = {210,50}, %
9851 /uni1FBC.alt = {,205}, % Alpha prosgegrammeni
9852 /uni1F88.alt = {50,190}, %Alpha psili prosgegrammeni
9853 /uni1F89.alt = {,200}, %Alpha dasia prosgegrammeni
9854 /uni1F8A.alt = {130,180}, %Alpha psili baria prosgegrammeni
9855 /uni1F8B.alt = {130,190}, %Alpha dasia baria prosgegrammeni

```

```

9856 /uni1F8C.alt = {100,190}, %Alpha psili oxia prosgegrammeni
9857 /uni1F8D.alt = {70,190}, %Alpha dasia oxia prosgegrammeni
9858 /uni1F8E.alt = {120,190}, %Alpha psili perispomeni prosgegrammeni
9859 /uni1F8F.alt = {120,190}, %Alpha dasia perispomeni prosgegrammeni
9860 %
9861 /uni1FCC.alt = {205}, % Eta prosgegrammeni
9862 /uni1F98.alt = {185,170}, %Eta psili prosgegrammeni
9863 /uni1F99.alt = {185,170}, %Eta dasia prosgegrammeni
9864 /uni1F9A.alt = {220,170}, %Eta psili baria prosgegrammeni
9865 /uni1F9B.alt = {220,170}, %Eta dasia baria prosgegrammeni
9866 /uni1F9C.alt = {220,170}, %Eta psili oxia prosgegrammeni
9867 /uni1F9D.alt = {220,170}, %Eta dasia oxia prosgegrammeni
9868 /uni1F9E.alt = {255,170}, %Eta psili perispomeni prosgegrammeni
9869 /uni1F9F.alt = {255,170}, %Eta dasia perispomeni prosgegrammeni
9870 %
9871 O = {95,50}, %
9872 <NewComputerModern>
9873 Γ = { ,180}, % /Gamma
9874 <LatinModernRoman> Δ = {100,100}, % /Delta
9875 <NewComputerModern> Δ = {50,50}, % /Delta
9876 Θ = { 50, 50}, % /Theta
9877 <LatinModernRoman> Λ = {100,100}, % /Lambda
9878 <NewComputerModern> Λ = {50,50}, % /Lambda
9879 % Ξ = {,}, % /Xi
9880 % Π = {,}, % /Pi
9881 Σ = { 50, 50}, % /Sigma
9882 <LatinModernRoman> Υ = {100,100}, % /Upsilon
9883 <NewComputerModern> Υ = {80,80}, % /Upsilon
9884 Φ = { 50, 50}, % /Phi
9885 Ψ = { 50, 50}, % /Psi
9886 <*NewComputerModern>
9887 Ω = { 20, 30}, % /Omega
9888 Ω = {150,30},
9889 Ω = {220,30},
9890 Ω = {205,30},
9891 Ω = {285,30},
9892 Ω = {285,30},
9893 Ω = {270,30},
9894 Ω = {270,30},
9895 Ω = {310,30},
9896 Ω = {310,30},
9897 Ω = {205,30},
9898 Ω = {205,30},
9899 Ω = {285,30},
9900 Ω = {285,30},
9901 Ω = {270,30},
9902 Ω = {270,30},
9903 Ω = {310,30},
9904 Ω = {310,30},
9905 /uni1FFC.alt = {,230}, % Omega prosgegrammeni
9906 /uni1FA8.alt = {185,190}, %Omega psili prosgegrammeni
9907 /uni1FA9.alt = {185,190}, %Omega dasia prosgegrammeni
9908 /uni1FAA.alt = {220,190}, %Omega psili baria prosgegrammeni
9909 /uni1FAB.alt = {220,190}, %Omega dasia baria prosgegrammeni
9910 /uni1FAC.alt = {220,190}, %Omega psili oxia prosgegrammeni
9911 /uni1FAD.alt = {220,190}, %Omega dasia oxia prosgegrammeni
9912 /uni1FAE.alt = {255,190}, %Omega psili perispomeni prosgegrammeni
9913 /uni1FAF.alt = {255,190}, %Omega dasia perispomeni prosgegrammeni
9914 %
9915 α = {,50},
9916 γ = {50,50},
9917 ζ = {,50},
9918 ϑ = {30,40},
9919 ι = {,50},
9920 ï = {-20,-30},

```

```

9921 x = {50,50},
9922 λ = {50,50},
9923 v = {50,25},
9924 π = {50,50},
9925 σ = {,50},
9926 c = {,50},
9927 τ = {50,50},
9928 χ = {50,50},
9929 ψ = {50,50},
9930 % /uni1F98.alt = {,},

```

CMU Serif doesn't include \*.end glyphs, and the OldStyle numbers' names differ.

```

9931 }
9932
9933 \SetProtrusion
9934 [ name      = NCM-TU,
9935   load      = NCM-default ]
9936 { encoding = {TU,EU1,EU2},
9937   family   = {New Computer Modern} }
9938 {
9939   /a.end = {,330},
9940   /e.end = {,350},
9941   /k.alt = { ,50},
9942   /r.end = {,300},
9943   /m.end = {,200},
9944   /n.end = {,300},
9945   /one.oldstyle = {100,100},
9946   /two.oldstyle = { 50, 50},
9947   /three.oldstyle = { 30, 80},
9948   /four.oldstyle = { 50, 50},
9949   /seven.oldstyle = { 50, 80},
9950 }
9951
9952 \SetProtrusion
9953 [ name      = CMU-TU,
9954   load      = NCM-default ]
9955 { encoding = {TU,EU1,EU2},
9956   family   = {CMU Serif} }
9957 {
9958   /oneoldstyle = {100,100},
9959   /twooldstyle = { 50, 50},
9960   /threeoldstyle = { 30, 80},
9961   /fouroldstyle = { 50, 50},
9962   /sevenoldstyle = { 50, 80},
9963 }
9964 }
9965
9966 \SetProtrusion
9967 <LatinModernRoman> [ name      = LMR-it ]
9968 <NewComputerModern> [ name      = NCM-it ]
9969 <LatinModernRoman> { encoding = {TU,EU1,EU2},
9970 <LatinModernRoman>   family   = Latin Modern Roman,
9971 <LatinModernRoman>   shape    = {it,sl} }
9972 <NewComputerModern> { }
9973 {
9974   A = {125,100},
9975   Æ = {125,-55},
9976   B = {90,-40},
9977   C = {145,-75},
9978   D = {75,-28},
9979   E = {80,-55},
9980   F = {85,-80},
9981   G = {153,-15},
9982   H = {73,-60},
9983   I = {140,-120},

```

9984 IJ = {140,-80},  
9985 J = {135,-80},  
9986 K = {70,-30},  
9987 L = {87, 40},  
9988 M = {67,-45},  
9989 N = {75,-55},  
9990 O = {150,-30},  
9991 OE = {150,-55},  
9992 P = {82,-50},  
9993 Q = {150,-30},  
9994 R = {75, 15},  
9995 S = {90,-65},  
9996 \$ = {100,-20},  
9997 T = {220,-85},  
9998 U = {230,-55},  
9999 V = {260,-60},  
10000 W = {185,-55},  
10001 X = {70,-30},  
10002 Y = {250,-60},  
10003 Z = {90,-60},  
10004 a = {150,-10},  
10005 b = {170, },  
10006 c = {173,-10},  
10007 d = {150,-55},  
10008 e = {180, },  
10009 f = { , -250},  
10010 g = {150,-10},  
10011 h = {100, },  
10012 i = {210, },  
10013 ij = {210,-40},  
10014 j = { , -40},  
10015 k = {110,-50},  
10016 l = {240,-110},  
10017 m = {80, },  
10018 n = {115, },  
10019 o = {155, },  
10020 q = {170,-40},  
10021 r = {155,-40},  
10022 s = {130, },  
10023 t = {230,-10},  
10024 u = {120, },  
10025 v = {140,-25},  
10026 w = {98,-20},  
10027 x = {65,-40},  
10028 y = {130,-20},  
10029 z = {110,-80},  
10030 0 = {170,-85},  
10031 1 = {230,110},  
10032 2 = {130,-70},  
10033 3 = {140,-70},  
10034 4 = {130,80},  
10035 5 = {160, },  
10036 6 = {175,-30},  
10037 7 = {250,-150},  
10038 8 = {130,-40},  
10039 9 = {155,-80},  
10040 . = { , 500},  
10041 {,} = { , 450},  
10042 : = { , 300},  
10043 ; = { , 300},  
10044 & = {130,30},  
10045 \% = {180,50},  
10046 \* = {380,20},  
10047 + = {180,200},  
10048 @ = {180,10},



```

10049 ~ = {200,150},
10050 (= {300, }, ) = { ,70},
10051 / = {100,100},
10052 - = {500,300}, % /hyphen
10053 – = {500,300}, % /endash
10054 — = {400,170}, % /emdash
10055 _ = {100,200}, % /underscore
10056 ' = {300,400}, % /quotesingle
10057 " = {500,300},
10058 ‘ = {800,200}, ’ = {800,-20},
10059 “ = {540,100}, ” = {500,100},
10060 , = {300,700}, „ = {200,600},
10061 ‹ = {500,300}, › = {400,400},
10062 « = {400,100}, » = {200,300},
10063 ¡ = {200, }, ¿ = {200, },
10064 < = {300,100}, > = {200,100},
10065 /backslash = {300,300},
10066 /braceleft = {400,100}, /braceright = {200,200},
10067 † = {200, 80},
10068 ‡ = {120, 80},
10069 • = {220,100},
10070 · = {550,300}, % / periodcentered
10071 °C = {170, },
10072 ¢ = {100, 50},
10073 ¶ = {200, },
10074 ° = {500,300},
10075 ™ = {200, 70},
10076 © = { 50, 70},
10077 ® = { 50, 70},
10078 º = {140,100},
10079 º = {140,100},
10080 ¹ = {400,150},
10081 º = {250, 80},
10082 ³ = {250, 80},
10083 ¬ = {250, 80},
10084 − = {300,200},
10085 ± = {150,170},
10086 × = {200,200},
10087 ÷ = {200,200},
10088 € = {150, },
10089 < *LatinModernRoman >
10090 /one.oldstyle = {100,100},
10091 /two.oldstyle = {100, 80},
10092 /three.oldstyle = { 80, 50},
10093 /four.oldstyle = { 80, 80},
10094 /five.oldstyle = { 50, },
10095 /six.oldstyle = { 50, },
10096 /seven.oldstyle = { 80, 80},
10097 /eight.oldstyle = { 50, },
10098 < /LatinModernRoman >
10099 Γ = {100,120}, % /Gamma
10100 Δ = {120,100}, % /Delta
10101 Θ = {120, 50}, % /Theta
10102 < LatinModernRoman > Λ = {130,100}, % /Lambda
10103 < NewComputerModern > Λ = {160,100}, % /Lambda
10104 Ξ = {100,}, % /Xi
10105 Π = {100,}, % /Pi
10106 Σ = {100, 50}, % /Sigma
10107 < LatinModernRoman > Υ = {180,100}, % /Upsilon
10108 < NewComputerModern > Υ = {260,100}, % /Upsilon
10109 Φ = {130, 70}, % /Phi
10110 Ψ = {130, 50}, % /Psi
10111 Ω = { 50,}, % /Omega
10112 < *NewComputerModern >
10113 Α = {190,50}, %

```

```

10114   Å = {220,50}, %
10115   Å = {200,50}, %
10116   ˆÅ = {300,50}, %
10117   ˘Å = {300,50}, %
10118   ˇÅ = {300,50}, %
10119   ˚Å = {300,50}, %
10120   ˛Å = {320,50}, %
10121   ˜Å = {320,50}, %
10122   ˝Å = {200,50}, %
10123   ˞Å = {200,50}, %
10124   ˟Å = {300,50}, %
10125   ˠÅ = {300,50}, %
10126   ˡÅ = {300,50}, %
10127   ˢÅ = {300,50}, %
10128   ˣÅ = {320,50}, %
10129   ˚Å = {320,50}, %
10130   /uni1FBC.alt = {,205}, % Alpha prosgegrammeni
10131   /uni1F88.alt = {50,190}, %Alpha psili prosgegrammeni
10132   /uni1F89.alt = {,200}, %Alpha dasia prosgegrammeni
10133   /uni1F8A.alt = {130,180}, %Alpha psili baria prosgegrammeni
10134   /uni1F8B.alt = {130,190}, %Alpha dasia baria prosgegrammeni
10135   /uni1F8C.alt = {100,190}, %Alpha psili oxia prosgegrammeni
10136   /uni1F8D.alt = {70,190}, %Alpha dasia oxia prosgegrammeni
10137   /uni1F8E.alt = {120,190}, %Alpha psili perispomeni prosgegrammeni
10138   /uni1F8F.alt = {120,190}, %Alpha dasia perispomeni prosgegrammeni
10139   %
10140   /uni1FCC.alt = {,205}, % Eta prosgegrammeni
10141   /uni1F98.alt = {185,170}, %Eta psili prosgegrammeni
10142   /uni1F99.alt = {185,170}, %Eta dasia prosgegrammeni
10143   /uni1F9A.alt = {220,170}, %Eta psili baria prosgegrammeni
10144   /uni1F9B.alt = {220,170}, %Eta dasia baria prosgegrammeni
10145   /uni1F9C.alt = {220,170}, %Eta psili oxia prosgegrammeni
10146   /uni1F9D.alt = {220,170}, %Eta dasia oxia prosgegrammeni
10147   /uni1F9E.alt = {255,170}, %Eta psili perispomeni prosgegrammeni
10148   /uni1F9F.alt = {255,170}, %Eta dasia perispomeni prosgegrammeni
10149   %
10150   O = {95,50}, %
10151   Ω = {120,30}, % /Omega
10152   Ω = {160,30},
10153   ˆΩ = {250,30},
10154   ˘Ω = {250,30},
10155   ˚Ω = {300,30},
10156   ˛Ω = {300,30},
10157   ˜Ω = {300,30},
10158   ˝Ω = {300,30},
10159   ˞Ω = {330,30},
10160   ˟Ω = {330,30},
10161   Ω = {30,30},
10162   ˆΩ = {230,30},
10163   ˘Ω = {230,30},
10164   ˚Ω = {300,30},
10165   ˛Ω = {300,30},
10166   ˜Ω = {300,30},
10167   ˝Ω = {300,30},
10168   ˞Ω = {330,30},
10169   ˟Ω = {330,30},
10170   /uni1FFC.alt = {,230}, % Omega prosgegrammeni
10171   /uni1FA8.alt = {185,190}, %Omega psili prosgegrammeni
10172   /uni1FA9.alt = {185,190}, %Omega dasia prosgegrammeni
10173   /uni1FAA.alt = {220,190}, %Omega psili baria prosgegrammeni
10174   /uni1FAB.alt = {220,190}, %Omega dasia baria prosgegrammeni
10175   /uni1FAC.alt = {220,190}, %Omega psili oxia prosgegrammeni
10176   /uni1FAD.alt = {220,190}, %Omega dasia oxia prosgegrammeni
10177   /uni1FAE.alt = {255,190}, %Omega psili perispomeni prosgegrammeni
10178   /uni1FAF.alt = {255,190}, %Omega dasia perispomeni prosgegrammeni

```

```

10179 %
10180   α = {50,50},
10181   γ = {100,50},
10182   δ = {30,50},
10183   ε = {30,},
10184   ζ = {20,50},
10185   θ = {30,40},
10186   ι = {,50},
10187   ï = {-20,-30},
10188   κ = {50,50},
10189   λ = {-20,50},
10190   ν = {50,25},
10191   ο = {40,},
10192   π = {50,50},
10193   σ = {40,50},
10194   ς = {20,50},
10195   τ = {50,50},
10196   υ = {80,},
10197   φ = {80,},
10198   χ = {20,},
10199   ψ = {80,},
10200 % /uniF98.alt = {,},
10201   }
10202
10203 \SetProtrusion
10204   [ name      = NCM-it-TU,
10205     load      = NCM-it ]
10206   { encoding = {TU,EU1,EU2},
10207     family   = {New Computer Modern},
10208     shape     = {it,sl} }
10209   {
10210     /a.end = {,330}, %Fix
10211     /e.end = {,350}, %Fix
10212     /k.alt = {,50}, %Fix
10213     /r.end = {,300}, %Fix
10214     /m.end = {,200}, %Fix
10215     /n.end = {,300}, %Fix
10216     /one.oldstyle = {100,100},
10217     /two.oldstyle = {100,80},
10218     /three.oldstyle = {80,50},
10219     /four.oldstyle = {80,80},
10220     /five.oldstyle = {50,},
10221     /six.oldstyle = {50,},
10222     /seven.oldstyle = {80,80},
10223     /eight.oldstyle = {50,},
10224   }
10225
10226 \SetProtrusion
10227   [ name      = CMU-it-TU,
10228     load      = NCM-it ]
10229   { encoding = {TU,EU1,EU2},
10230     family   = {CMU Serif},
10231     shape     = {it,sl} }
10232   {
10233     /oneoldstyle = {100,100},
10234     /twooldstyle = {100,80},
10235     /threeoldstyle = {80,50},
10236     /fouroldstyle = {80,80},
10237     /fiveoldstyle = {50,},
10238     /sixoldstyle = {50,},
10239     /sevenoldstyle = {80,80},
10240     /eightoldstyle = {50,},
10241   } </NewComputerModern>
10242   }
10243 </LatinModernRoman|NewComputerModern>

```

### 3.2.2 Charis SIL

```

10244 (*CharisSIL)
10245 \SetProtrusion
10246 [ name = Charis-default ]
10247 { encoding = {TU,EU1,EU2},
10248   family = Charis SIL }
10249 {
10250   A = {50,50},
10251   Æ = {50,50},
10252   C = {50, },
10253   D = { ,50},
10254   F = { ,50},
10255   G = {50, },
10256   J = {100, },
10257   K = { ,50},
10258   L = { ,50},
10259   Ḷ = { ,100},
10260   O = {50,50},
10261   Œ = {50, },
10262   P = { ,50},
10263   Q = {50,70},
10264   R = { ,50},
10265   ß = { ,40}, % capital sharp s
10266   T = {50,50},
10267   V = {50,50},
10268   W = {50,50},
10269   X = {50,50},
10270   Y = {50,50},
10271   k = { ,50},
10272   ḷ = { ,150},
10273   r = { ,50},
10274   t = { ,50},
10275   v = {50,50},
10276   w = {50,50},
10277   x = {50,50},
10278   y = { ,50},
10279   1 = {150,150},
10280   2 = {50,50},
10281   3 = {50, },
10282   4 = {100,50},
10283   6 = {50, },
10284   7 = {50,80},
10285   9 = {50,50},
10286   . = { ,600},
10287   {,} = { ,500},
10288   : = { ,400},
10289   ; = { ,300},
10290   ! = { ,100},
10291   ? = { ,200},
10292   @ = {50,50},
10293   ~ = {200,250},
10294   \% = { ,50},
10295   * = {300,300},
10296   + = {200,250},
10297   / = { ,200},
10298   /backslash = {150,200},
10299   | = {200,200},
10300   - = {400,500}, % hyphen
10301   - = {200,300}, % endash
10302   — = {150,250}, % emdash
10303   — = {200,200}, % Horizontal Bar = \texttwelveudash
10304   - = {150,150}, % Figure Dash = \textthreequartersemdash
10305   _ = {100,100},
10306   {=} = {100,100},

```

```

10307   ‘ = {300,400},   ’ = {300,400},
10308   “ = {300,300},   ” = {300,300},
10309   , = {400,400},   „ = {300,300},
10310   < = {400,300},   > = {300,400},
10311   « = {200,200},   » = {150,300},
10312   ¡ = {100,   },   ¿ = {100,   },
10313   ( = {200,   },   ) = {   ,200},
10314   < = {200,150},   > = {100,200},
10315   [ = {100,   },   ] = {   ,100},
10316   /braceleft = {200,   }, /braceright = {   ,300},
10317   † = { 80, 80},
10318   ‡ = {100,100},
10319   • = {200,200},
10320   ° = {150,200},
10321   ™ = {150,150},
10322   ¢ = { 50,   },
10323   £ = { 50,   },
10324   | = {200,200},
10325   © = {100,100},
10326   ® = {100,100},
10327   º = {100,200},
10328   ¸ = {200,200},
10329   ¬ = {200, 50},
10330   μ = {   ,100},
10331   ¶ = {   ,100},
10332   · = {300,400},
10333   ¹ = {200,300},
10334   º = {100,200},
10335   ³ = {100,200},
10336   € = {100,   },
10337   ± = {150,200},
10338   × = {200,200},
10339   ÷ = {250,250},
10340   /minus = {200,200},
10341   − = {200,200},
10342   % Cyrillic
10343   Б = {   ,50},
10344   Г = {   ,130},
10345   Ж = {50,50},
10346   З = {30,50},
10347   Л = {50,   },
10348   У = {50,50},
10349   Ф = {50,50},
10350   Ч = {100,   },
10351   Ъ = {   ,50},
10352   б = {   ,50},
10353   ѓ = {50,50},
10354   ю = {   ,40},
10355   я = {50,   },
10356   V = {50,50},
10357   € = {50,   },
10358   Ъ = {50,100},
10359   € = {50,   },
10360   Ъ = {50,50},
10361   Ъ = {   ,50},
10362   Ъ = {50,50},
10363   Ъ = {100,100},
10364   Ъ = {50,50},
10365   Ъ = {   ,50},
10366   Ъ = {   ,50},
10367   Ъ = {50,80},
10368   Ъ = {   ,80},
10369   Ъ = {50,50},
10370   Ъ = {50,   },
10371   Ъ = {50,40},

```

```

10372   K = { ,50},
10373   Æ = {50, },
10374   Œ = { ,50},
10375   Ḧ = { ,50},
10376   đ = { ,100},
10377   ǫ = {50,50},
10378   ɀ = { ,70},
10379   ƙ = { ,50},
10380   ɀ = {50, },
10381   ɀ = {50,50},
10382   ϕ = {50,50},
10383   ч = {50, },
10384   ъ = { ,50},
10385   ь = { ,50},
10386   э = { ,50},
10387   я = {50, },
10388   љ = {50, },
10389   њ = { ,50},
10390   њ = { ,50},
10391   ʋ = {50,50},
10392   ƣ = {50, },
10393   Ъ = { ,50},
10394   ʸ = {50,50},
10395   Ъ = { ,50},
10396   Ъ = { ,50},
10397   đ = { ,100},
10398   ʒ = {100,100},
10399   ʒ = {50,50},
10400   ɀ = {50,70},
10401   ɀ = { ,70},
10402   æ = {50,30},
10403   ɀ = { ,50},
10404   ɀ = { ,50},
10405   %   Д П Ц Ш Щ Ъ Ы Ь Ѡ ѡ Ѣ ѣ Ѥ ѥ Ѧ ѧ
10406   %   в д ж з и м н п ц ш ы ю ѧ ѧ ѣ ѣ ѥ ѥ Ѧ Ѧ ѧ ѧ
10407   % Greek
10408   Δ = {50,50},
10409   Ψ = {50,50},
10410   γ = {70,70},
10411   λ = {40,70},
10412   π = {40,50},
10413   ρ = { ,50},
10414   σ = { ,50},
10415   χ = {50,50},
10416 }
10417
10418 \SetProtrusion
10419   [ name      = Charis-it   ]
10420   { encoding = {TU,EU1,EU2},
10421     family   = Charis SIL,
10422     shape     = {it,sl} }
10423   {
10424     C = {50, },
10425     G = {50, },
10426     J = {50, },
10427     L = {50,50},
10428     O = {50, },
10429     Œ = {50, },
10430     Q = {50, },
10431     S = {50, },
10432     $ = {50, },
10433     T = {70, },
10434     o = {50,50},
10435     p = { ,50},
10436     q = {50, },

```

```

10437     t = { ,50},
10438     w = { ,50},
10439     y = { ,50},
10440     1 = {150,100},
10441     3 = {50, },
10442     4 = {100, },
10443     6 = {50, },
10444     7 = {100, },
10445     . = { ,700},
10446     {,}= { ,600},
10447     : = { ,400},
10448     ; = { ,400},
10449     ? = { ,150},
10450     & = { ,80},
10451     \% = {50,50},
10452     * = {300,200},
10453     + = {250,250},
10454     @ = {80,50},
10455     ~ = {150,150},
10456     / = { ,150},
10457     /backslash = {150,150},
10458     - = {300,400}, % hyphen
10459     – = {200,300}, % endash
10460     — = {150,200}, % emdash
10461     _ = { ,100},
10462     {=} = {200,200},
10463     ± = {150,200},
10464     × = {250,250},
10465     ÷ = {250,250},
10466     ° = {150,200},
10467     · = {300,400},
10468     ‘ = {400,200}, ’ = {400,200},
10469     “ = {300,200}, ” = {400,200},
10470     , = {200,500}, „ = {150,500},
10471     ‹ = {300,400}, › = {200,500},
10472     « = {200,300}, » = {150,400},
10473     ( = {200, }, ) = { ,200},
10474     < = {200,200}, > = {200,200},
10475     /braceleft = {300, }, /braceright = { ,200},
10476     % Cyrillic
10477     Ж = {50,30},
10478     Л = {50, },
10479     У = {50,30},
10480     Ф = {50, },
10481     Ч = {100, },
10482     Ъ = { ,50},
10483     Ь = { ,50},
10484     Э = {50,50},
10485     Я = {50, },
10486     В = {50,50},
10487     Љ = {50,50},
10488     Њ = {140,100},
10489     Ћ = {70,50},
10490     Ќ = {50,80},
10491     Њ = { ,80},
10492     Ћ = {50,50},
10493     Г = {50,50},
10494     Д = {50,30},
10495     М = {50, },
10496     Ф = {50, },
10497     Ч = {50, },
10498     Ъ = { ,50},
10499     Ь = { ,50},
10500     Э = { ,50},
10501     Я = {50, },

```

```

10502     њ = {50,50},
10503     Њ = { ,50},
10504     ѵ = {50,50},
10505     Ћ = { ,50},
10506     џ = {140,100},
10507     Ͱ = {70,50},
10508     ͱ = {50,70},
10509     Ͳ = { ,70},
10510     % Greek
10511     Γ = { ,130},
10512     Δ = {50,50},
10513     Ψ = {50,50},
10514     γ = {70,70},
10515     λ = {40,70},
10516     π = {40,50},
10517     ρ = { ,50},
10518     σ = { ,50},
10519     χ = {50,50},
10520 }

```

The small caps glyph names in Charis SIL have changed with version 5.0 of the font. We try to get the names right both with LuaTeX (where we can simply query the font version) and with XeTeX (where we check for glyph name).

```

10521
10522 % quick and dirty -- maybe we'll promote this to a
10523 % regular key some time
10524 \define@key{MT@pr@c}{command}{\csname #1\endcsname}
10525
10526 % glyph names have changed with version 5.0 of Charis SIL:
10527 % before: /a.SC, /b.SC, ...
10528 % after:  /a.sc, /b.sc, ...
10529 \ifx\MT@lua\undefined
10530   \gdef\MT@get@CHARIS@SC{
10531     % test whether glyph "a.sc" exists
10532     \ifnum\numexpr\XeTeXglyphindex "a.sc"\relax > 0
10533       \gdef\MT@CHARIS@SC{sc}%
10534     \else
10535       \gdef\MT@CHARIS@SC{SC}%
10536     \fi
10537   }
10538 \else
10539   \gdef\MT@get@CHARIS@SC{
10540     \gdef\MT@CHARIS@SC{\MT@lua{
10541       % check font version
10542       % -- why doesn't this work?:
10543       %   f = font.getfont(font.current());
10544       %   i = fontloader.info(f.filename);
10545       %   if (tonumber(i.version) < 5) then;
10546       %     if (tonumber(fontloader.info(font.getfont(font.current()).filename).version) < 5) then;
10547       %       tex.print("SC");
10548       %     else;
10549       %       tex.print("sc");
10550       %     end
10551     }}
10552   }
10553 \fi
10554
10555 \SetProtrusion
10556 [ name      = Charis-sc,
10557   load      = Charis-default,
10558   command   = {MT@get@CHARIS@SC} ]
10559 { encoding = {TU,EU1,EU2},
10560   family   = Charis SIL,
10561   shape     = {sc} }

```



```

10562 {
10563 %   A = {100,100}, % etc., doesn't work with \textsc
10564     /a.\MT@CHARIS@SC = {100,100},
10565     /c.\MT@CHARIS@SC = {50, },
10566     /d.\MT@CHARIS@SC = { ,50},
10567     /f.\MT@CHARIS@SC = { ,50},
10568     /g.\MT@CHARIS@SC = {50, },
10569     /j.\MT@CHARIS@SC = {100, },
10570     /k.\MT@CHARIS@SC = { ,50},
10571     /l.\MT@CHARIS@SC = { ,50},
10572     /f_l.\MT@CHARIS@SC = { ,50},
10573     /o.\MT@CHARIS@SC = {50,50},
10574     /oe.\MT@CHARIS@SC = {50, },
10575     /q.\MT@CHARIS@SC = {50,70},
10576     /r.\MT@CHARIS@SC = { ,50},
10577     /t.\MT@CHARIS@SC = {50,100},
10578     /v.\MT@CHARIS@SC = {50,50},
10579     /w.\MT@CHARIS@SC = {50,50},
10580     /x.\MT@CHARIS@SC = {50,50},
10581     /y.\MT@CHARIS@SC = {50,50}
10582 }
10583 </CharisSIL>

```

### 3.2.3 EB Garamond

```

10584 <*EBGaramond>
10585 \SetProtrusion
10586 [ name      = EBGaramond-TU,
10587   load      = EBGaramond-T1-LF ]
10588 { encoding = {TU,EU1,EU2},
10589   family   = EBGaramond }
10590 {
10591   /one.tosf = {150,150},
10592   /two.tosf = {50,50},
10593   /three.tosf = {50,50},
10594   /four.tosf = {50,50},
10595   /five.tosf = {50,50},
10596   /six.tosf = {50,50},
10597   /seven.tosf = {50,80},
10598   /eight.tosf = {50,50},
10599   /nine.tosf = {50,50},
10600   /one.lf = {50,50},
10601   /two.lf = {50,50},
10602   /four.lf = {50,50},
10603   /seven.lf = {50,50},
10604   /one.osf = {50,50},
10605   /two.osf = {50,50},
10606   /four.osf = {50,50},
10607   /seven.osf = {50,50},
10608   IV = { , 35},
10609   VI = { 35, },
10610   VII = { 30, },
10611   VIII = { 25, },
10612   IX = { , 35},
10613   XI = { 35, },
10614   XII = { 30, },
10615   iv = { , 25},
10616   vi = { 25, },
10617   vii = { 20, },
10618   viii = { 20, },
10619   ix = { , 25},
10620   xi = { 25, },
10621   xii = { 20, },
10622 % textcomp
10623 \textquotesingle = {400,500},
10624 _ = {200,250},

```

```

10625  f = { ,100},
10626  ℄ = { 50, },
10627  † = {100,100},
10628  ‡ = { 80, 80},
10629  • = { ,100},
10630  · = {300,400}, % periodcentered
10631  /twodotenleader = {150,200},
10632  /ellipsis = {100,150},
10633  °C = { 80, },
10634  ° = {400,400},
10635  ™ = {100,100},
10636  © = {100,100},
10637  ® = {100,100},
10638  º = {200,200},
10639  º = {200,200},
10640  ¹ = {200,200},
10641  º = {200,200},
10642  º = {200,200},
10643  ¬ = {200, },
10644  ¶ = { ,100},
10645  − = {300,300}, % minus
10646  ± = {150,200},
10647  × = {100,150},
10648  ÷ = {150,200},
10649  € = { 50,100},
10650  ¥ = { 50, 50},
10651  % Greek
10652  Γ = { ,150},
10653  Δ = {100,100},
10654  Θ = { 50, 50},
10655  Λ = {100,100},
10656  Ξ = { 50, 50},
10657  Υ = {100,100},
10658  Φ = { 50, 50},
10659  Ψ = { 50, 50},
10660  Ω = { , 50},
10661  ζ = { , 50},
10662  λ = { 50, 50},
10663  γ = { 50, 50},
10664  π = { 50, 50},
10665  ρ = { , 50},
10666  σ = { 50, 50},
10667  τ = { 50, 50},
10668  χ = { 50, 50},
10669  φ = { 50, 50},
10670  ϑ = { 50, 50},
10671  ψ = { 50, 50},
10672  % Cyrillic
10673  Γ = { ,150},
10674  Д = { 50, 50},
10675  Ж = { 50, 50},
10676  К = { , 50},
10677  Л = { 50, },
10678  Ъ = { 50, 50},
10679  З = { 50, 50},
10680  У = { 50,100},
10681  Ф = { 50, 50},
10682  Ч = { 70, },
10683  Я = { 50, },
10684  Ъ = { 50, 50},
10685  Ь = { , 50},
10686  ж = { 50, 50},
10687  ф = { 50, 50},
10688  ъ = { 50, 50},
10689  Ѣ = { 50, 50},

```

```

10690     r = {   , 50},
10691     V = { 50, 50},
10692 % other
10693     P = {   , 50},
10694     p = {   , 50},
10695     Δ = {100,100},
10696     (i) = { 35, 65},
10697     (a) = { 30, 60},
10698 }
10699
10700 \SetProtrusion
10701 [ name      = EBGaramond-it-TU,
10702   load      = EBGaramond-it-T1-LF ]
10703 { encoding = {TU,EU1,EU2},
10704   family   = EBGaramond,
10705   shape     = it }
10706 {
10707   /zero.tosf = {150,150},
10708   /one.tosf  = {150,150},
10709   /two.tosf  = {80,80},
10710   /three.tosf = {50,80},
10711   /four.tosf = {50,80},
10712   /five.tosf = {50,80},
10713   /six.tosf  = {50,50},
10714   /seven.tosf = {50,100},
10715   /eight.tosf = {50,50},
10716   /nine.tosf = {50,80},
10717   /one.lf    = {50,50},
10718   /two.lf    = {50,50},
10719   /three.lf  = {80,50},
10720   /four.lf   = {50,50},
10721   /five.lf   = {50,50},
10722   /six.lf    = {50,50},
10723   /seven.lf  = {50,50},
10724   /eight.lf  = {50,50},
10725   /nine.lf   = {50,  },
10726   /one.osf   = {50,50},
10727   /two.osf   = {50,50},
10728   /three.osf = {  ,80},
10729   /four.osf  = {50,50},
10730   /seven.osf = {50,50},
10731 % textcomp
10732   \textquotesingle = {800,100},
10733   - = {300,300}, % minus
10734   _ = {200,250},
10735   † = {200,100},
10736   ‡ = { 80, 80},
10737   • = {300,  },
10738   °C = {200,  },
10739   f = {100,  },
10740   ℄ = {100,  },
10741   ™ = {200,  },
10742   © = {200,100},
10743   ® = {200,100},
10744   ¬ = {300,  },
10745   ° = {500,100},
10746   ± = {200,150},
10747   ¹ = {300,100},
10748   ² = {300,  },
10749   ³ = {300,  },
10750   · = {300,500}, % periodcentered
10751   /twodotenleader = {150,300},
10752   /ellipsis = {100,200},
10753   € = {100,  },
10754   × = {200,100},

```

```

10755   ÷ = {200,200},
10756   ¶ = { ,100},
10757   ª = {200,200},
10758   º = {200,200},
10759   ¥ = { 50, 50},
10760   % Greek
10761   Δ = {150, },
10762   Θ = { 50, },
10763   Λ = {150, },
10764   Υ = {100, 50},
10765   Φ = { 50, },
10766   Χ = { 50, },
10767   Ψ = {100, },
10768   Ω = { 50, },
10769   γ = { , 50},
10770   λ = { 50, },
10771   % Cyrillic
10772   Υ = { 50, },
10773   Ч = {100, },
10774   З = {100, },
10775   % other
10776   Ъ = { 50, 50},
10777   ъ = { , 50},
10778   }
10779
10780 \SetProtrusion
10781 [ name = EBGaramond-sc-TU,
10782   load = EBGaramond-TU ]
10783 { encoding = {TU,EU1,EU2},
10784   family = EBGaramond,
10785   shape = sc }
10786 {
10787   a = {50,50},
10788   \ae = {50, },
10789   d = { ,50},
10790   f = { ,50},
10791   g = {50, },
10792   j = {50, },
10793   l = { ,50},
10794   o = {50,50},
10795   \oe = {50, },
10796   q = {50,70},
10797   r = { , 0},
10798   t = {50,50},
10799   y = {50,50},
10800   % Greek
10801   α = {50,50},
10802   γ = { ,50},
10803   δ = {50,50},
10804   λ = {50,50},
10805   ο = {50,50},
10806   τ = {50,50},
10807   υ = {50,50},
10808   ψ = {50,50},
10809   % Cyrillic
10810   τ = {50,50},
10811   }
10812
10813 \SetProtrusion
10814 [ name = EBGaramond-scit-TU,
10815   load = EBGaramond-it-TU ]
10816 { encoding = {TU,EU1,EU2},
10817   family = EBGaramond,
10818   shape = scit }

```

```

10819 {
10820     a = {50,50},
10821     \ae = {50, },
10822     d = { ,50},
10823     f = { ,50},
10824     g = {50, },
10825     j = {50, },
10826     l = { ,50},
10827     o = {50,50},
10828     \oe = {50, },
10829     q = {50,70},
10830     r = { , 0},
10831     t = {50,50},
10832     y = {50,50},
10833     % Greek
10834     α = {50,50},
10835     γ = { ,50},
10836     δ = {50,50},
10837     λ = {50,50},
10838     ο = {50,50},
10839     τ = {50,50},
10840     υ = {50,50},
10841     ψ = {50,50},
10842     % Cyrillic
10843     τ = {50,50},
10844 }
10845 </EBGaramond>

```

### 3.2.4 Palatino

```

10846 <*Palatino>
10847 \SetProtrusion
10848 [ name      = palatino-default ]
10849 { encoding = {TU,EU1,EU2},
10850   family   = {Palatino} }
10851 {
10852     A = {50,50},
10853     D = { ,50},
10854     J = {50, },
10855     K = { ,50},
10856     L = { ,50},
10857     O = {25, },
10858     T = {50,50},
10859     V = {50,50},
10860     W = {50,50},
10861     X = {50,50},
10862     Y = {50,50},
10863     b = { ,25},
10864     d = {25,30},
10865     f = { ,50},
10866     g = { ,100},
10867     k = { ,50},
10868     p = { ,50},
10869     q = {50, },
10870     r = { ,50},
10871     t = { ,50}, ♦ = { ,50}, ♦ = { ,50},
10872     v = {75,50},
10873     w = {50,50},
10874     x = {50,50},
10875     y = {50,70},
10876     1 = {100,50},
10877     2 = {25,50},
10878     4 = {50, },
10879     6 = {50, },
10880     9 = {25, },

```

```

10881   Æ = {100, },
10882   Œ = {25, },
10883   . = { ,700},      .. = { ,350},      ... = {,150},
10884   {,} = { ,500},
10885   : = { ,500},
10886   ; = { ,500},
10887   ! = { ,100},      !! = { ,100},
10888   ? = { ,200},      ʔ = { ,200},
10889   @ = {50,50},
10890   ~ = {200,250},
10891   & = {50,100},
10892   \% = {100,100},
10893   * = {200,200},
10894   + = {250,250},
10895   ( = {100, },      ) = { ,300},
10896   / = {200,300},
10897   - = {400,500},
10898   \textendash       = {300,300},      \textemdash       = {200,200},
10899   \textquoteleft    = {500,700},      \textquoteright   = {500,700},
10900   \textquotedblleft = {300,400},      \textquotedblright = {300,400},
10901   \textbackslash     = {200,300},
10902   \quotesinglbase    = {400,400},      \quotedblbase     = {400,400},
10903   \guilsinglleft     = {400,400},      \guilsinglright    = {300,500},
10904   \guillemotleft     = {300,300},      \guillemotright    = {200,400},
10905   \textexclamdown    = {100, },      \textquestiondown  = {100, },
10906   \textbraceleft     = {400,200},      \textbraceright    = {200,400},
10907   \textless          = {200,100},      \textgreater       = {100,200},
10908   ≤                  = {200,100},      ≥                  = {100,200},
10909   \textminus         = {300,300},
10910   \texttrademark     = {200,200},
10911   \textcopyright     = {200,200},
10912   \textregistered    = {200,200},
10913   \textdegree        = {300,300},
10914   ¡                  = {450,500},      ¬                  = {250,150},
10915   ¯                  = {150,250},
10916   ·                  = {850, 700},
10917   ¶                  = {100,0},
10918   ×                  = {150, 300},
10919   ª                  = {300,300},      °                  = {300,300},
10920   ⁰ = {200,400},
10921   ¹ = {400,350},      ² = {200,300},      ³ = {250,400},
10922   ⁴ = {250,350},      ⁵ = {200,300},      ⁶ = {250,400},
10923   ⁷ = {200,450},      ⁸ = {250,400},      ⁹ = {200,350},
10924   ⁰ = {200,400},
10925   ¹ = {400,250},      ² = {200,300},      ³ = {250,400},
10926   ⁴ = {250,350},      ⁵ = {200,300},      ⁶ = {250,400},
10927   ⁷ = {200,450},      ⁸ = {250,400},      ⁹ = {200,350},
10928   ± = {150,100},      ÷ = {300,300},
10929   þ = { ,25},
10930   ˙ = {300,450},      ˘ = {300,450},
10931   ˙ = {300,450},      ˘ = {300,450},
10932   † = {200,250},      ‡ = {200,250},
10933   π = {50, },
10934   f = { ,50},
10935   № = {100,150},
10936   \textservicemark   = {100,200},
10937   - = {400,500},      - = {400,500},      - = {200,300},
10938   - = {205,305},      — = {200,300},      — = {50,150},
10939   ● = {125,200},
10940   % /a.sc = {50,50},

10941 }
10942
10943 \SetProtrusion
10944 [ name = palatino-it ]
10945 { encoding = {TU,EU1,EU2},

```

```

10946     family   = {Palatino},
10947     shape     = {it,sl} }
10948 {
10949     A = {50,50},
10950     Æ = {50, },
10951     B = {50, },
10952     C = {50, },
10953     D = {50,50},
10954     E = {50, },
10955     F = {50, },
10956     G = {50, },
10957     H = {50, },
10958     K = {50, },
10959     L = {50, },
10960     O = {50, },
10961     Œ = {50, },
10962     P = {50, },
10963     Q = {50, },
10964     R = {50, },
10965     S = {50, },
10966     $ = {50, },
10967     T = {100, },
10968     U = {50, },
10969     V = {100,50},
10970     W = {50, },
10971     X = {50, },
10972     Y = {100,50},
10973     b = { ,50},
10974     c = {25, },
10975     g = {75, },
10976     i = {25, },
10977     m = { ,50},
10978     n = { ,50},
10979     p = { ,25},
10980     q = {25, },
10981     x = { ,50},
10982     1 = {100, },
10983     2 = {50, },
10984     4 = {50, },
10985     7 = {50, },
10986     . = { ,50},      .. = { ,350},      ... = { ,200},
10987     {,} = { ,50},
10988     : = { ,300},
10989     ; = { ,300},
10990     ? = { ,300},      ¿ = { ,300},
10991     & = {50,50},
10992     \% = {100,100},
10993     * = {200,200},
10994     + = {150,200},
10995     @ = {50,50},
10996     ~ = {200,150},
10997     ( = {200, },      ) = { ,200},
10998     / = {100,200},
10999     - = {300,500},
11000     \textendash      = {300,300},      \textemdash      = {200,200},
11001     \textquoteleft   = {700,400},      \textquoteright   = {700,400},
11002     \textquotedblleft = {500,300},      \textquotedblright = {500,300},
11003     _ = {100,100},
11004     \textbackslash     = {100,200},
11005     \quotesinglbase    = {500,500},      \quotedblbase     = {400,400},
11006     \guilsinglleft     = {400,400},      \guilsinglright    = {300,500},
11007     \guillemotleft     = {300,300},      \guillemotright    = {300,300},
11008     \textexclamdown    = {100, },      \textquestiondown  = {200, },
11009     \textbraceleft     = {200,100},      \textbraceright    = {200,200},
11010     \textless          = {300,100},      \textgreater        = {200,100},

```

```

11011 ≤ = {200,100}, ≥ = {100,200},
11012 | = {450,500}, ¬ = {250,150},
11013 · = {850, 700},
11014 ¶ = {100,0},
11015 × = {150, 300},
11016 ª = {300,250}, ° = {300,300}, º = {300,250},
11017 º = {300,200},
11018 ¹ = {300,150}, º = {350,200}, ³ = {250,150},
11019 ² = {350,100}, ⁵ = {300, 50}, ⁶ = {400,100},
11020 ⁷ = {400, 50}, ⁸ = {250, 50}, ⁹ = {300, 50},
11021 ⁰ = {300,300},
11022 ¹ = {300,350}, ² = {300,150}, ³ = {250,250},
11023 ⁴ = {400,200}, ⁵ = {300,100}, ⁶ = {450,200},
11024 ⁷ = {450,150}, ⁸ = {400,250}, ⁹ = {400,200},
11025 ± = {150,100}, ÷ = {300,300},
11026 þ = { 50, },
11027 † = {250,200}, ‡ = {250,200},
11028 º = {300,450}, º = {300,450},
11029 º = {300,450}, º = {300,450},
11030 - = {300,500}, - = {300,500}, - = {100,300},
11031 - = {125,305}, — = {200,300}, — = {125,150},
11032 • = {125,200}

11033 }
11034
11035 \SetProtrusion
11036 [ name = palatino-sc,
11037 load = palatino-default ]
11038 { encoding = {TU,EU1,EU2},
11039 family = {Palatino},
11040 shape = sc }
11041 {

11042 a = {50,50},
11043 æ = {50, },
11044 b = { 0, 0},
11045 d = { 0, 0},
11046 f = { 0, 0},
11047 g = { 0, 0},
11048 j = {50, },
11049 l = { ,50},
11050 o = { 0, 0},
11051 p = { 0, 0},
11052 q = { 0, },
11053 r = { , 0},
11054 t = {50,50},
11055 y = {50,50},
11056 fl = { 0,50},
11057 ffl = { 0,50},
11058 ◊ = { 0,50},
11059 ◊ = { 0,50}

11060 }
11061 </Palatino>

```

### 3.2.5 Basic glyph set

The protrusion settings will still be loaded from microtype.cfg.

```
11062 <TU-basic> %% No settings.
```

### 3.2.6 Empty glyph set

```

11063 <*TU-empty>
11064 \SetProtrusion
11065 [ name = empty ]
11066 { encoding = {TU,EU1,EU2},

```



```
11067     family    = {TU-empty} }
11068     { }
11069 </TU-empty>
11070
```

## 4 Auxiliary file for micro fine tuning

This file may be used to test protrusion and (less so) expansion settings.

```

11071 <*test>
11072 \documentclass{article}
11073 %% options are passed through to microtype
11074 \usepackage[stretch=50]{microtype-show}
11075
11076 %% options for microtype-show
11077 \ShowGlyphIndextrue
11078 \ShowMissingGlyphstrue
11079 \def\GlyphScaleFactor{2}
11080
11081 %% load any required font packages:
11082 \ifpdf
11083 \usepackage[T1]{fontenc}
11084 \else
11085 \usepackage{fontspec}
11086 \fi
11087
11088 \begin{document}
11089 \microtypesetup{expansion=false}
11090
11091 %% load your font here:
11092
11093 \ShowCharacterInheritance
11094
11095 \newpage
11096 \ShowProtrusion
11097
11098 \newpage
11099 %% show single glyphs
11100 %\ShowDummyLine
11101 %\ShowProtrusionLineGlyph{A}
11102 %\ShowProtrusionLineIndex{27}
11103
11104 %% loop through all glyphs of the font;
11105 %% protrusion values are shown in 1000th of 1em
11106 \ShowProtrusionDefined
11107
11108 %\ShowProtrusionMissing
11109
11110 %\ShowProtrusionAll
11111
11112 \newpage %% -----
11113 This is the current font stretched by 5%, normal, and shrunk by 5%:
11114
11115 \newlength{\MTln}
11116 \newcommand*{\teststring}
11117 {ABCDEFGHIJKLMNQRSTUUVWXYZabcdefghijklmnopqrstuvwxy}
11118 \settowidth{\MTln}{\teststring}
11119 \microtypesetup{expansion=true}
11120
11121 \bigskip\noindent\parbox{1.05\MTln}{\teststring\linebreak\\teststring}\par
11122 \bigskip\noindent\parbox{0.95\MTln}{\teststring}
11123 \end{document}
11124 </test>

```

Needless to say that things may always be improved. For suggestions, mail to [w.m.l@gmx.net](mailto:w.m.l@gmx.net) or file an issue at <https://github.com/schlicht/microtype/issues>.

## A The title logo

This is `microtype-logo.dtx`. You may treat this file in three different ways:

- compile it by itself
- `\input` it in the body of a `dtx` file
- `\input` it in the preamble: it then provides the command `\printlogo`, which will do just that

The first two cases require the style file `microtype-doc.sty`, which can be generated from `microtype.ins` with:

```
\makefile{microtype-doc.sty}{docsty}
```

11125 *(`*logo`)*

Here's how the logo on the title page was created.<sup>19</sup> It has nothing to do with `microtype`, actually, but uses `fontinst`. It is based on an experiment I posted to the [de.comp.text.tex](#) newsgroup.<sup>20</sup> It will show:

- the character
- the  $\TeX$  box
- the bounding box
- kerns

### A.1 Macros

To run this file,  $\TeX$  needs to find the `afm` file (either in the `TEXINPUTS` path, or in the current working directory).

First input `fontinst`.

11126 `\input fontinst.sty`

`bbox.sty` is an addition to `fontinst`, which makes dimensions of the bounding boxes available (and was written by Hàn Thế Thành, by the way). These dimensions are specified in the `afm` file, but not used by  $\TeX$ , which is why `fontinst` will discard them otherwise.

11127 `\input bbox.sty`

`\tempdim` Allocate some `dimen` registers.

11128 `\newdimen\tempdim`

`\fboxrulei` Frame width of the box as  $\TeX$  sees it.

11129 `\newdimen\fboxrulei`

11130 `\fboxrulei=0.1pt`

`\fboxruleii` Frame width of the bounding box.

11131 `\newdimen\fboxruleii`

11132 `\fboxruleii=0.1pt`

`\kernboxheight` Height of the box indicating the kern.

11133 `\newdimen\kernboxheight`

11134 `\kernboxheight=5pt`

`\scaletoem` An auxiliary macro. Return a dimension relative to the `em`-width of the font. Requires  $\mathrm{e}\TeX$ .

11135 `\setcommand\scaletoem#1{\dimexpr #1 sp*\fontdimen6\font/1000\relax}`

`\showlogo` A `fontinst` incantation whose sole purpose is to produce the logo. Its argument is a string (letters only).

11136 `\fontinstcc`

11137 `\def\showlogo#1{%`

Some fonts do not specify the `\fontdimen6` (width of an `em`) in the `afm` file. In this case, use the font size, which is correct in most cases.

11138 `\ifdim\fontdimen6\font = 0pt`

11139 `\typeout{***-Warning:-no-fontdimen-6-specified-***^^J%}`

11140 `***-setting-it-to-\pdffontsize\font \ifnum\pdfTEXversion < 130 pt\fi-***}`

11141 `\fontdimen6\font=\pdffontsize\font \ifnum\pdfTEXversion < 130 pt\fi\relax`

11142 `\fi`

11143 `\installfonts`

11144 `\input_metrics{{\logofont,\metrics\printbbs{#1}}\relax}`

<sup>19</sup> Note that the logo module will not be created when installing `microtype`. Instead, the source file `microtype-logo.dtx` is included as an attachment in the PDF file. If your PDF reader supports this, you can [click here](#) to extract it; alternatively, you may use the `pdftk` tool.

<sup>20</sup> Message ID: 42aa3687\$0\$24366\$9b4e6d93@newsread2.arcor-online.net

```

11145 \endinstallfonts
11146 }
11147 \normalcc
      Layers.
11148 \makeatletter
11149 \def\mtl@layer#1#2{\pdfliteral{/OC/#1 BDC}#2\pdfliteral{EMC}}
11150 \ifx\mt@objects\undefined\let\mt@objects\@empty\fi
11151 \ifx\mt@order\undefined\let\mt@order\@empty\fi
11152 \xdef\mt@order{\mt@order[(Logo)]}
11153 \let\mtl@resources\@empty
11154 \def\mtl@register#1{%
11155   \immediate\pdfobj{<< /Type/OCG /Name{#1} >>}
11156   \expandafter\xdef\csname mtl@#1\endcsname{\the\pdfobj\space 0 R }
11157   \xdef\mt@objects{\mt@objects\csname mtl@#1\endcsname}
11158   \xdef\mt@order{\mt@order\csname mtl@#1\endcsname}
11159   \xdef\mtl@resources{\mtl@resources/#1 \csname mtl@#1\endcsname}}
11160 \mtl@register{canvas}
11161 \mtl@register{characters}
11162 \mtl@register{bounding-boxes}
11163 \mtl@register{TeX-boxes}
11164 \xdef\mt@order{\mt@order]}
11165 \global\let\mtl@objects\mt@objects
11166 \def\togglelayer#1#2{%
11167   \pdfstartlink width \wd\logobox height \ht\logobox depth \dp\logobox
11168   user{/Subtype/Link
11169     /BS << /Type/Border/W 0 >> /H/0
11170     /A << /S/SetOCGState
11171       /State[/Toggle \csname mtl@#1\endcsname] >>
11172   }#2\pdfendlink
11173 }

```

\printbbs Preparation.

```

11174 \setcommand\printbbs#1{%
11175   \setbox0\hbox{#1}%
11176   \leavevmode
11177   \kern-\fboxrulei
      The canvas in the natural width of the text minus protrusion, in color bgcolor.
11178   \mtl@layer{canvas}{%
11179     \getboundarychars#1\relax
11180     \tempdim=\dimexpr\wd0 - (\scaletoem{\lcode\font\firstchar}+
11181       \scaletoem{\rcode\font\lastchar})\relax
11182     \kern\dimexpr\scaletoem{\lcode\font\firstchar}\relax
11183     \lower\dimexpr\dp0+0.05em\relax \vbox{\color{bgcolor}%
11184       \hrule width \tempdim
11185         height \dimexpr\dp0+\ht0+0.15em\relax}%
11186     \kern-\tempdim

```

The baseline, in color blcolor.

```

11187     \vbox{\color{blcolor}%
11188       \hrule width \tempdim
11189         height \fboxrulei}%
11190     }%
11191     \kern-\dimexpr\wd0 -\scaletoem{\rcode\font\lastchar}\relax

```

The string.

```

11192   \printbbs #1\relax\relax
11193 }

```

\getboundarychars Get first ....

```

11194 \def\getboundarychars#1#2\relax{%
11195   \def\firstchar{~#1}%
11196   \getlastchar#1#2\relax
11197 }

```

\getlastchar ... and last character.

```

11198 \def\getlastchar#1#2{%

```

```

11199 \ifx\relax#2\relax
11200 \def\lastchar{`#1}%
11201 \else
11202 \expandafter\getlastchar
11203 \fi #2%
11204 }

\printbbs Loop over all characters of the string.
11205 \def\printbbs#1#2#3\relax{%
11206 \ifx\relax#1\relax
11207 \else
11208 \ifx\relax#2\relax
11209 \printbb{#1}{}%
11210 \else
11211 \printbb{#1}{#2}%
11212 \fi
11213 \expandafter\printbbs
11214 \fi #2#3\relax
11215 }

\printbb Record the kern between the current and the following character. \kerning is a fontinst
command.
11216 \setcommand\printbb#1#2{%
11217 \setbox0\hbox{\kerning{#1}{#2}\xdef\thekern{\number\result}}%
11218 \showboxes{#1}%
This could be another application.
11219 % \quad
11220 % w: \the\scaletom{\width{#1}},
11221 % bb: \the\scaletom{\bbleft{#1}}/%
11222 % \the\scaletom{\bbright{#1}},
11223 % \the\scaletom{\number\numexpr\width{#1}-\bbright{#1}\relax}
11224 % h: \height{#1}/\bbtop{#1}, \bbbotttom{#1}/\depth{#1}\par
11225 }

\showboxes Print the boxes for char <#1>. This won't work if <#1> isn't also the PostScript name of the glyph (e.g., 'comma' ≠ ',').
11226 \setcommand\showboxes#1{%
11227 \leavevmode
11228 \color{texcolor}%
We have to record the width of the glyph.
11229 \setbox0\hbox{\color{textcolor}{#1}}%
11230 \global\tempdim=\wd0\relax
11231 \kern-\fboxrulei

1. The  $\TeX$  box: Print a frame in color texcolor. This frame shows the glyph as  $\TeX$  sees it.
11232 \mtl@layer{TeX-boxes}{%
11233 \hbox{%
11234 \lower\dimexpr \dp0 + \fboxrulei\relax
11235 \hbox{%
11236 \vbox{%
11237 \hrule height\fboxrulei
11238 \hbox{%
11239 \vrule width\fboxrulei height \dimexpr\ht0 + 2\fboxrulei\relax
11240 \phantom{\unhcopy0}%
11241 \vrule width\fboxrulei
11242 }%
11243 \hrule height\fboxrulei}}}%
11244 }%

2. The character: Now we step back and print the actual glyph. We hold it back until now, so that it will be printed
on top of its box.
11245 \kern-\wd0
11246 \mtl@layer{characters}{\hbox{\box0}}%

Step back by the amount that the character's bounding box differs from the  $\TeX$  box on the left side.
11247 \kern\dimexpr\scaletom{\bbleft{#1}}-\tempdim-\fboxruleii\relax

```

3. *The bounding box*: will be printed in color `bbcolor`.

```

11248 \mtl@layer{bounding-boxes}{%
11249   {\color{bbcolor}%
11250    \hbox{%
11251     \lower\dimexpr-\scaletoem{\bbbottom{#1}}+\fboxruleii\relax
11252     \hbox{%
11253      \vbox{%
11254       \hrule height\fboxruleii
11255       \hbox to \dimexpr\scaletoem{\numexpr
11256        \bbright{#1}-\bbleft{#1}\relax}+2\fboxruleii\relax{%
11257        \vrule height \dimexpr\scaletoem{\numexpr
11258         \bbtop{#1}-\bbbottom{#1}\relax}%
11259         width\fboxruleii
11260         \hfill
11261         \vrule width\fboxruleii}%
11262         \hrule height\fboxruleii}}}%
11263     }%
11264     \kern-\dimexpr\fboxruleii+\fboxrulei\relax
11265   }%

```

4. *The kern*: We also print a small box in color `kerncolor` indicating the kerning between the current and the next character; filled for negative kerns, empty for positive kerns.

```

11266 \kern\scaletoem{\numexpr\width{#1}-\bbright{#1}\relax}%
11267 \mtl@layer{TeX-boxes}{%
11268   {\ifnum\thekern<0
11269    \color{kerncolor}%
11270    \kern\scaletoem{\thekern}%
11271    \lower\kernboxheight\hbox{\vrule width -\dimexpr\scaletoem{\thekern}\relax
11272     height \kernboxheight}%
11273    \kern\scaletoem{\thekern}%
11274   \else
11275    \color{texcolor}%
11276    \ifnum\thekern=0 \else
11277     \lower\kernboxheight
11278     \hbox{%
11279      \vbox{%
11280       \hrule height\fboxrulei
11281       \hbox{%
11282        \vrule height \kernboxheight width\fboxrulei
11283        \kern\dimexpr\scaletoem{\thekern}-2\fboxrulei\relax
11284        \vrule width\fboxrulei
11285       }%
11286       \hrule height\fboxruleii}%
11287      \fi
11288     \fi
11289    }%
11290   }%
11291   % \kern-\fboxrulei
11292 }

```

\printlogo

```

11293 \newbox\logobox
11294 \def\printlogo{%
11295   \setbox\logobox=\hbox{\vbox{%
11296     \MakePercentComment

```

This is the Kepler MM font used in the logo.

```

11297   \def\logofont{pkpri9e10}
11298   \transformfont{\logofont}{\reencodefont{8r}{\fromafm{pkpmmri8a10}}}
11299   \font\thelogofont=\logofont\space at 82pt

```

This would load the italic Palatino font instead.

```

11300 %\def\logofont{pplri}
11301 %\transformfont{\logofont8r}{\reencodefont{8r}{\fromafm{\logofont8a}}}
11302 %\edef\logofont{\logofont8r}
11303 %\font\thelogofont=\logofont\space at 78pt

```

Load the font.

```
11304 \thelogo font
```

Protrusion values (overdone for didactic reasons).

```
11305 \lcode\font`M=96
```

```
11306 \rcode\font`e=46
```

Now we can generate the logo.

```
11307 \pdfliteral direct{/SXS gs}%
11308 \showlogo{Microtype}%
11309 % \rlap{\normalfont\normalsize\raisebox{55pt}{\footnotemark[1]}}%
11310 % \kern5pt\[\[3\baselineskip]
11311 % \long\def\@makefnstext##1{%
11312 % \leftskip 0pt
11313 % \parindent 0pt
11314 % \everypar{\parindent 0pt}%
11315 % \leavevmode\hbox to 15pt{\@thefnmark\hss}##1}
11316 % \footnotetext[1]{This graphic displays on a
11317 % \togglelayer{canvas}{canvas} the \togglelayer{characters}{characters},
11318 % their \togglelayer{bounding-boxes}{bounding boxes}
11319 % and \togglelayer{TeX-boxes}{\TeX\ boxes}.}
11320 %}%
11321 \edef\logodimens{width \the\wd\logobox height \the\ht\logobox depth \the\dp\logobox}
11322 \immediate\pdfobj{<</Type/ExtGState /CA 0.6 /ca 0.6 /BM/Normal >>}%
11323 \immediate\pdfxform
11324 attr {/Group <</Type/Group /S/Transparency /I true /CS/DeviceRGB >>}
11325 resources {/Properties <<\mtl@resources>>
11326 /ExtGState << /SXS \the\pdflastobj\space 0 R >> }
11327 \logobox
11328 % \vskip-2.5\baselineskip
11329 % \leavevmode
11330 % \togglelayer{characters}{%
11331 % \pdfrefxform\pdflastxform
11332 % }%
11333 \pdfannot\logodimens{%
11334 /Subtype/Widget /FT/Btn /T(Logo)
11335 %/F 4 % why did I say this?
11336 /AP << /N \the\pdflastxform\space 0 R >>
11337 /AA << /E << /S/SetOCGState /State[/Toggle \mtl@characters] >>
11338 /X << /S/SetOCGState /State[/Toggle \mtl@characters] >>
11339 /D << /S/SetOCGState /State[/Toggle \csname mtl@bounding-boxes\endcsname] >>
11340 /U << /S/SetOCGState /State[/Toggle \csname mtl@TeX-boxes\endcsname] >>
11341 >> }%
11342 \vspace{3\baselineskip}
11343 }
11344 \IfFileExists{pkpmmri8a10.afm}\relax{\def\printlogo{\MT@warning{File pkpmmri8a10.afm not found.
11345 \MessageBreak Cannot create logo}}}
```

Our font.

```
11346 \pdfmapline{+pkpmmri8r10 Kep1MM-It_385_575_10_ " TeXBase1Encoding ReEncodeFont " <8r.enc <pkpmmri8a10.pfb}
```

Define colours (thered and thegreen are copied from microtype.dtx).

```
11347 \def\mtdefinecolors{
11348 \definecolor{thered}{rgb}{0.65,0.04,0.07}
11349 \definecolor{thegreen}{rgb}{0.06,0.44,0.08}
11350 \colorlet{texcolor}{thegreen!50} % TeX boxes
11351 \colorlet{kerncolor}{texcolor} % negative kerns
11352 \colorlet{bbcolor}{thered!50} % bounding box
11353 \colorlet{bgcolor}{black!8} % canvas
11354 \colorlet{blcolor}{black!50} % baseline
11355 \colorlet{textcolor}{black!40} % text
11356 }
```

Use with microtype.dtx

```
11357 \ifx\documentclass\@twoclasseserror
11358 \usepackage[xcdraw]{xcolor}
11359 \mtdefinecolors
```

11360 \else

## A.2 Document

Now we can start the document.

```

11361 \documentclass[10pt,a4paper]{ltxdoc}
11362 \providecommand\MakePercentComment{\relax}
11363 \expandafter\def\csname ver@microtype.dtx\endcsname{2999/99/99}
    Re-use the preamble from microtype.dtx.
11364 \usepackage{microtype-doc}
11365 \usepackage{attachfile}
11366 \makeatletter
11367 \pdfcatalog{/OCGs [\mt@objects] /D << /Order [\mt@order] >> >>}
11368 \makeatother
11369 \begin{document}
    You are currently reading this.
11370 \DocInput{microtype-logo.dtx}
11371 \newpage
11372 And here it is:\vspace{6\baselineskip}
11373 \begin{center}
11374   \printlogo
11375 \end{center}
11376 \expandafter\enddocument
11377 \fi
    That's it.
11378 /logo

```

## B The letterspacing illustration

This is `microtype-lssample.dtx`. You may treat this file in three different ways:

- compile it by itself
- `\input` it in the body of a dtx file
- `\input` it in the preamble: it then provides the commands
  - `\lssample`: prints the letterspacing illustration
  - `\anchorarrow`: anchors an arrow for layer `<#1>`
  - `\showarrow`: toggles layer `<#1>` or `<#2>`, and prints `<#2>`

The first two cases require the style file `microtype-doc.sty`, which can be generated from `microtype.ins` with:

```
\makefile{microtype-doc.sty}{docsty}
```

```

11379 \ifx\lssample\undefined
11380 <*lssample>

```

Upon popular request, here's how I've created the letterspacing illustration. <sup>21</sup>

### B.1 Macros

Rule width and image height and depth.

```

11381 \makeatletter
11382 \newdimen\lsamount
11383 \newdimen\lsrule
11384 \lsrule=0.2pt
11385 \def\lsheight{8pt}
11386 \def\lsdepth{12pt}

```

<sup>21</sup> Note that the `lssample` module will not be created when installing `microtype`. Instead, the source file `microtype-lssample.dtx` is included as an attachment in the PDF file. If your PDF reader supports this, you can [click here](#) to extract it; alternatively, you may use the `pdftk` tool.



Our font (Adobe Caslon).

```
11387 \def\lsfont{\fontfamily{paca}\selectfont}
      Loop over all letters in <#2>, letterspacing them by <#1>.
11388 \def\dols#1#2{\lsamount=#1\relax \dolss#2\enddols}
11389 \def\dolss#1#2\enddols{%
11390   \ifx\empty#2\empty\divide\lsamount 2\fi
11391   \ls{#1}%
11392   \ifx\empty#2\empty\else \dolss#2\enddols \fi
11393 }
```

One tikz picture for each letter.

```
11394 \def\ls#1{%
11395   \begin{tikzpicture}[remember picture,line width=\lsrule]
11396     \tikzstyle{every node}=[inner sep=0pt]
```

The bounding box.

```
11397     \mts@layer{stuff}{%
11398       \node[draw=thegrey,
11399         fill=theshade,
11400         outer sep=\lsrule,
11401         anchor=base,
11402         font=\lsfont]{\phantom{#1}};
11403     }
```

The letter.

```
11404     \node[anchor=base,font=\lsfont](#1){#1};
```

Two auxiliary coordinates.

```
11405     \path (#1.south west) ++(+.5\lsrule,-.5\lsrule) coordinate (#1L);
11406     \path (#1.base east) ++(-.5\lsrule,-\lsdepth) coordinate (#1R);
11407     \mts@layer{stuff}{%
```

Now draw the normal character width,

```
11408       \draw[color=thered!75,
11409         fill=thered!30,
11410         outer sep=\lsrule]
11411         (#1L) rectangle (#1R);
11412       \ifdim\lsamount>0pt
11413         \path (#1.base east) ++(+.5\lsamount,-6pt) coordinate (#1_ls);
11414         \path (#1R) ++(\lsamount+\lsrule,\lsdepth) coordinate (#1E);
```

and the letter space.

```
11415       \draw[color=thered,
11416         fill=thered!50,
11417         outer sep=\lsrule]
11418         (#1R) ++(+\lsrule,+0pt) rectangle (#1E);
11419     \fi
11420   }
11421 \end{tikzpicture}%
11422 \ignorespaces
11423 }
```

Draw the interword space.

```
11424 \def\lssp#1#2#3#4{%
11425   \begin{tikzpicture}[remember picture,line width=\lsrule,inner sep=0pt]
11426     \mts@layer{stuff}{%
11427       \tikzstyle{every draw}=[anchor=bottom]
11428       \coordinate(#1space) at (#2/2,\lsdepth/2);
11429       \coordinate(#1stretch) at (#2+#3/2,+0pt);
11430       \coordinate(#1shrink) at (#2-#4/2,+0pt);
11431       \draw[color=thegreen,fill=thegreen!50,use as bounding box]
11432         (0,0) rectangle ++(#2,\lsdepth);
11433       \draw[color=thegreen,fill=thegreen!30]
11434         (+#2,-\lsrule) rectangle ++(+#3,-4pt+\lsrule);
11435       \draw[color=thegreen,fill=thegreen!50]
11436         (+#2,-\lsrule) rectangle ++(-#4,-4pt+\lsrule);
11437       \draw[->,line width=0.3pt,shorten <=0.5\lsrule,color=thegreen!50]
```

```

11438      (+#2,-2pt-.5\lsrule) -- ++(+#3,+0pt);
11439      \draw[->,line width=0.3pt,shorten <=0.5\lsrule,color=thegreen!30]
11440      (+#2,-2pt-.5\lsrule) -- ++(-#4,+0pt);
11441    }%
11442  \end{tikzpicture}%
11443  \ignorespaces
11444 }

Layers.
11445 \def\mts@layer#1#2{\pdfliteral page{/OC/#1 BDC}#2\pdfliteral page{EMC}}
11446 \def\mts@layer#1#2{\pdfliteral page{/OC/stuff BDC /OC/#1 BDC}#2\pdfliteral page{EMC EMC}}
11447 \ifx\mt@objects\undefined\let\mt@objects\@empty\fi
11448 \ifx\mt@order\undefined\let\mt@order\@empty\fi
11449 \xdef\mt@order{\mt@order[(Sheep)]}
11450 \let\mts@resources\@empty
11451 \def\mts@register#1{%
11452   \immediate\pdfobj{<< /Type/OCG /Name(#1) >>}
11453   \expandafter\xdef\csname mts@#1\endcsname{\the\pdfastobj\space 0 R }
11454   \xdef\mt@objects{\mt@objects\csname mts@#1\endcsname}
11455   \xdef\mt@order{\mt@order\csname mts@#1\endcsname}
11456   \xdef\mts@resources{\mts@resources/#1 \csname mts@#1\endcsname}}
11457 \mts@register{stuff}
11458 \mts@register{tracking}
11459 \mts@register{ispace}
11460 \mts@register{ospace}
11461 \mts@register{istretch}
11462 \mts@register{ishrink}
11463 \mts@register{ostretch}
11464 \mts@register{oshrink}
11465 \mts@register{okern}
11466 \mts@register{ligature}
11467 \mts@register{_compatibility}
11468 \xdef\mt@order{\mt@order]}

Anchor point for the arrow in the code.
11469 \newcommand\anchorarrow[1]{%
11470   \tikz[remember picture,overlay]\node(#1_c){};}

Add an arrow from code to image.
11471 \newcommand\add@arrow[5][left]{%
11472   \tikz[remember picture,overlay,bend angle=14,looseness=0.75,>=latex]{%
11473     \mts@layer{#3}{\draw[->,thick,color=the#2](#4) to[bend #1] (#5);}}%
11474 }

Toggle layer.
11475 \def\toggle@layer#1#2#3{%
11476   \pdfstartlink
11477   user{/Subtype/Link
11478     /BS << /Type/Border/W 0 >> /H/0
11479   %   /BS << /Type/Border/W 1 /S/D /D[4 1] >>
11480   %   /C[0.7 0.7 0.7] /H/0
11481     /Contents(Click to Toggle!)
11482     /A << /S/SetOCGState
11483       /State[/Toggle \csname mts@#1\endcsname] >> }%
11484   \rlap{#2}%
11485   {\fboxsep=0pt \fboxrule=0pt
11486     \mts@layer{stuff}{%
11487       \rlap{\fcolorbox{white}{white}{\vphantom{kg}\color{the#3}#2}}}%
11488     \mts@layer{#1}{%
11489       \fcolorbox{white}{the#3!50}{\vphantom{kg}\color{white}#2}}}%
11490   }%
11491   \pdfendlink
11492 }
11493 \newcommand\showarrow[2][]{%
11494   \ifx\relax#1\relax\def\@tempa{#2}\else\def\@tempa{#1}\fi
11495   \toggle@layer{\@tempa}{\itshape #2}}

```

The environment for our illustration.

```

11496 \def\ls@sample#1{%
11497   \parskip 4pt \parindent 0pt
11498   \par
11499   \vskip4pt
11500   {\leftskip 15pt
11501    \mt@pseudo@margin{\color{theblue}Click on the image to show the kerns
11502     and spacings involved. Click on emphasised words in the text below
11503     to reveal the relation of image and code.\strut}
11504    \mt@layer{_compatibility}{%
11505     \mt@place{\rlap{\hskip-\marginparwidth \color{white}%
11506      \vrule width\dimexpr\hsize+\marginparwidth\relax height\mt@unvdimen}}
11507     \mt@pseudo@margin{\color{thered}%
11508      If you had a \acronym{PDF} viewer that understands
11509      \acronym{PDF}\,,{\smaller1.5}, you could hide the arrows selectively.}}
11510     \vskip-\mt@unvdimen}%
11511   \vskip-4pt
11512   \setlength\fbboxsep{4pt}%
11513   \leavevmode
11514   \pdfstartlink
11515     user{/Subtype/Link
11516       /BS << /Type/Border/W 0 >> /H/0
11517       /A << /S/SetOCGState
11518         /State[/Toggle \mts@stuff] >> }%
11519     \fcolorbox{theframe}{theshade}%
11520     {\fontsize{34}{38}\selectfont #1}%
11521   \pdfendlink
11522   \par\medskip
11523   }%
11524   \edef\x{\pdfpageresources{/Properties <<\mts@resources>>}}\x
11525 }
```

Now define the illustration to be used in the document.

```

11526 \def\lssample{%
11527   \ls@sample{%
11528     \dols{0pt}{Stop}
11529     \lssp{o}{0.45em}{0.25em}{0.15em}
11530     \dols{0.16em}{\stealing}\hskip-\dimexpr 0.08em+\lsrule\relax
11531     \lssp{i}{13.82pt}{4.65pt}{2.08pt}
11532     \dols{0.16em}{sheep}
11533     \dols{0pt}{!}
11534   }%
```

Don't forget to add the arrows.

```

11535   \vspace{-\baselineskip}
11536   \add@arrow{red}      {tracking}{lsamount_c.east}{a_ls}
11537   \add@arrow{red}      {okern}   {okernend_c.east}{p_ls}
11538   \add@arrow{green}    {ospace}  {ospace_c.east} {ospace}
11539   \add@arrow{green}    {ispace}  {ispace_c.center}{ispace}
11540   \add@arrow{green!75} {istretch}{istretch_c.east}{istretch.north}
11541   \add@arrow{green!75} {ishrink} {ishrink_c.west} {ishrink.north}
11542   \add@arrow{green!75} {ostretch}{ostretch_c.east}{ostretch.north}
11543   \add@arrow{green!75} {oshrink} {oshrink_c.east} {oshrink.north}
11544   \add@arrow[right]{grey}{ligature}{nolig_c.east} {st.center}
11545 }
11546 \fi
```

This is for use with microtype.dtx

```

11547 \ifx\documentclass\@twoclasseserror
11548   \usepackage{tikz}
11549 \else
```

## B.2 Document

```

11550 \documentclass[10pt,a4paper]{ltxdoc}
11551 \expandafter\def\csname ver@microtype.dtx\endcsname{2999/99/99}
```

Re-use the preamble from microtype.dtx.

```

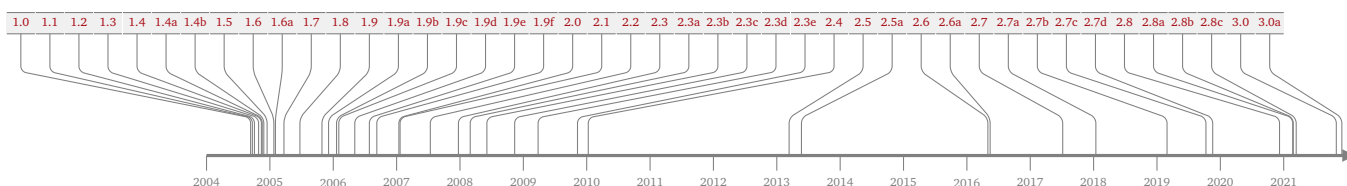
11552 \usepackage{microtype-doc}
11553 \usepackage{attachfile}
11554 \usepackage{tikz}
11555 \makeatletter
11556 \pdfcatalog{/OCProperties << /OCGs [\mt@objects]
11557                                     /D << /Order [\mt@order] /BaseState/OFF >> >> }
11558 \makeatother
11559 \begin{document}

  You are currently reading this.
11560 \DocInput{microtype-lssample.dtx}

  Now show what we are able to do.
11561 \noindent
11562 Since a picture is worth a thousand words, probably even more if, in our
11563 case, it depicts a couple of letterspaced words, let's bring one to sum up
11564 these somewhat confusing options. Suppose you had the following settings
11565 (which I would in no way recommend; they are only for illustrative purposes):
11566 \begin{verbatim}
11567 \SetTracking
11568 [ no ligatures = {"\anchorarrow{nolig}"f},
11569   spacing      = {60"\anchorarrow{ispace}"0*, "%
11570                  "-1"\anchorarrow{istretch}"00*, "\anchorarrow{ishrink}"},
11571   outer spacing = {4"\anchorarrow{ospace}"50, "%
11572                  "2"\anchorarrow{ostretch}"50,1"\anchorarrow{oshrink}"50},
11573   outer kerning = {"\anchorarrow{okernbegin}"*, "%
11574                  "\anchorarrow{okernend}"*} ]
11575 { encoding = * }
11576 { 1"\anchorarrow{lsamount}"60 }
11577 \end{verbatim}
11578 and then write:
11579 \begin{verbatim}
11580 Stop \textls{stealing sheep}!
11581 \end{verbatim}
11582 this is the (typographically dubious) outcome:
11583
11584 \lssample
11585
11586 \noindent
11587 While the word 'Stop' is not letterspaced, the space between the letters in
11588 the other two words is expanded by the \showarrow[tracking]{tracking-amount}{red}
11589 of 160/1000\,em\,=\allowbreak\,0.16\,em.
11590 The \showarrow[ispace]{inner~space}{green} within the letterspaced text is
11591 increased by 60\%, while its \showarrow[istretch]{stretch}{green} amount is
11592 decreased by 10\% and the \showarrow[ishrink]{shrink}{green} amount is left
11593 untouched.
11594 The \showarrow[ospace]{outer~space}{green} (of 0.45\,em) immediately before the
11595 piece of text may \showarrow[ostretch]{stretch}{green} by 0.25\,em and
11596 \showarrow[oshrink]{shrink}{green} by 0.15\,em.
11597 Note that there is no outer space after the text, since the exclamation mark
11598 immediately follows; instead, the default \showarrow[okern]{outer~kern}{red}
11599 of half the letterspace amount (0.08\,em) is added.
11600 Furthermore, one \showarrow{ligature}{grey} wasn't broken up, because we
11601 neglected to specify the '~|s|' in the |no ligatures| key.
11602
11603 \expandafter\enddocument
11604 \fi
11605 (/lssample)

```

## C Change history



Numbers prefixed with 'U' refer to the User manual.

### 2004/09/11 **Version 1.0**

General: Initial version ..... [U1](#)

### 2004/09/21 **Version 1.1**

General: configuration file names in lowercase (suggested by <i>Harald Harders</i> ) .....	72	list .....	73
remove 8-bit characters from the configuration files (suggested by <i>Harald Harders</i> ) .....	134	<code>\MT@ifempty</code> : fix: use category code 12 for the percent character (reported by <i>Tom Kink</i> ) .....	20
Protrusion: add factors for some more characters .....	142	<code>\MT@is@number</code> : numbers may also be specified in hexadecimal or octal (suggested by <i>Harald Harders</i> ) .....	79
settings for Adobe Minion (contributed by <i>Harald Harders</i> ) .....	143	<code>\MT@pdfTeX@no</code> : fix: version check (reported by <i>Harald Harders</i> ) .....	14
<code>\DeclareCharacterInheritance</code> : new command: possibility to specify character inheritance .....	104	<code>\MT@permute</code> : don't use sets for empty encoding ..	106
<code>\MT@declare@sets</code> : remove spaces around set name ..	90	<code>\MT@setup@expansion</code> : issue an error instead of a warning, when pdfTeX version is too old for autoexpand .....	123
<code>\MT@find@file</code> : fix: also check whether the file for the base font family has already been loaded ..	72	<code>\MT@split@codes</code> : fix: allow zero and negative values ..	42
<code>\MT@get@basefamily</code> : only remove suffixes 'x' or 'j' ..	73	<code>\MT@use@set</code> : remove spaces around set name .....	95
<code>\MT@get@listname@</code> : don't check for empty attributes			

### 2004/10/03 **Version 1.2**

Font aliases: declare <code>cmor</code> as an alias of <code>cmr</code> .....	131	<code>\MT@get@inh@list</code> : fix: set inheritance list <code>\globally</code> to <code>\empty</code> .....	75
Font sets: new: <code>allmath</code> and <code>basicmath</code> .....	130	<code>\MT@get@listname@</code> : alternatively check for alias font name .....	73
Protrusion: add settings for Computer Modern Roman and Adobe Garamond in TS1 encoding .....	173	<code>\MT@get@size</code> : additional magic to catch some errors ..	93
add settings for Computer Modern Roman math symbols .....	177	<code>\MT@get@size@@</code> : hijack <code>\set@fontsize</code> instead of <code>\set@fontsize</code> .....	93
<code>\MT@familyalias</code> : define alias font name as an alternative, not as a replacement .....	38	<code>\MT@loop</code> : fix: new macro, used instead of <code>\loop</code> ..	24
<code>\MT@get@basefamily</code> : also remove 'w' (swash capitals) .....	73	<code>\MT@maybe@do</code> : also check for alias font name .....	39
<code>\MT@get@highlevel</code> : check whether defaults have changed .....	91	<code>\MT@permute@@@@</code> : more sanity checks for <code>\SetProtrusion</code> and <code>\SetExpansion</code> .....	108
		<code>\MT@setupfont</code> : also search for alias font file .....	35
		fix: call <code>\@enc@update</code> if necessary .....	35

### 2004/10/27 **Version 1.3**

General: fix: specifying <code>load</code> option does no longer require to give a name, too .....	101	<code>\MT@fix@catcode</code> : check some category codes (compatibility with german) .....	5
Font aliases: declare <code>aer</code> , <code>zer</code> and <code>hfor</code> as aliases of <code>cmr</code> .....	131	<code>\MT@load@list</code> : check whether list exists .....	71

### 2004/11/12 **Version 1.4**

General: check for <code>pdfcprot</code> .....	30	the hook for <code>\MT@setupfont</code> .....	84
don't use scratch registers in global definitions ..	75	use one instead of five counters .....	25
use <code>\pickup@font</code> instead of <code>\define@newfont</code> as		Protrusion: tweak quote characters for <code>cmr</code> variants	

(OT1, T1, lmr) . . . . .	148	disabled in package options . . . . .	116
\microtypesetup: fix: set the correct levels, and remember them; warning when enabling an option		\SetExpansion: fix: specifying extra options does no longer require to give a name, too . . . . .	98

#### 2004/11/17 **Version 1.4a**

General: new option: final . . . . .	113	when reading files (reported by <i>Michael Hoppe</i> )	72
\MT@cfg@catcodes: fix: reset some more catcodes			

#### 2004/11/26 **Version 1.4b**

General: fix: set catcodes before reading global configuration file (reported by <i>Christoph Bier</i> ) . .	115	form abcz (reported by <i>Georg Verwey</i> ) . . . .	73
optimisation: use less \expandafers and \csnames	19	\MT@get@slot: don't define \MT@char globally (save stack problem) . . . . .	75
Protrusion: harmonise dashes in upshape and italic (cmr, pad, ppl) . . . . .	142	\MT@ifdimen: don't set \MT@count globally (save stack problem) . . . . .	21
slanted like italics . . . . .	153	\MT@setup@PDF: new message if \pdfoutput is changed . . . . .	120
\MT@checklist@family: fix: don't try alias family name if encoding failed . . . . .	40	\MT@use@set: don't use undeclared font sets . . . .	95
\MT@get@basefamily: fix: failed for font names of the			

#### 2004/12/15 **Version 1.5**

General: defaults: step: 4 (suggested by <i>Hàn Thế Thành</i> ) . . . . .	113	\MT@get@highlevel: don't test defaults if called after begin document . . . . .	91
new option: selected, by default false (suggested by <i>Hàn Thế Thành</i> ) . . . . .	111	\MT@scale@factor: warning for factors outside limits	45
Documentation: add 'Short history' . . . . .	U32	\MT@scale@to@em: don't use \lcode and \rcode for the calculation . . . . .	43
Inheritance: remove \ss from T1 list, add \DJ . .	135	\MT@set@ex@codes: allow non-selected font expansion . . . . .	54
Protrusion: settings for Bitstream Charter . . . .	143	\MT@set@pr@codes: adjust protrusion factors before setting the inheriting characters . . . . .	41
\DeclareMicrotypeAlias: remove spaces around arguments . . . . .	96	\MT@setup@expansion: defaults: calculate step as min(stretch,shrink)/5 . . . . .	122
\MT@cfg@catcodes: reset catcode of '=' (compatibility with Turkish babel) . . . . .	72	defaults: turn off expansion for DVI output . . . .	121
\MT@fix@catcode: reset catcode of '^' (compatibility with chemsym) . . . . .	5	disable automatic expansion for DVI output . . .	122

#### 2005/01/24 **Version 1.6**

General: defaults: turn off expansion for old pdfTeX versions . . . . .	115	tune CMR math letters (OML encoding) . . . . .	178
load a font if none is selected . . . . .	35	\MT@get@charwd: use e-TeX's \fontcharwd, if available	44
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2005/03/23 **Version 1.7**

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remove table of match order (now table 1 on page 74)	U11	<code>\MT@scale</code> : new macro: use e-TeX's <code>\numexpr</code> if available	26
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<code>\MT@begin@catcodes</code> : also use inside configuration commands	73	fix: also check for <code>//(series)/(shape)//</code> (reported by <i>Andreas Böhmann</i> )	73
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2005/06/23 **Version 1.8**

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Documentation: add example for factor option	U12	<code>\MT@get@slot</code> : fix: expand active characters	76
add example of how to get rid of a widow (suggested by <i>Adam Kucharczyk</i> )	U14	test whether <code>\(encoding)\(...</code> is defined made more robust	76
add hint about error messages	U28	<code>\MT@get@unit</code> : new macro: get unit for codes	46
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<code>\MT@define@set@key@</code> : use comma lists instead of token lists	90	<code>\MT@split@codes</code> : get character width once only	42
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2005/10/28 **Version 1.9**

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Documentation: add hint about verbatim environment .....	U27	<code>\MT@is@active</code> : redone: use <code>\set@display@protect</code>	79
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2005/12/05 **Version 1.9a**

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Documentation: add explanation for error message in DVI mode .....	U28	<code>\MT@ifint</code> : use <code>\pdfmatch</code> if available .....	20
add explanation for error message with non-Type 1 fonts .....	U29	<code>\MT@ifstreq</code> : use <code>\pdfstrcmp</code> if available .....	22
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Protrusion: fix: remove ‘_’ from OT1 encoding ...	147	<code>\MT@info@missing@char</code> : info instead of warning (after Michael Hoppe reported that the ‘fl’ ligature is missing in Palatino SC) .....	45
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2006/01/20 **Version 1.9b**

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Documentation: activate expansion in the distributed PDF .....	U1	<code>\MT@ifdimen</code> : use <code>\pdfmatch</code> if available .....	21
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2006/02/02 **Version 1.9c**

Documentation: add example of how to increase protrusion of footnote markers (suggested by Georg Verwey) .....	U21	<code>\MT@define@code@key@font</code> : fix: context was ignored	100
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2006/05/05 **Version 1.9d**

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\MT@detokenize@n: new macro: use \detokenize if		(et al.) split keys of optional and mandatory argu-	
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\MT@get@ex@opt: fix: evaluate preset . . . . .	55		

2006/07/28 **Version 1.9e**

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Documentation: add hint about unknown encodings	U27	\DeclareCharacterInheritance: new key 'inputenc'	
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Protrusion: complete settings for Euler Fraktur and		\pickup@font: no tracing with trace package . . . .	86
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2006/09/09 **Version 1.9f**

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expanded . . . . .	83	\MT@set@inh@list: fix: forgotten comma in the fea-	
\MT@gdef@n: new macros: global variants . . . . .	19	tures list . . . . .	105
\MT@get@inh@list: fix: input encoding must be set		\MT@set@named@keys: new macro: set name first, sim-	
after the inheritance list has been parsed . . . .	75	plify parsing of optional argument . . . . .	99
\MT@glet: new macro . . . . .	19	\SetProtrusion: (et al.) set catcodes before parsing	
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2007/01/14 **Version 2.0**

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'relative' completely . . . . .	103	ing set . . . . .	90
Documentation: add hint about how to increase		\MT@is@symbol: made even more robust . . . . .	80
font_max and font_mem_size . . . . .	U29	\MT@load@inputenc: sanitise catcodes before loading	
add hint about warning when tracking and expan-		input encoding (problem with listings) . . . .	47
sion is applied to a font . . . . .	U30	\MT@pdfTeX@no: case 6: pdfTeX 1.40 . . . . .	14
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2007/01/21 **Version 2.1**

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2007/07/14 **Version 2.2**

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Documentation: add hint about error message with pdfTeX 1.40 .....	U29	<code>\MT@pdftex@no</code> : case 7: pdfTeX 1.40.4 .....	14
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add overview .....	U4	<code>\MT@set@all@pr</code> : (et al.) allow empty values .....	42
logo transparency and amusement .....	U1	<code>\MT@set@inputenc</code> : only load <code>inputenc</code> files if necessary .....	47
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Inheritance: remove <code>'-'</code> → <code>'127'</code> .....	135	<code>\MT@setupfont</code> : don't call <code>\@enc@update</code> anymore ..	35
Protrusion: settings for Bitstream Letter Gothic ..	143	only add features that are available with the respective pdfTeX .....	36
Spacing: add sample .....	190	<code>\MT@setupfont@hook</code> : restore percent character if Galician <code>babel</code> is loaded .....	29
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<code>\MT@ifint</code> : employ LuaTeX features if available ..	21		
<code>\MT@ifstreq</code> : employ LuaTeX features if available ..	22		
fix: e-TeX version shouldn't use <code>\x</code> and <code>\y</code> (found by <i>Wiebke Petersen</i> ) .....	22		

2007/12/23 **Version 2.3**

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<code>\microtypecontext</code> : made robust (reported by <i>Stephan Hennig</i> )	88	<code>\MT@set@curr@os</code> : adjusting spaces made more reliable	61
<code>\MT@begin@catcodes</code> : fix: don't disable <code>\KV@sp@def</code>	73	<code>\MT@set@tr@codes</code> : also adjust tracking if protrusion is not enabled, and even for letterspace (reported by <i>Stephan Hennig</i> )	60
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<code>\MT@noligatures</code> : fix: set evaluation didn't work (bug introduced in v2.2)	69	<code>\MT@tr@outer@l</code> : only change pre outer space if it contains shrink	65
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2008/02/29 **Version 2.3a**

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Documentation: add hint about <code>babel</code> having to be loaded first	U28	<code>\MT@fix@catcode</code> : fix catcodes earlier, and also for the letterspace package	5
add table of available and enabled features	U6	<code>\MT@getkey</code> : fix: <code>key=val</code> in class options list	120
mention <code>soulutf8</code>	U32	<code>\MT@set@codes</code> : generalised	42
Protrusion: adjust LMR quotation marks again	148	<code>\MT@setupfont@hook</code> : restore percent character if Mexican <code>babel</code> is loaded	29
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2008/06/04 **Version 2.3b**

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<code>X<sub>Y</sub>TeX</code> (engine) . . . . .	<a href="#">U1</a> , <a href="#">U3</a> , <a href="#">U5</a> , <a href="#">U6</a> , <a href="#">U8</a> , <a href="#">U11</a> , <a href="#">U12</a> , <a href="#">U19</a> , <a href="#">U29</a> , <a href="#">U30</a> , <a href="#">U32</a> , <a href="#">1</a> , <a href="#">4</a> , <a href="#">13</a> , <a href="#">15</a> , <a href="#">25</a> , <a href="#">28</a> , <a href="#">35</a> , <a href="#">38</a> , <a href="#">48</a> , <a href="#">68</a> , <a href="#">77</a> , <a href="#">119</a> , <a href="#">124</a> , <a href="#">126</a> , <a href="#">131</a> , <a href="#">134</a> , <a href="#">138</a> , <a href="#">147</a> , <a href="#">215</a> , <a href="#">244</a> , <a href="#">245</a> , <a href="#">246</a>	<code>\xspaceskip</code> . . . . .	<a href="#">2772</a> , <a href="#">2775</a>
<code>\XeTeXcharglyph</code> . . . . .	<a href="#">3307</a>	<code>xunicode</code> (package) . . . . .	<a href="#">81</a> , <a href="#">82</a> , <a href="#">244</a>
<code>\XeTeXfonttype</code> . . . . .	<a href="#">3258</a>	<code>xunicode-addon</code> (package) . . . . .	<a href="#">85</a>
<code>\XeTeXglyph</code> . . . . .	<a href="#">1713</a>		
<b>Y</b>		<code>zefonts</code> (package) . . . . .	<a href="#">U21</a> , <a href="#">131</a>
<code>yfonts</code> (package) . . . . .	<a href="#">U23</a>		
<b>Z</b>			
<i>Michael Zedler</i> (contributor) . . . . .	<a href="#">U31</a>		

## E The L<sup>A</sup>T<sub>E</sub>X Project Public License

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### Preamble

The L<sup>A</sup>T<sub>E</sub>X Project Public License (LPPL) is the primary license under which the L<sup>A</sup>T<sub>E</sub>X kernel and the base L<sup>A</sup>T<sub>E</sub>X packages are distributed.

You may use this license for any work of which you hold the copyright and which you wish to distribute. This license may be particularly suitable if your work is T<sub>E</sub>X-related (such as a L<sup>A</sup>T<sub>E</sub>X package), but it is written in such a way that you can use it even if your work is unrelated to T<sub>E</sub>X.

The section ‘WHETHER AND HOW TO DISTRIBUTE WORKS UNDER THIS LICENSE’, below, gives instructions, examples, and recommendations for authors who are considering distributing their works under this license.

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We, the L<sup>A</sup>T<sub>E</sub>X3 Project, believe that the conditions below give you the freedom to make and distribute modified versions of your work that conform with whatever technical specifications you wish while maintaining the availability, integrity, and reliability of that work. If you do not see how to achieve your goal while meeting these conditions, then read the document ‘c<sub>f</sub>gguide.tex’ and ‘m<sub>o</sub>dguide.tex’ in the base L<sup>A</sup>T<sub>E</sub>X distribution for suggestions.

## Definitions

In this license document the following terms are used:

**Work:** Any work being distributed under this License.

**Derived Work:** Any work that under any applicable law is derived from the Work.

**Modification:** Any procedure that produces a Derived Work under any applicable law – for example, the production of a file containing an original file associated with the Work or a significant portion of such a file, either verbatim or with modifications and/or translated into another language.

**Modify:** To apply any procedure that produces a Derived Work under any applicable law.

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There is no warranty for the Work. Except when otherwise stated in writing, the Copyright Holder provides the Work ‘as is’, without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality and performance of the Work is with you. Should the Work prove defective, you assume the cost of all necessary servicing, repair, or correction.

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thor named in the components of the Work, or any other party who may distribute and/or modify the Work as permitted above, be liable to you for damages, including any general, special, incidental or consequential damages arising out of any use of the Work or out of inability to use the Work (including, but not limited to, loss of data, data being rendered inaccurate, or losses sustained by anyone as a result of any failure of the Work to operate with any other programs), even if the Copyright Holder or said author or said other party has been advised of the possibility of such damages.

## Maintenance of The Work

The Work has the status ‘author-maintained’ if the Copyright Holder explicitly and prominently states near the primary copyright notice in the Work that the Work can only be maintained by the Copyright Holder or simply that it is ‘author-maintained’.

The Work has the status ‘maintained’ if there is a Current Maintainer who has indicated in the Work that they are willing to receive error reports for the Work (for example, by supplying a valid e-mail address). It is not required for the Current Maintainer to acknowledge or act upon these error reports.

The Work changes from status ‘maintained’ to ‘unmaintained’ if there is no Current Maintainer, or the person stated to be Current Maintainer of the work cannot be reached through the indicated means of communication for a period of six months, and there are no other significant signs of active maintenance.

You can become the Current Maintainer of the Work by agreement with any existing Current Maintainer to take over this role.

If the Work is unmaintained, you can become the Current Maintainer of the Work through the following steps:

1. Make a reasonable attempt to trace the Current Maintainer (and the Copyright Holder, if the two differ) through the means of an Internet or similar search.
2. If this search is successful, then enquire whether the Work is still maintained.
  - (a) If it is being maintained, then ask the Current Maintainer to update their communication data within one month.
  - (b) If the search is unsuccessful or no action to resume active maintenance is taken by the Current Maintainer, then announce within the pertinent community your intention to take over maintenance. (If the Work is a L<sup>A</sup>T<sub>E</sub>X work, this could be done, for example, by posting to `comp.text.tex`.)
3. (a) If the Current Maintainer is reachable and agrees to pass maintenance of the Work to you, then this takes effect immediately upon announcement.
  - (b) If the Current Maintainer is not reachable and the Copyright Holder agrees that maintenance of the Work be passed to you, then this takes effect immediately upon announcement.



4. If you make an ‘intention announcement’ as described in 2b above and after three months your intention is challenged neither by the Current Maintainer nor by the Copyright Holder nor by other people, then you may arrange for the Work to be changed so as to name you as the (new) Current Maintainer.
5. If the previously unreachable Current Maintainer becomes reachable once more within three months of a change completed under the terms of 3b or 4, then that Current Maintainer must become or remain the

Current Maintainer upon request provided they then update their communication data within one month.

A change in the Current Maintainer does not, of itself, alter the fact that the Work is distributed under the LPPL license.

If you become the Current Maintainer of the Work, you should immediately provide, within the Work, a prominent and unambiguous statement of your status as Current Maintainer. You should also announce your new status to the same pertinent community as in 2b above.

## Whether and How to Distribute Works under This License

This section contains important instructions, examples, and recommendations for authors who are considering distributing their works under this license. These authors are addressed as ‘you’ in this section.

### Choosing This License or Another License

If for any part of your work you want or need to use *distribution* conditions that differ significantly from those in this license, then do not refer to this license anywhere in your work but, instead, distribute your work under a different license. You may use the text of this license as a model for your own license, but your license should not refer to the LPPL or otherwise give the impression that your work is distributed under the LPPL.

The document ‘modguide.tex’ in the base L<sup>A</sup>T<sub>E</sub>X distribution explains the motivation behind the conditions of this license. It explains, for example, why distributing L<sup>A</sup>T<sub>E</sub>X under the GNU General Public License (GPL) was considered inappropriate. Even if your work is unrelated to L<sup>A</sup>T<sub>E</sub>X, the discussion in ‘modguide.tex’ may still be relevant, and authors intending to distribute their works under any license are encouraged to read it.

### A Recommendation on Modification Without Distribution

It is wise never to modify a component of the Work, even for your own personal use, without also meeting the above conditions for distributing the modified component. While you might intend that such modifications will never be distributed, often this will happen by accident – you may forget that you have modified that component; or it may not occur to you when allowing others to access the modified version that you are thus distributing it and violating the conditions of this license in ways that could have legal implications and, worse, cause problems for the community. It is therefore usually in your best interest to keep your copy of the Work identical with the public one. Many works provide ways to control the behavior of that work without altering any of its licensed components.

### How to Use This License

To use this license, place in each of the components of your work both an explicit copyright notice including your name and the year the work was authored and/or last substantially modified. Include also a statement that the distribution and/or modification of that component is constrained by the conditions in this license.

Here is an example of such a notice and statement:

```
%% pig.dtx
%% Copyright 2005 M. Y. Name
%
% This work may be distributed and/or modified under the
% conditions of the LaTeX Project Public License, either version 1.3
% of this license or (at your option) any later version.
% The latest version of this license is in
%   https://www.latex-project.org/lppl.txt
% and version 1.3 or later is part of all distributions of LaTeX
% version 2005/12/01 or later.
%
% This work has the LPPL maintenance status ‘maintained’.
%
% The Current Maintainer of this work is M. Y. Name.
%
% This work consists of the files pig.dtx and pig.ins
% and the derived file pig.sty.
```

Given such a notice and statement in a file, the conditions given in this license document would apply, with the ‘Work’ referring to the three files ‘pig.dtx’, ‘pig.ins’, and ‘pig.sty’ (the last being generated from ‘pig.dtx’ using ‘pig.ins’), the ‘Base Interpreter’ referring to any ‘L<sup>A</sup>T<sub>E</sub>X-Format’, and both ‘Copyright Holder’ and ‘Current Maintainer’ referring to the person ‘M. Y. Name’.

If you do not want the Maintenance section of LPPL to apply to your Work, change ‘maintained’ above into ‘author-maintained’. However, we recommend that you use ‘maintained’ as the Maintenance section was added in order to ensure that your Work remains useful to the community even when you can no longer maintain and support it yourself.

### Derived Works That Are Not Replacements

Several clauses of the LPPL specify means to provide reliability and stability for the user community. They therefore concern themselves with the case that a Derived Work is intended to be used as a (compatible or incompatible) replacement of the original Work. If this is not the case (e.g., if a few lines of code are reused for a completely different task), then clauses 6b and 6d shall not apply.

### Important Recommendations

#### Defining What Constitutes the Work

The LPPL requires that distributions of the Work contain all the files of the Work. It is therefore important that you provide a way for the licensee to determine which files constitute the Work. This could, for example, be achieved by explicitly listing all the files of the Work near the copyright notice of each file or by using a line such as:

```
% This work consists of all files listed in manifest.txt.
```

in that place. In the absence of an unequivocal list it might be impossible for the licensee to determine what is considered by you to comprise the Work and, in such a case, the licensee would be entitled to make reasonable conjectures as to which files comprise the Work.