

The atveryend package

Heiko Oberdiek*

<heiko.oberdiek at gmail.com>

2016/05/16 v1.9

Abstract

This L^AT_EX package provides two hooks for `\end{document}` that are executed after the hook of `\AtEndDocument`. `\AfterLastShipout` can be used for code that is to be executed right after the last `\clearpage` before the .aux file is closed. `\AtVeryEndDocument` is used for code after closing and final reading of the .aux file.

Contents

1	Documentation	2
1.1	Related work	3
2	Implementation	3
2.1	Tools	4
2.2	Hooks	4
2.3	Redefining <code>\enddocument</code>	6
2.3.1	L ^A T _E X kernel	6
2.3.2	L ^A T _E X kernel 2011/06/27	7
2.3.3	Package booklet, file 2up.tex	9
2.3.4	Class dinbrief	9
2.3.5	Class combine	10
2.3.6	Class jpsj2	11
2.3.7	Testing and redefining	12
2.4	Hack into <code>\enddocument</code>	13
2.5	Using hooks of other packages	14
2.5.1	Package scrfile	14
2.5.2	Package etoolbox	14
2.6	Class letter	14
3	Test	16
3.1	Catcode checks for loading	16
4	Installation	17
4.1	Download	17
4.2	Bundle installation	18
4.3	Package installation	18
4.4	Refresh file name databases	18
4.5	Some details for the interested	18
5	Catalogue	19
6	Acknowledgement	19

*Please report any issues at <https://github.com/ho-tex/oberdiek/issues>

7	References	19
8	History	20
	[2009/12/06 v1.0]	20
	[2009/12/07 v1.1]	20
	[2009/12/09 v1.2]	20
	[2009/12/11 v1.3]	20
	[2010/01/25 v1.4]	20
	[2010/03/24 v1.5]	20
	[2011/04/15 v1.6]	20
	[2011/04/23 v1.7]	20
	[2011/06/30 v1.8]	21
	[2016/05/16 v1.9]	21
9	Index	21

1 Documentation

There are packages (e.g. `hyperref` [4], `lastpage` [6]) that want to call code after the typesetting is done, for example to remember the last page number. \LaTeX provides the hook `\AtEndDocument` (clsguide [1]). There are packages that use this hook to do their job for typesetting pages (e.g. `endfloat` emits the floats here [2]). Also a user might provide additional code in `\AtEndDocument`. Therefore packages have to call `\clearpage` in `\AtEndDocument` to get after the last shipout page. But this is not too reliable, because the right timing is important between packages that want or have to do things before the last page is output and packages that only work properly if they can reach the point after the last shipout.

Therefore the task of this package is to provide additional hooks for `\end{document}`. All hooks are called after the hook of `\AtEndDocument`.

`\BeforeClearDocument {<code>}`

The code is called before the final `\clearpage` in `\enddocument`. However it is unknown, whether the last page is already shipped out or if this will be triggered by the final `\clearpage`.

`\AfterLastShipout {<code>}`

The code is called after the final `\clearpage` of `\enddocument` before the main `.aux` file is closed. This is the right place to remember the last page in the `.aux` file, for instance.

`\AtVeryEndDocument {<code>}`

The code is called after the `.aux` file is closed and read in again. It is the place for final checks, rerun hints, final messages.

`\AtEndAfterFileList {<code>}`

After the `.aux` file closing and reading \LaTeX prints the file list if requested by `\listfiles`. Then this hook is executed.

`\AtVeryVeryEnd {<code>}`

This code is called right before the final `\@@end`.

1.1 Related work

Package `scrfile`: Markus Kohm has written package `scrfile` (part of KOMA-Script [5]) that provides hooks `\BeforeClosingMainAux` and `\AfterReadingMainAux`. They have the same function as the hooks of this package. In fact this package uses them, if they are available.

Class `revtex4-1`: This class calls `\clear@document` in `\enddocument` that wraps the final call of `\clearpage`. Thus it can be used as hook to call stuff after that `\clearpage`. This is also done by this package.

Package `etoolbox`: It provides `\AfterEndDocument`, a hook right before `\dead-cycles` or `\@@end` [3].

This package tries to combine as many approaches as possible:

- It looks for a known `\enddocument` and redefines it.
- Hooks that are provided by others are used (package `scrfile` or class `revtex4-1`).
- It redefines `\@checkend` and `\@dofilelist` to insert the hooks similar to package `scrfile`.
- The hook execution is wrapped in a macro that is redefined by its first call to prevent calling the hook more than once.

2 Implementation

```
1 (*package)
2 \begingroup\catcode61\catcode48\catcode32=10\relax%
3 \catcode13=5 % ^^M
4 \endlinechar=13 %
5 \catcode123=1 % {
6 \catcode125=2 % }
7 \catcode64=11 % @
8 \def\x{\endgroup
9 \expandafter\edef\csname AtVeryEnd@AtEnd\endcsname{%
10 \endlinechar=\the\endlinechar\relax
11 \catcode13=\the\catcode13\relax
12 \catcode32=\the\catcode32\relax
13 \catcode35=\the\catcode35\relax
14 \catcode61=\the\catcode61\relax
15 \catcode64=\the\catcode64\relax
16 \catcode123=\the\catcode123\relax
17 \catcode125=\the\catcode125\relax
18 }%
19 }%
20 \x\catcode61\catcode48\catcode32=10\relax%
21 \catcode13=5 % ^^M
22 \endlinechar=13 %
23 \catcode35=6 % #
24 \catcode64=11 % @
25 \catcode123=1 % {
26 \catcode125=2 % }
27 \def\TMP@EnsureCode#1#2{%
28 \edef\AtVeryEnd@AtEnd{%
29 \AtVeryEnd@AtEnd
30 \catcode#1=\the\catcode#1\relax
31 }%
32 \catcode#1=#2\relax
33 }
34 \TMP@EnsureCode{9}{10}% (tab)
```

```

35 \TMP@EnsureCode{39}{12}% '
36 \TMP@EnsureCode{40}{12}% (
37 \TMP@EnsureCode{41}{12}% )
38 \TMP@EnsureCode{42}{12}% *
39 \TMP@EnsureCode{45}{12}% -
40 \TMP@EnsureCode{46}{12}% .
41 \TMP@EnsureCode{47}{12}% /
42 \TMP@EnsureCode{62}{12}% >
43 \TMP@EnsureCode{91}{12}% [
44 \TMP@EnsureCode{93}{12}% ]
45 \TMP@EnsureCode{96}{12}% `
46 \edef\AtVeryEnd@AtEnd{\AtVeryEnd@AtEnd\noexpand\endinput}

```

Package identification.

```

47 \NeedsTeXFormat{LaTeX2e}
48 \ProvidesPackage{atveryend}%
49 [2016/05/16 v1.9 Hooks at the very end of document (HO)]

```

2.1 Tools

\AtVeryEnd@ifundefined

```

50 \def\AtVeryEnd@ifundefined#1{%
51   \begingroup\expandafter\expandafter\expandafter\endgroup
52   \expandafter\ifx\csname #1\endcsname\relax
53     \expandafter\@firstoftwo
54   \else
55     \expandafter\@secondoftwo
56   \fi
57 }

```

2.2 Hooks

\AtVeryEnd@BeforeClearDocumentHook

```

58 \let\AtVeryEnd@BeforeClearDocumentHook\@empty

```

\AtVeryEnd@AfterLastShipoutHook

```

59 \let\AtVeryEnd@AfterLastShipoutHook\@empty

```

\AtVeryEnd@AtVeryEndDocumentHook

```

60 \let\AtVeryEnd@AtVeryEndDocumentHook\@empty

```

\AtVeryEnd@AtEndAfterFileListHook

```

61 \let\AtVeryEnd@AtEndAfterFileListHook\@empty

```

\AtVeryEnd@AtVeryVeryEndHook

```

62 \let\AtVeryEnd@AtVeryVeryEndHook\@empty

```

\BeforeClearDocument

```

63 \newcommand*{\BeforeClearDocument}{%
64   \g@addto@macro\AtVeryEnd@BeforeClearDocumentHook
65 }

```

\AfterLastShipout

```

66 \newcommand*{\AfterLastShipout}{%
67   \g@addto@macro\AtVeryEnd@AfterLastShipoutHook
68 }

```

\AtVeryEndDocument

```

69 \newcommand*{\AtVeryEndDocument}{%
70   \g@addto@macro\AtVeryEnd@AtVeryEndDocumentHook
71 }

```

\AtEndAfterFileList

```
72 \newcommand*{\AtEndAfterFileList}{%
73   \g@addto@macro\AtVeryEnd\AtEndAfterFileListHook
74 }
```

\AtVeryVeryEnd

```
75 \newcommand*{\AtVeryVeryEnd}{%
76   \g@addto@macro\AtVeryEnd\AtVeryVeryEndHook
77 }
```

\Call@BeforeClearDocument

```
78 \newcommand*{\Call@BeforeClearDocument}{%
79   \let\BeforeClearDocument\@firstofone
80   \ifx\AtVeryEnd@BeforeClearDocumentHook\@empty
81     \PackageInfo{atveryend}{Empty hook `BeforeClearDocument'}%
82   \else
83     \PackageInfo{atveryend}{Executing hook `BeforeClearDocument'}%
84     \AtVeryEnd@BeforeClearDocumentHook
85   \fi
86   \global\let\AtVeryEnd@BeforeClearDocumentHook\@undefined
87   \global\let\Call@BeforeClearDocument\relax
88 }
```

\Call@AfterLastShipout

```
89 \newcommand*{\Call@AfterLastShipout}{%
90   \let\AfterLastShipout\@firstofone
91   \ifx\AtVeryEnd@AfterLastShipoutHook\@empty
92     \PackageInfo{atveryend}{Empty hook `AfterLastShipout'}%
93   \else
94     \PackageInfo{atveryend}{Executing hook `AfterLastShipout'}%
95     \AtVeryEnd@AfterLastShipoutHook
96   \fi
97   \global\let\AtVeryEnd@AfterLastShipoutHook\@undefined
98   \global\let\Call@AfterLastShipout\relax
99 }
```

\Call@AtVeryEndDocument

```
100 \newcommand*{\Call@AtVeryEndDocument}{%
101   \let\AtVeryEndDocument\@firstofone
102   \ifx\AtVeryEnd@AtVeryEndDocumentHook\@empty
103     \PackageInfo{atveryend}{Empty hook `AtVeryEndDocument'}%
104   \else
105     \PackageInfo{atveryend}{Executing hook `AtVeryEndDocument'}%
106     \AtVeryEnd@AtVeryEndDocumentHook
107   \fi
108   \global\let\AtVeryEnd@AtVeryEndDocumentHook\@undefined
109   \global\let\Call@AtVeryEndDocument\relax
110 }
```

\Call@AtEndAfterFileList

```
111 \newcommand*{\Call@AtEndAfterFileList}{%
112   \Call@AtVeryEndDocument
113   \let\AtEndAfterFileList\@firstofone
114   \ifx\AtVeryEnd@AtEndAfterFileListHook\@empty
115     \PackageInfo{atveryend}{Empty hook `AtEndAfterFileList'}%
116   \else
117     \PackageInfo{atveryend}{Executing hook `AtEndAfterFileList'}%
118     \AtVeryEnd@AtEndAfterFileListHook
119   \fi
120   \global\let\AtVeryEnd@AtEndAfterFileListHook\@undefined
121   \global\let\Call@AtEndAfterFileList\relax
122 }
```

`\Call@AtVeryVeryEnd`

```

123 \newcommand*{\Call@AtVeryVeryEnd}{%
124   \Call@AtEndAfterFileList
125   \let\AtVeryVeryEnd\@firstofone
126   \ifx\AtVeryEnd@AtVeryVeryEndHook\@empty
127     \PackageInfo{atveryend}{Empty hook `AtVeryVeryEnd'}%
128   \else
129     \PackageInfo{atveryend}{Executing hook `AtVeryVeryEnd'}%
130     \AtVeryEnd@AtVeryVeryEndHook
131   \fi
132   \global\let\AtVeryEnd@AtVeryVeryEndHook\@undefined
133   \global\let\Call@AtVeryVeryEnd\relax
134 }
```

2.3 Redefining `\enddocument`

This approach looks for known versions of `\enddocument` and redefines it. Class `seminar` and package `slidesec` are not checked, because there would be too much combinations to check.

2.3.1 L^AT_EX kernel

`\AtVeryEnd@test@standard`

```

135 \def\AtVeryEnd@test@standard{%
136   \let\AtEndDocument\@firstofone
137   \@enddocumenthook
138   \@checkend{document}%
139   \clearpage
140   \begingroup
141     \if@filesw
142       \immediate\closeout\@mainaux
143       \let\@setckpt\@gobbletwo
144       \let\@newl@bel\@testdef
145       \@tempswafalse
146       \makeatletter
147       \input\jobname.aux %
148     \fi
149     \@dofilelist
150     \ifdim \font@submax > \fontsubfuzz\relax
151       \@font@warning{Size substitutions with differences\MessageBreak
152         up to \font@submax\space have occurred.\@gobbletwo}%
153     \fi
154     \@defaultsubs
155     \@refundefined
156     \if@filesw
157       \ifx \@multiplelabels \relax
158         \if@tempswa
159           \@latex@warning@no@line{Label(s) may have changed. %
160             Rerun to get cross-references right}%
161         \fi
162       \else
163         \@multiplelabels
164       \fi
165     \fi
166   \endgroup
167   \deadcycles\z@
168   \@@@end
169 }
```

`\AtVeryEnd@enddocument@standard`

```

170 \def\AtVeryEnd@enddocument@standard{%
171   \let\AtEndDocument\@firstofone
```

```

172 \@enddocumenthook
173 \@checkend{document}%
174 \Call@BeforeClearDocument
175 \clearpage
176 \Call@AfterLastShipout
177 \begingroup
178 \if@filesw
179 \immediate\closeout\@mainaux
180 \let\@setckpt\@gobbletwo
181 \let\@newl@bel\@testdef
182 \@tempswafalse
183 \makeatletter
184 \input\jobname.aux %
185 \fi
186 \Call@AtVeryEndDocument
187 \@dofilelist
188 \Call@AtEndAfterFileList
189 \ifdim \font@submax >\fontsubfuzz\relax
190 \@font@warning{Size substitutions with differences\MessageBreak
191 up to \font@submax\space have occurred.\@gobbletwo}%
192 \fi
193 \@defaultsubs
194 \@refundefined
195 \if@filesw
196 \ifx \@multiplelabels \relax
197 \if@tempswa
198 \@latex@warning@no@line{Label(s) may have changed. %
199 Rerun to get cross-references right}%
200 \fi
201 \else
202 \@multiplelabels
203 \fi
204 \fi
205 \endgroup
206 \deadcycles\z@
207 \Call@AtVeryVeryEnd
208 \@@@end
209 }

```

2.3.2 L^AT_EX kernel 2011/06/27

The L^AT_EX 2_ε release 2011/06/27 has changed `\enddocument` (`\input` is replaced by `\@@input`).

VeryEnd@test@standard20110627

```

210 \expandafter\def\csname AtVeryEnd@test@standard20110627\endcsname{%
211 \let\AtEndDocument\@firstofone
212 \@enddocumenthook
213 \@checkend{document}%
214 \clearpage
215 \begingroup
216 \if@filesw
217 \immediate\closeout\@mainaux
218 \let\@setckpt\@gobbletwo
219 \let\@newl@bel\@testdef
220 \@tempswafalse
221 \makeatletter
222 \@@input\jobname.aux %
223 \fi
224 \@dofilelist
225 \ifdim \font@submax >\fontsubfuzz\relax
226 \@font@warning{Size substitutions with differences\MessageBreak
227 up to \font@submax\space have occurred.\@gobbletwo}%

```

```

228 \fi
229 \@defaultsubs
230 \@refundefined
231 \if@filesw
232 \ifx \@multiplelabels \relax
233 \if@tempswa
234 \@latex@warning@no@line{Label(s) may have changed. %
235 Rerun to get cross-references right}%
236 \fi
237 \else
238 \@multiplelabels
239 \fi
240 \fi
241 \endgroup
242 \deadcycles\z@
243 \@@@end
244 }

```

endddocument@standard20110627

```

245 \expandafter\def\csname AtVeryEnd@endddocument@standard20110627\endcsname{%
246 \let\AtEndDocument\@firstofone
247 \@endddocumenthook
248 \@checkend{document}%
249 \Call@BeforeClearDocument
250 \clearpage
251 \Call@AfterLastShipout
252 \begingroup
253 \if@filesw
254 \immediate\closeout\@mainaux
255 \let\@setckpt\@gobbletwo
256 \let\@newl@bel\@testdef
257 \@tempwafalse
258 \makeatletter
259 \@@@input\jobname.aux %
260 \fi
261 \Call@AtVeryEndDocument
262 \@dofilelist
263 \Call@AtEndAfterFileList
264 \ifdim \font@submax >\fontsubfuzz\relax
265 \@font@warning{Size substitutions with differences\MessageBreak
266 up to \font@submax\space have occurred.\@gobbletwo}%
267 \fi
268 \@defaultsubs
269 \@refundefined
270 \if@filesw
271 \ifx \@multiplelabels \relax
272 \if@tempswa
273 \@latex@warning@no@line{Label(s) may have changed. %
274 Rerun to get cross-references right}%
275 \fi
276 \else
277 \@multiplelabels
278 \fi
279 \fi
280 \endgroup
281 \deadcycles\z@
282 \Call@AtVeryVeryEnd
283 \@@@end
284 }

```


2.3.3 Package booklet, file 2up.tex

\AtVeryEnd@test@booklet

```
285 \expandafter\def\expandafter\AtVeryEnd@test@booklet\expandafter{%
286   \expandafter\twoupclearpage
287   \AtVeryEnd@test@standard
288 }
```

tVeryEnd@enddocument@booklet

```
289 \expandafter\def\expandafter\AtVeryEnd@enddocument@booklet\expandafter{%
290   \expandafter\twoclearpage
291   \AtVeryEnd@enddocument@standard
292 }
```

2.3.4 Class dinbrief

\AtVeryEnd@test@dinbrief

```
293 \def\AtVeryEnd@test@dinbrief{%
294   \@checkend{document} %
295   \newpage
296   \begingroup
297   \if@filesw
298     \ifnum\c@labelgen>0 %
299       \immediate\closeout\@mainlbl
300       \makeatletter
301       \input \jobname@lbl\relax
302       \clearpage
303     \fi
304     \immediate\closeout\@mainaux
305   \fi
306   \endgroup
307   \deadcycles\z@
308   \@@end
309 }
```

tVeryEnd@enddocument@dinbrief

```
310 \def\AtVeryEnd@enddocument@dinbrief{%
311   \@checkend{document}%
312   \Call@BeforeClearDocument
313   \newpage
314   \Call@AfterLastShipout
315   \begingroup
316   \if@filesw
317     \ifnum\c@labelgen>\z@
318       \immediate\closeout\@mainlbl
319       \makeatletter
320       \input \jobname@lbl\relax
321       \clearpage
322     \fi
323     \immediate\closeout\@mainaux
324   \fi
325   \Call@AtVeryEndDocument
326   \csname @dofilelist\endcsname
327   \Call@AtEndAfterFileList
328   \endgroup
329   \deadcycles\z@
330   \Call@AtVeryVeryEnd
331   \@@end
332 }
```

2.3.5 Class combine

\AtVeryEnd@test@combine

```

333 \def\AtVeryEnd@test@combine{%
334 \enddocumenthook
335 \@checkend{document}%
336 \clearpage
337 \begingroup
338 \if@filesw
339 \immediate\closeout\@mainaux
340 \immediate\closeout\@partaux
341 \let\@setckpt\@gobbletwo
342 \let\@newl@bel\@testdef
343 \@tempswafalse
344 \makeatletter \input\c@lmainauxfile %% change here
345 \fi
346 \c@lenddoca %% a replacement
347 \@refundefined
348 \endgroup
349 \deadcycles\z@
350 \@@end
351 }
```

VeryEnd@enddocument@combine

```

352 \def\AtVeryEnd@enddocument@combine{%
353 \enddocumenthook
354 \@checkend{document}%
355 \Call@BeforeClearDocument
356 \clearpage
357 \Call@AfterLastShipout
358 \begingroup
359 \if@filesw
360 \immediate\closeout\@mainaux
361 \immediate\closeout\@partaux
362 \let\@setckpt\@gobbletwo
363 \let\@newl@bel\@testdef
364 \@tempswafalse
365 \makeatletter \input\c@lmainauxfile %% change here
366 \fi
367 \Call@AtVeryEndDocument
368 \c@lenddoca %% a replacement
369 \@refundefined
370 \endgroup
371 \deadcycles\z@
372 \Call@AtVeryVeryEnd
373 \@@end
374 }
```

\AtVeryEnd@test@c@lenddoca

```

375 \long\def\AtVeryEnd@test@c@lenddoca{%
376 \@dofilelist
377 \ifdim\font@submax>\fontsubfuzz\relax
378 \@font@warning{%
379 Size substitutions with differences\MessageBreak
380 up to \font@submax\space have occurred.\@gobbletwo
381 }%
382 \fi
383 \@defaultsubs
384 \if@filesw
385 \ifx\@multiplelabels\relax
386 \if@tempswa
387 \@latex@warning@no@line{%
388 Label(s) may have changed. %
```

```

389         Rerun to get cross-references right%
390     }%
391 \fi
392 \else
393     \@multiplelabels
394 \fi
395 \fi
396 }

\c@lenddoca
397 \ifx\AtVeryEnd@c@lenddoca\c@lenddoca
398 \def\c@lenddoca{%
399     \@dofilelist
400     \Call@AtEndAfterFileList
401     \ifdim\font@submax>\fontsubfuzz\relax
402         \@font@warning{%
403             Size substitutions with differences\MessageBreak
404             up to \font@submax\space have occurred.\@gobbletwo
405         }%
406     \fi
407     \@defaultsubs
408     \if@filesw
409         \ifx\@multiplelabels\relax
410             \if@tempswa
411                 \@latex@warning@no@line{%
412                     Label(s) may have changed. %
413                     Rerun to get cross-references right%
414                 }%
415             \fi
416         \else
417             \@multiplelabels
418         \fi
419     \fi
420 }%
421 \fi

```

2.3.6 Class jpsj2

```

\AtVeryEnd@test@jpsj
422 \def\AtVeryEnd@test@jpsj{%
423     \if@lastpagebalancing
424         \global\let\@outputdblcol=\balancing@outputdblcol
425     \fi
426     \@checkend{document}%
427     \clearpage
428     \begingroup
429     \if@filesw
430         \immediate\closeout\@mainaux
431         \def\global\@namedef###1##2{%
432             \def\newlabel{\@testdef r}%
433             \def\bibcite{\@testdef b}%
434         \@tempswafalse
435         \makeatletter
436         \input \jobname.aux %
437         \if@tempswa
438             \@warning{%
439                 Label(s) may have changed. %
440                 Rerun to get cross-references right%
441             }%
442         \fi
443     \fi
444 \endgroup

```

```

445 \deadcycles\z@
446 \@@end
447 }

\AtVeryEnd@enddocument@jpsj
448 \def\AtVeryEnd@enddocument@jpsj{%
449 \if@lastpagebalancing
450 \global\let\@outputdblcol=\balancing@outputdblcol
451 \fi
452 \@checkend{document}%
453 \Call@BeforeClearDocument
454 \clearpage
455 \Call@AfterLastShipout
456 \begingroup
457 \if@files
458 \immediate\closeout\@mainaux
459 \def\global\@namedef##1##2{%
460 \def\newlabel{\@testdef r}%
461 \def\bibcite{\@testdef b}%
462 \@tempswafalse
463 \makeatletter
464 \input \jobname.aux %
465 \if@tempswa
466 \warning{%
467 Label(s) may have changed. %
468 Rerun to get cross-references right%
469 }%
470 \fi
471 \fi
472 \Call@AtVeryEndDocument
473 \csname @dofilelist\endcsname
474 \Call@AtEndAfterFileList
475 \endgroup
476 \deadcycles\z@
477 \Call@AtVeryVeryEnd
478 \@@end
479 }

```

2.3.7 Testing and redefining

```

\AtVeryEnd@Test
480 \def\AtVeryEnd@Test#1#2{%
481 \expandafter\ifx\csname AtVeryEnd@test@#2\endcsname#1%
482 \expandafter\let\expandafter#1%
483 \csname AtVeryEnd@enddocument@#2\endcsname
484 \begingroup
485 \let\on@line\@empty
486 \PackageInfo{atveryend}{%
487 \string#1 detected (#2)%
488 }%
489 \endgroup
490 \expandafter\AtVeryEnd@SkipToNil
491 \fi
492 }

```

\AtVeryEnd@SkipToNil

```

493 \def\AtVeryEnd@SkipToNil#1\@nil{}

```

\AtVeryEnd@RedefEndDocument

```

494 \def\AtVeryEnd@RedefEndDocument#1{%
495 \ifx#1\@undefined
496 \else

```

```

497 \AtVeryEnd@Test#1{standard20110627}%
498 \AtVeryEnd@Test#1{standard}%
499 \AtVeryEnd@Test#1{booklet}%
500 \AtVeryEnd@Test#1{dinbrief}%
501 \AtVeryEnd@Test#1{combine}%
502 \AtVeryEnd@Test#1{jpsj}%
503 \AtVeryEnd@SkipToNil
504 \@nil
505 \fi
506 }

507 \AtVeryEnd@RedefEndDocument\enddocument
508 \AtVeryEnd@RedefEndDocument\AP@enddocument % afterpage.sty
509 \AtVeryEnd@RedefEndDocument\hyper@back@cite@enddocument % htx-bc.sty
510 \AtVeryEnd@RedefEndDocument\hyper@enddocument % hyper.sty
511 \AtVeryEnd@RedefEndDocument\hyper@fn@enddocument % hyper.sty
512 \AtVeryEnd@RedefEndDocument\cweb@save@enddocument % cweb.cls
513 \AtVeryEnd@RedefEndDocument\prev@enddocument % flushend.sty
514 \AtVeryEnd@RedefEndDocument\endorigdocument % gaceta.cls
515 \AtVeryEnd@RedefEndDocument\keependdoc % aguplus.sty
516 \AtVeryEnd@RedefEndDocument\EMenddocument % t-angles.sty
517 \AtVeryEnd@RedefEndDocument\docmute@enddocument % docmute.sty
518 \AtVeryEnd@RedefEndDocument\latex@enddocument % alatex.sty
519 \AtVeryEnd@RedefEndDocument\enddocumentasusual % frenchle.sty
520 \AtVeryEnd@RedefEndDocument\old@enddocument % uwthesis.cls

```

2.4 Hack into \enddocument

```

521 \def\AtVeryEnd@document{document}%
522 \def\AtVeryEnd@RedefCheckEnd{%
523   \expandafter\def\expandafter\@checkend
524   \expandafter##\expandafter1\expandafter{%
525     \@checkend{##1}%
526     \def\AtVeryEnd@temp{##1}%
527     \ifx\AtVeryEnd@temp\AtVeryEnd@document
528       \let\AtVeryEnd@OrgClearpage\clearpage
529       \def\clearpage{%
530         \let\clearpage\AtVeryEnd@OrgClearpage
531         \Call@BeforeClearDocument
532         \clearpage
533         \Call@AfterLastShipout
534       }%
535     \fi
536   }%
537   \aftergroup\AtVeryEnd@RedefCheckEnd
538 }%
539 \AtBeginDocument{%
540   \AtEndDocument{%
541     \AtVeryEnd@RedefCheckEnd
542   }%
543 }
544 \AtEndDocument{%
545   \@ifundefined{@dofilelist}{%
546     \gdef@dofilelist{%
547       \Call@AtVeryEndDocument
548       \Call@AtEndAfterFileList
549     }%
550   }{%
551     \begingroup
552     \toks@\expandafter{\@dofilelist}%
553     \xdef@dofilelist{%
554       \noexpand\Call@AtVeryEndDocument

```

```

555     \the\toks@
556     \noexpand\Call@AtEndAfterFileList
557   }%
558   \endgroup
559 }%
560 }

```

2.5 Using hooks of other packages

2.5.1 Package scrfile

```

561 \AtBeginDocument{%
562   \@ifpackageloaded{scrfile}{%
563     \AtVeryEnd@ifundefined{BeforeClosingMainAux}{%
564       \BeforeClosingMainAux{\Call@AfterLastShipout}%
565     }%
566     \AtVeryEnd@ifundefined{AfterReadingMainAux}{%
567       \AfterReadingMainAux{\Call@AtVeryEndDocument}%
568     }%
569   }{}%

```

2.5.2 Package etoolbox

```

570   \@ifpackageloaded{etoolbox}{%
571     \AtVeryEnd@ifundefined{AfterEndDocument}{%
572       \AfterEndDocument{\Call@AtVeryEndDocument}%
573     }%
574   }{}%
575 }

```

2.6 Class letter

The class letter and some similar classes insert material (`\@startlabels`) at the end of the document. However, this method violates a precondition of this package that the `\clearpage` in `\enddocument` is the final call with no material at later times. Therefore we move the label making from the `.aux` file to `\AtEndDocument`.

```

576 \def\AtVeryEnd@temp{%
577   \AtBeginDocument{%
578     \let\@startlabels\startlabels
579     \let\@mlabel\mlabel
580     \if@filesw
581       \immediate\write\@mainaux{\string\@startlabels}%
582     \fi
583   }%
584   \AtEndDocument{%
585     \if@filesw
586       \immediate\write\@mainaux{\string\clearpage}%
587     \fi
588   }%
589 }
590 \ifx\makelabels\AtVeryEnd@temp
591 \else
592   \expandafter\AtVeryEnd@AtEnd
593 \fi%
594 \let\AtVeryEnd@PatchLetter=N%
595 \begingroup\expandafter\expandafter\expandafter\endgroup
596 \expandafter\ifx\csname endlletter\endcsname\relax
597 \else
598   \long\def\AtVeryEnd@TestEndLetter#1\@auxout#2#3\AtVeryEnd@Nil{%
599     \def\AtVeryEnd@temp{#2}%
600     \ifx\AtVeryEnd@temp\@empty
601       \else
602         \@onelevel@sanitize\AtVeryEnd@temp
603         \edef\AtVeryEnd@StringMlabel{%

```

```

604 \string\string
605 \string\@mlabel
606 \expandafter\@gobble\string\{%
607 }%
608 \def\AtVeryEnd@CatchFirst##1##2##3##4##5##6##7##8{%
609 ##1##2##3##4##5##6##7##8\AtVeryEnd@CatchSecond
610 }%
611 \def\AtVeryEnd@CatchSecond##1##2##3##4##5##6##7##8##9\@nil{%
612 ##1##2##3##4##5##6##7##8%
613 }%
614 \edef\AtVeryEnd@temp{%
615 \expandafter\AtVeryEnd@CatchFirst\AtVeryEnd@temp
616 {}{}{}{}{}{}{}{}%
617 {}{}{}{}{}{}{}{}%
618 \@nil
619 }%
620 \ifx\AtVeryEnd@temp\AtVeryEnd@StringMlabel
621 \expandafter\def\expandafter\endletter\expandafter{%
622 \endletter
623 \begingroup
624 \let\=\relax
625 \let\protect\@unexpandable@protect
626 \let\@mlabel=\relax
627 \edef\x{\endgroup
628 \noexpand\AtEndDocument{%
629 \@gobble#2%
630 }%
631 }%
632 \x
633 }%
634 \let\AtVeryEnd@PatchLetter=Y%
635 \fi
636 \fi
637 }%
638 \expandafter\AtVeryEnd@TestEndLetter\endletter
639 \@auxout{}\AtVeryEnd@Nil
640 \fi
641 \ifx\AtVeryEnd@PatchLetter Y%
642 \begingroup
643 \let\on@line\@empty
644 \PackageInfo{atveryend}{%
645 \@backslashchar makelabels detected. %
646 Moving labels\MessageBreak
647 from '.aux' file to \@backslashchar AtEndDocument%
648 }%
649 \endgroup
650 \def\makelabels{%
651 \AtBeginDocument{%
652 \let\@startlabels\startlabels
653 \let\@mlabel\mlabel
654 }%
655 }%
656 \AtEndDocument{%
657 \AtVeryEnd@ifundefined{@startlabels}{%
658 }{%
659 \clearpage
660 \@startlabels
661 }%
662 }%
663 \AfterLastShipout{%
664 \let\@startlabels\relax
665 \let\@mlabel\@gobbletwo

```

```

666 }%
667 \else
668 \PackageWarningNoLine{atveryend}{%
669 \@backslashchar makelabels detected, but labels cannot\MessageBreak
670 be moved to \@backslashchar AtEndDocument, because\MessageBreak
671 \@backslashchar endletter is not in expected form%
672 }%
673 \fi

674 \AtVeryEnd@AtEnd%
675 \end{package}

```

3 Test

3.1 Catcode checks for loading

```

676 (*test1)

677 \catcode`\{=1 %
678 \catcode`\}=2 %
679 \catcode`\#=6 %
680 \catcode`\@=11 %
681 \expandafter\ifx\csname count@\endcsname\relax
682 \countdef\count@=255 %
683 \fi

684 \expandafter\ifx\csname @gobble\endcsname\relax
685 \long\def\@gobble#1{%
686 \fi

687 \expandafter\ifx\csname @firstofone\endcsname\relax
688 \long\def\@firstofone#1{#1}%
689 \fi

690 \expandafter\ifx\csname loop\endcsname\relax
691 \expandafter\@firstofone
692 \else
693 \expandafter\@gobble
694 \fi

695 {%
696 \def\loop#1\repeat{%
697 \def\body{#1}%
698 \iterate
699 }%
700 \def\iterate{%
701 \body
702 \let\next\iterate
703 \else
704 \let\next\relax
705 \fi
706 \next
707 }%
708 \let\repeat=\fi
709 }%
710 \def\RestoreCatcodes{
711 \count@=0 %
712 \loop
713 \edef\RestoreCatcodes{%
714 \RestoreCatcodes
715 \catcode\the\count@=\the\catcode\count@\relax
716 }%
717 \ifnum\count@<255 %
718 \advance\count@ 1 %
719 \repeat
720
721 \def\RangeCatcodeInvalid#1#2{%

```



```

722 \count@=#1\relax
723 \loop
724 \catcode\count@=15 %
725 \ifnum\count@<#2\relax
726 \advance\count@ 1 %
727 \repeat
728 }
729 \def\RangeCatcodeCheck#1#2#3{%
730 \count@=#1\relax
731 \loop
732 \ifnum#3=\catcode\count@
733 \else
734 \errmessage{%
735 Character \the\count@\space
736 with wrong catcode \the\catcode\count@\space
737 instead of \number#3%
738 }%
739 \fi
740 \ifnum\count@<#2\relax
741 \advance\count@ 1 %
742 \repeat
743 }
744 \def\space{ }
745 \expandafter\ifx\csname LoadCommand\endcsname\relax
746 \def\LoadCommand{\input atveryend.sty\relax}%
747 \fi
748 \def\Test{%
749 \RangeCatcodeInvalid{0}{47}%
750 \RangeCatcodeInvalid{58}{64}%
751 \RangeCatcodeInvalid{91}{96}%
752 \RangeCatcodeInvalid{123}{255}%
753 \catcode`\@=12 %
754 \catcode`\|=0 %
755 \catcode`\%=14 %
756 \LoadCommand
757 \RangeCatcodeCheck{0}{36}{15}%
758 \RangeCatcodeCheck{37}{37}{14}%
759 \RangeCatcodeCheck{38}{47}{15}%
760 \RangeCatcodeCheck{48}{57}{12}%
761 \RangeCatcodeCheck{58}{63}{15}%
762 \RangeCatcodeCheck{64}{64}{12}%
763 \RangeCatcodeCheck{65}{90}{11}%
764 \RangeCatcodeCheck{91}{91}{15}%
765 \RangeCatcodeCheck{92}{92}{0}%
766 \RangeCatcodeCheck{93}{96}{15}%
767 \RangeCatcodeCheck{97}{122}{11}%
768 \RangeCatcodeCheck{123}{255}{15}%
769 \RestoreCatcodes
770 }
771 \Test
772 \csname @@end\endcsname
773 \end
774 </test1>

```

4 Installation

4.1 Download

Package. This package is available on CTAN¹:

CTAN:[macros/latex/contrib/oberdiek/atveryend.dtx](http://ctan.org/pkg/atveryend) The source file.

¹<http://ctan.org/pkg/atveryend>

[CTAN:macros/latex/contrib/oberdiek/atveryend.pdf](#) Documentation.

Bundle. All the packages of the bundle ‘oberdiek’ are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

[CTAN:install/macros/latex/contrib/oberdiek.tds.zip](#)

TDS refers to the standard “A Directory Structure for T_EX Files” ([CTAN:tds/tds.pdf](#)). Directories with `texmf` in their name are usually organized this way.

4.2 Bundle installation

Unpacking. Unpack the `oberdiek.tds.zip` in the TDS tree (also known as `texmf` tree) of your choice. Example (linux):

```
unzip oberdiek.tds.zip -d ~/texmf
```

Script installation. Check the directory `TDS:scripts/oberdiek/` for scripts that need further installation steps. Package `attachfile2` comes with the Perl script `pdfatfi.pl` that should be installed in such a way that it can be called as `pdfatfi`. Example (linux):

```
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
```

4.3 Package installation

Unpacking. The `.dtx` file is a self-extracting `docstrip` archive. The files are extracted by running the `.dtx` through plain T_EX:

```
tex atveryend.dtx
```

TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as `texmf` tree):

<code>atveryend.sty</code>	→ <code>tex/latex/oberdiek/atveryend.sty</code>
<code>atveryend.pdf</code>	→ <code>doc/latex/oberdiek/atveryend.pdf</code>
<code>test/atveryend-test1.tex</code>	→ <code>doc/latex/oberdiek/test/atveryend-test1.tex</code>
<code>atveryend.dtx</code>	→ <code>source/latex/oberdiek/atveryend.dtx</code>

If you have a `docstrip.cfg` that configures and enables `docstrip`’s TDS installing feature, then some files can already be in the right place, see the documentation of `docstrip`.

4.4 Refresh file name databases

If your T_EX distribution (teT_EX, mikT_EX, ...) relies on file name databases, you must refresh these. For example, teT_EX users run `texhash` or `mktextlsr`.

4.5 Some details for the interested

Unpacking with L^AT_EX. The `.dtx` chooses its action depending on the format:

plain T_EX: Run `docstrip` and extract the files.

L^AT_EX: Generate the documentation.

If you insist on using L^AT_EX for `docstrip` (really, `docstrip` does not need L^AT_EX), then inform the autodetect routine about your intention:

```
latex \let\install=y\input{atveryend.dtx}
```

Do not forget to quote the argument according to the demands of your shell.

Generating the documentation. You can use both the `.dtx` or the `.drv` to generate the documentation. The process can be configured by the configuration file `ltxdoc.cfg`. For instance, put this line into this file, if you want to have A4 as paper format:

```
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdfL^AT_EX:

```
pdflatex atveryend.dtx
makeindex -s gind.ist atveryend.idx
pdflatex atveryend.dtx
makeindex -s gind.ist atveryend.idx
pdflatex atveryend.dtx
```

5 Catalogue

The following XML file can be used as source for the [T_EX Catalogue](#). The elements `caption` and `description` are imported from the original XML file from the Catalogue. The name of the XML file in the Catalogue is `atveryend.xml`.

```
775 (*catalogue)
776 <?xml version='1.0' encoding='us-ascii'?>
777 <!DOCTYPE entry SYSTEM 'catalogue.dtd'>
778 <entry datestamp='$Date$' modifier='$Author$' id='atveryend'>
779   <name>atveryend</name>
780   <caption>Hooks at the very end of a document.</caption>
781   <authorref id='auth:oberdiek'>
782     <copyright owner='Heiko Oberdiek' year='2009-2011'>
783       <license type='lppl1.3'>
784         <version number='1.9'>
785           <description>
786             This LaTeX packages provides two hooks for <tt>\end{document}</tt>
787             that are executed after the hook of <tt>\AtEndDocument</tt>:
788             <tt>\AfterLastShipout</tt> can be used for code that is to be executed
789             right after the last <tt>\clearpage</tt> before the <tt>.aux</tt> file
790             is closed. <tt>\AtVeryEndDocument</tt> is used for code after closing
791             and final reading of the <tt>.aux</tt> file.
792           <p/>
793             The package is part of the <xref refid='oberdiek'>oberdiek</xref> bundle.
794         </description>
795         <documentation details='Package documentation'
796           href='ctan:/macros/latex/contrib/oberdiek/atveryend.pdf'>
797           <ctan file='true' path='/macros/latex/contrib/oberdiek/atveryend.dtx'>
798             <miktex location='oberdiek'>
799             <texlive location='oberdiek'>
800             <install path='/macros/latex/contrib/oberdiek/oberdiek.tds.zip'>
801           </entry>
802 </catalogue>
```

6 Acknowledgement

Arthur Ogawa: He proposed the new API with `\AfterLastShipout` and gave me much feedback, comprehensive class/package lists, many suggestions and comments.

7 References

- [1] The L^AT_EX3 Project: *L^AT_EX2_ε for class and package writers* 2006/02/15; [CTAN:macros/latex/doc/clsguide.pdf](#).

- [2] James Darrell McCauley, Jeff Goldberg: *The endfloat package*; 1995/10/11 v2.4i; CTAN:macros/latex/contrib/endfloat/endfloat.pdf.
- [3] Philipp Lehmann: *The etoolbox package*; 2009/08/06 v1.8; CTAN:macros/latex/contrib/etoolbox/etoolbox.pdf.
- [4] Sebastian Rahtz, Heiko Oberdiek: *The hyperref package*; 2009/12/05 v6.79l; CTAN:macros/latex/contrib/hyperref/.
- [5] Markus Kohm: *KOMA-Script*; 2009/07/24 v3.04a; <http://www.komascript.de/>.
- [6] Jeff Goldberg: *The lastpage package*; 1994/07/20 v0.1b; CTAN:macros/latex/contrib/lastpage/lastpage.pdf.
- [7] APS, AIP, Arthur Orgawa; ReVTeX 4.1; 2009/10/13 v4.1; <http://authors.aps.org/revtex4/>.

8 History

[2009/12/06 v1.0]

- The first version.

[2009/12/07 v1.1]

- Bug fixes.

[2009/12/09 v1.2]

- Additional support of classes and packages.

[2009/12/11 v1.3]

- Patch for letter like classes that puts label into the ‘aux’ file.
- Hook `\BeforeClearDocument` added (request from Arthur Ogawa).
- Patch of `\clear@document` removed (Arthur Ogawa).
- A nested `\AtBeginDocument` removed.

[2010/01/25 v1.4]

- Moved from TDS:*/generic/* to TDS:*/latex/.

[2010/03/24 v1.5]

- `\Call@BeforeClearDocument` fixed (Ahmed Musa).

[2011/04/15 v1.6]

- `\Call@AtEndAfterFileList` and `\Call@AtVeryVeryEnd` added.

[2011/04/23 v1.7]

- Some fix for `\AtVeryEnd@RedefCheckEnd` to avoid error because of undefined control sequence in some circumstances (thanks to D.P. Story for bug report).

[2011/06/30 v1.8]

- Support of changed `\enddocument` of L^AT_EX 2_ε 2011/06/27.

[2016/05/16 v1.9]

- Documentation updates.

9 Index

Numbers written in *italic* refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; plain numbers refer to the code lines where the entry is used.

Symbols	
<code>\#</code>	679
<code>\%</code>	755
<code>\@</code>	680, 753
<code>\@end</code>	168, 208, 243, 283, 308, 331, 350, 373, 446, 478
<code>\@input</code>	222, 259
<code>\@auxout</code>	598, 639
<code>\@backslashchar</code>	645, 647, 669, 670, 671
<code>\@checkend</code>	138, 173, 213, 248, 294, 311, 335, 354, 426, 452, 523, 525
<code>\@defaultsubs</code>	154, 193, 229, 268, 383, 407
<code>\@dofilelist</code>	149, 187, 224, 262, 376, 399, 546, 552, 553
<code>\@empty</code>	58, 59, 60, 61, 62, 80, 91, 102, 114, 126, 485, 600, 643
<code>\@enddocumenthook</code>	137, 172, 212, 247, 334, 353
<code>\@firstofone</code>	79, 90, 101, 113, 125, 136, 171, 211, 246, 688, 691
<code>\@firstoftwo</code>	53
<code>\@font@warning</code>	151, 190, 226, 265, 378, 402
<code>\@gobble</code>	606, 629, 685, 693
<code>\@gobbletwo</code>	143, 152, 180, 191, 218, 227, 255, 266, 341, 362, 380, 404, 665
<code>\@ifpackageloaded</code>	562, 570
<code>\@ifundefined</code>	545
<code>\@latex@warning@no@line</code>	159, 198, 234, 273, 387, 411
<code>\@mainaux</code>	142, 179, 217, 254, 304, 323, 339, 360, 430, 458, 581, 586
<code>\@mainlbl</code>	299, 318
<code>\@mlabel</code>	579, 605, 626, 653, 665
<code>\@multiplelabels</code>	157, 163, 196, 202, 232, 238, 271, 277, 385, 393, 409, 417
<code>\@namedef</code>	431, 459
<code>\@newl@bel</code>	144, 181, 219, 256, 342, 363
<code>\@nil</code>	493, 504, 611, 618
<code>\@onelevel@sanitize</code>	602
<code>\@outputdblcol</code>	424, 450
<code>\@partaux</code>	340, 361
<code>\@refundefined</code>	155, 194, 230, 269, 347, 369
<code>\@secondoftwo</code>	55
<code>\@setckpt</code>	143, 180, 218, 255, 341, 362
<code>\@startlabels</code>	578, 581, 652, 660, 664
<code>\@tempswafalse</code>	145, 182, 220, 257, 343, 364, 434, 462
<code>\@testdef</code>	144, 181, 219, 256, 342, 363, 432, 433, 460, 461
<code>\@undefined</code>	86, 97, 108, 120, 132, 495
<code>\@unexpandable@protect</code>	625
<code>\@warning</code>	438, 466
<code>\@</code>	624, 754
<code>\{</code>	606, 677
<code>\}</code>	678
A	
<code>\a@enddocument</code>	518
<code>\advance</code>	718, 726, 741
<code>\AfterEndDocument</code>	572
<code>\aftergroup</code>	537
<code>\AfterLastShipout</code>	2, <u>66</u> , 90, 663, 788
<code>\AfterReadingMainAux</code>	567
<code>\AP@enddocument</code>	508
<code>\AtBeginDocument</code>	539, 561, 577, 651
<code>\AtEndAfterFileList</code>	2, <u>72</u> , 113
<code>\AtEndDocument</code>	136, 171, 211, 246, 540, 544, 584, 628, 656, 787
<code>\AtVeryEnd@AfterLastShipoutHook</code>	59, 67, 91, 95, 97
<code>\AtVeryEnd@AtEnd</code>	28, 29, 46, 592, 674
<code>\AtVeryEnd@AtEndAfterFileListHook</code>	<u>61</u> , 73, 114, 118, 120
<code>\AtVeryEnd@AtVeryEndDocu- mentHook</code>	<u>60</u> , 70, 102, 106, 108
<code>\AtVeryEnd@AtVeryEndHook</code>	<u>62</u> , 76, 126, 130, 132
<code>\AtVeryEnd@BeforeClearDocu- mentHook</code>	<u>58</u> , 64, 80, 84, 86
<code>\AtVeryEnd@c@lenddoca</code>	397
<code>\AtVeryEnd@CatchFirst</code>	608, 615
<code>\AtVeryEnd@CatchSecond</code>	609, 611
<code>\AtVeryEnd@document</code>	521, 527
<code>\AtVeryEnd@enddocument@booklet</code>	<u>289</u>
<code>\AtVeryEnd@enddocument@combine</code>	<u>352</u>
<code>\AtVeryEnd@enddocument@dinbrief</code>	<u>310</u>
<code>\AtVeryEnd@enddocument@jpsj</code>	<u>448</u>
<code>\AtVeryEnd@enddocument@standard</code>	<u>170</u> , 291

\AtVeryEnd@endddocument@stand- ard20110627	245	\count@	682, 711, 715, 717, 718, 722, 724, 725, 726, 730, 732, 735, 736, 740, 741
\AtVeryEnd@ifundefined	50, 563, 566, 571, 657	\countdef	682
\AtVeryEnd@Nil	598, 639	\csname	9, 52, 210, 245, 326, 473, 481, 483, 596, 681, 684, 687, 690, 745, 772
\AtVeryEnd@OrgClearpage . . .	528, 530	\cweb@save@endddocument	512
\AtVeryEnd@PatchLetter	594, 634, 641		
\AtVeryEnd@RedefCheckEnd	522, 537, 541		
\AtVeryEnd@RedefEndDocument . .	494, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520	D	
\AtVeryEnd@SkipToNil	490, 493, 503	\deadcycles	167, 206, 242, 281, 307, 329, 349, 371, 445, 476
\AtVeryEnd@StringMlabel	603, 620	\docmute@endddocument	517
\AtVeryEnd@temp	526, 527, 576, 590, 599, 600, 602, 614, 615, 620		
\AtVeryEnd@Test	480, 497, 498, 499, 500, 501, 502	E	
\AtVeryEnd@test@booklet	285	\EMendddocument	516
\AtVeryEnd@test@c@lenddoca	375	\end	773, 786
\AtVeryEnd@test@combine	333	\endcsname	9, 52, 210, 245, 326, 473, 481, 483, 596, 681, 684, 687, 690, 745, 772
\AtVeryEnd@test@dinbrief	293	\endddocument	507
\AtVeryEnd@test@jpsj	422	\endddocumentasusual	519
\AtVeryEnd@test@standard	135, 287	\endingput	46
\AtVeryEnd@test@standard20110627	210	\endletter	621, 622, 638
\AtVeryEnd@TestEndLetter	598, 638	\endlinechar	4, 10, 22
\AtVeryEndDocument	2, 69, 101, 790	\endorigddocument	514
\AtVeryVeryEnd	2, 75, 125	\errmessage	734
B		F	
\balancing@outputdblcol	424, 450	\font@submax 150, 152, 189, 191, 225, 227, 264, 266, 377, 380, 401, 404	
\BeforeClearDocument	2, 63, 79	\fontsubfuzz 150, 189, 225, 264, 377, 401	
\BeforeClosingMainAux	564		
\biblecite	433, 461	G	
\body	697, 701	\g@addto@macro	64, 67, 70, 73, 76
		\gdef	546
C			
\c@labelgen	298, 317	H	
\c@lenddoca	346, 368, 397	\hyper@back@cite@endddocument . .	509
\c@lmainauxfile	344, 365	\hyper@endddocument	510
\Call@AfterLastShipout	89, 176, 251, 314, 357, 455, 533, 564	\hyper@fn@endddocument	511
\Call@AtEndAfterFileList	111, 124, 188, 263, 327, 400, 474, 548, 556		
\Call@AtVeryEndDocument	100, 112, 186, 261, 325, 367, 472, 547, 554, 567, 572	I	
\Call@AtVeryVeryEnd	123, 207, 282, 330, 372, 477	\if@filesw	141, 156, 178, 195, 216, 231, 253, 270, 297, 316, 338, 359, 384, 408, 429, 457, 580, 585
\Call@BeforeClearDocument	78, 174, 249, 312, 355, 453, 531	\if@lastpagebalancing	423, 449
\catcode	2, 3, 5, 6, 7, 11, 12, 13, 14, 15, 16, 17, 20, 21, 23, 24, 25, 26, 30, 32, 677, 678, 679, 680, 715, 724, 732, 736, 753, 754, 755	\if@tempswa	158, 197, 233, 272, 386, 410, 437, 465
\clearpage	139, 175, 214, 250, 302, 321, 336, 356, 427, 454, 528, 529, 530, 532, 586, 659, 789	\ifdim	150, 189, 225, 264, 377, 401
\closeout	142, 179, 217, 254, 299, 304, 318, 323, 339, 340, 360, 361, 430, 458	\ifnum	298, 317, 717, 725, 732, 740
		\ifx	52, 80, 91, 102, 114, 126, 157, 196, 232, 271, 385, 397, 409, 481, 495, 527, 590, 596, 600, 620, 641, 681, 684, 687, 690, 745
		\immediate	142, 179, 217, 254, 299, 304, 318, 323, 339, 340, 360, 361, 430, 458, 581, 586
		\input	147, 184, 301, 320, 344, 365, 436, 464, 746
		\iterate	698, 700, 702
		J	
		\jobname	147, 184, 222, 259, 436, 464
		\jobname@lbl	301, 320

K		R	
<code>\keepddoc</code>	515	<code>\RangeCatcodeCheck</code>	729, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768
L		<code>\RangeCatcodeInvalid</code>	721, 749, 750, 751, 752
<code>\LoadCommand</code>	746, 756	<code>\repeat</code>	696, 708, 719, 727, 742
<code>\loop</code>	696, 712, 723, 731	<code>\RestoreCatcodes</code>	710, 713, 714, 769
M		S	
<code>\makeatletter</code>	146, 183, 221, 258, 300, 319, 344, 365, 435, 463	<code>\space</code>	152, 191, 227, 266, 380, 404, 735, 736, 744
<code>\makelabels</code>	590, 650	<code>\startlabels</code>	578, 652
<code>\MessageBreak</code>	151, 190, 226, 265, 379, 403, 646, 669, 670	T	
<code>\mlabel</code>	579, 653	<code>\Test</code>	748, 771
N		<code>\the</code>	10, 11, 12, 13, 14, 15, 16, 17, 30, 555, 715, 735, 736
<code>\NeedsTeXFormat</code>	47	<code>\TMP@EnsureCode</code>	27, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45
<code>\newcommand</code>	63, 66, 69, 72, 75, 78, 89, 100, 111, 123	<code>\toks@</code>	552, 555
<code>\newlabel</code>	432, 460	<code>\twoclearpage</code>	290
<code>\newpage</code>	295, 313	<code>\twoupclearpage</code>	286
<code>\next</code>	702, 704, 706	W	
<code>\number</code>	737	<code>\write</code>	581, 586
O		X	
<code>\old@enddocument</code>	520	<code>\x</code>	8, 20, 627, 632
<code>\on@line</code>	485, 643	Z	
P		<code>\z@</code>	167, 206, 242, 281, 307, 317, 329, 349, 371, 445, 476
<code>\PackageInfo</code>	81, 83, 92, 94, 103, 105, 115, 117, 127, 129, 486, 644		
<code>\PackageWarningNoLine</code>	668		
<code>\prev@enddocument</code>	513		
<code>\protect</code>	625		
<code>\ProvidesPackage</code>	48		