

# The atveryend package

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## Abstract

This L<sup>A</sup>T<sub>E</sub>X 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

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>Documentation</b>                       | <b>2</b>  |
| 1.1      | Related work                               | 3         |
| <b>2</b> | <b>Implementation</b>                      | <b>3</b>  |
| 2.1      | Tools                                      | 4         |
| 2.2      | Hooks                                      | 4         |
| 2.3      | Redefining <code>\enddocument</code>       | 6         |
| 2.3.1    | L <sup>A</sup> T <sub>E</sub> X kernel     | 6         |
| 2.3.2    | Package booklet, file <code>2up.tex</code> | 7         |
| 2.3.3    | Class <code>dinbrief</code>                | 7         |
| 2.3.4    | Class <code>combine</code>                 | 8         |
| 2.3.5    | Class <code>jpsj2</code>                   | 10        |
| 2.3.6    | Testing and redefining                     | 11        |
| 2.4      | Hack into <code>\enddocument</code>        | 12        |
| 2.5      | Using hooks of other packages              | 12        |
| 2.5.1    | Package <code>scrfile</code>               | 12        |
| 2.5.2    | Package <code>etoolbox</code>              | 12        |
| 2.6      | Class <code>letter</code>                  | 13        |
| <b>3</b> | <b>Test</b>                                | <b>14</b> |
| 3.1      | Catcode checks for loading                 | 14        |
| <b>4</b> | <b>Installation</b>                        | <b>16</b> |
| 4.1      | Download                                   | 16        |
| 4.2      | Bundle installation                        | 16        |
| 4.3      | Package installation                       | 17        |
| 4.4      | Refresh file name databases                | 17        |
| 4.5      | Some details for the interested            | 17        |
| <b>5</b> | <b>Acknowledgement</b>                     | <b>17</b> |
| <b>6</b> | <b>References</b>                          | <b>18</b> |

|                   |           |
|-------------------|-----------|
| <b>7 History</b>  | <b>18</b> |
| [2009/12/06 v1.0] | 18        |
| [2009/12/07 v1.1] | 18        |
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| [2009/12/11 v1.3] | 18        |
| [2010/01/25 v1.4] | 18        |
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| [2011/04/15 v1.6] | 18        |
| [2011/04/23 v1.7] | 19        |
| <b>8 Index</b>    | <b>19</b> |

## 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`  $\{\langle code \rangle\}$

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`  $\{\langle code \rangle\}$

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`  $\{\langle code \rangle\}$

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`  $\{\langle code \rangle\}$

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

`\AtVeryVeryEnd`  $\{\langle code \rangle\}$

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 `\deadcycles` 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 `packagescrfile`.
- 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 [2011/04/23 v1.7 Hooks at very end of document (HO)]

```

## 2.1 Tools

\AtVeryEnd@ifundefined

```

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

```

## 2.2 Hooks

ryEnd@BeforeClearDocumentHook

```
58 \let\AtVeryEnd@BeforeClearDocumentHook\@empty
```

tVeryEnd@AfterLastShipoutHook

```
59 \let\AtVeryEnd@AfterLastShipoutHook\@empty
```

VeryEnd@AtVeryEndDocumentHook

```
60 \let\AtVeryEnd@AtVeryEndDocumentHook\@empty
```

eryEnd@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<sup>A</sup>T<sub>E</sub>X 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       \@tempwafalse
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 }
```

`tVeryEnd@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     \@tempwafalse
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 Package booklet, file 2up.tex

\AtVeryEnd@test@booklet

```

210 \expandafter\def\expandafter\AtVeryEnd@test@booklet\expandafter{%
211   \expandafter\twoupclearpage
212   \AtVeryEnd@test@standard
213 }

```

AtVeryEnd@enddocument@booklet

```

214 \expandafter\def\expandafter\AtVeryEnd@enddocument@booklet\expandafter{%
215   \expandafter\twoclearpage
216   \AtVeryEnd@enddocument@standard
217 }

```

### 2.3.3 Class dinbrief

\AtVeryEnd@test@dinbrief

```

218 \def\AtVeryEnd@test@dinbrief{%
219   \@checkend{document} %
220   \newpage
221   \begingroup
222     \if@filesw

```

```

223     \ifnum\c@labelgen>0 %
224     \immediate\closeout\@mainlbl
225     \makeatletter
226     \input \jobname@lbl\relax
227     \clearpage
228     \fi
229     \immediate\closeout\@mainaux
230     \fi
231 \endgroup
232 \deadcycles\z@
233 \@@end
234 }

```

tVeryEnd@enddocument@dinbrief

```

235 \def\AtVeryEnd@enddocument@dinbrief{%
236 \@checkend{document}%
237 \Call@BeforeClearDocument
238 \newpage
239 \Call@AfterLastShipout
240 \begingroup
241 \if@filesw
242     \ifnum\c@labelgen>\z@
243     \immediate\closeout\@mainlbl
244     \makeatletter
245     \input \jobname@lbl\relax
246     \clearpage
247     \fi
248     \immediate\closeout\@mainaux
249     \fi
250 \Call@AtVeryEndDocument
251 \csname @dofilelist\endcsname
252 \Call@AtEndAfterFileList
253 \endgroup
254 \deadcycles\z@
255 \Call@AtVeryVeryEnd
256 \@@end
257 }

```

### 2.3.4 Class combine

\AtVeryEnd@test@combine

```

258 \def\AtVeryEnd@test@combine{%
259 \@enddocumenthook
260 \@checkend{document}%
261 \clearpage
262 \begingroup
263 \if@filesw
264     \immediate\closeout\@mainaux
265     \immediate\closeout\@partaux
266     \let\@setckpt\@gobbletwo
267     \let\@newl@bel\@testdef
268     \@tempwafalse
269     \makeatletter \input\c@lmainauxfile %% change here
270     \fi
271     \c@lenddoca %% a replacement
272     \@refundefined
273 \endgroup
274 \deadcycles\z@
275 \@@end
276 }

```

AtVeryEnd@enddocument@combine



```

277 \def\AtVeryEnd@enddocument@combine{%
278 \enddocumenthook
279 \@checkend{document}%
280 \Call@BeforeClearDocument
281 \clearpage
282 \Call@AfterLastShipout
283 \begingroup
284 \if@filesw
285 \immediate\closeout\@mainaux
286 \immediate\closeout\@partaux
287 \let\@setckpt\@gobbletwo
288 \let\@newl@bel\@testdef
289 \@tempswafalse
290 \makeatletter \input\c@lmainauxfile %% change here
291 \fi
292 \Call@AtVeryEndDocument
293 \c@lenddoca %% a replacement
294 \@refundefined
295 \endgroup
296 \deadcycles\z@
297 \Call@AtVeryVeryEnd
298 \@@end
299 }

```

\AtVeryEnd@test@c@lenddoca

```

300 \long\def\AtVeryEnd@test@c@lenddoca{%
301 \@dofilelist
302 \ifdim\font@submax>\fontsubfuzz\relax
303 \@font@warning{%
304 Size substitutions with differences\MessageBreak
305 up to \font@submax\space have occurred.\@gobbletwo
306 }%
307 \fi
308 \@defaultsubs
309 \if@filesw
310 \ifx\@multiplelabels\relax
311 \if@tempswa
312 \@latex@warning@no@line{%
313 Label(s) may have changed. %
314 Rerun to get cross-references right%
315 }%
316 \fi
317 \else
318 \@multiplelabels
319 \fi
320 \fi
321 }

```

\c@lenddoca

```

322 \ifx\AtVeryEnd@c@lenddoca\c@lenddoca
323 \def\c@lenddoca{%
324 \@dofilelist
325 \Call@AtEndAfterFileList
326 \ifdim\font@submax>\fontsubfuzz\relax
327 \@font@warning{%
328 Size substitutions with differences\MessageBreak
329 up to \font@submax\space have occurred.\@gobbletwo
330 }%
331 \fi
332 \@defaultsubs
333 \if@filesw
334 \ifx\@multiplelabels\relax

```

```

335     \if@tempswa
336     \@latex@warning@no@line{%
337       Label(s) may have changed. %
338       Rerun to get cross-references right%
339     }%
340   \fi
341   \else
342     \@multiplelabels
343   \fi
344 \fi
345 }%
346 \fi

```

### 2.3.5 Class jpsj2

\AtVeryEnd@test@jpsj

```

347 \def\AtVeryEnd@test@jpsj{%
348   \if@lastpagebalancing
349     \global\let\@outputdblcol=\balancing@outputdblcol
350   \fi
351   \@checkend{document}%
352   \clearpage
353   \begingroup
354     \if@filesw
355       \immediate\closeout\@mainaux
356       \def\global\@namedef##1##2{%
357         \def\newlabel{\@testdef r}%
358         \def\bibcite{\@testdef b}%
359       \@tempwafalse
360       \makeatletter
361       \input \jobname.aux %
362       \if@tempswa
363         \@warning{%
364           Label(s) may have changed. %
365           Rerun to get cross-references right%
366         }%
367       \fi
368     \fi
369   \endgroup
370   \deadcycles\z@
371   \@@end
372 }

```

\AtVeryEnd@enddocument@jpsj

```

373 \def\AtVeryEnd@enddocument@jpsj{%
374   \if@lastpagebalancing
375     \global\let\@outputdblcol=\balancing@outputdblcol
376   \fi
377   \@checkend{document}%
378   \Call@BeforeClearDocument
379   \clearpage
380   \Call@AfterLastShipout
381   \begingroup
382     \if@filesw
383       \immediate\closeout\@mainaux
384       \def\global\@namedef##1##2{%
385         \def\newlabel{\@testdef r}%
386         \def\bibcite{\@testdef b}%
387       \@tempwafalse
388       \makeatletter
389       \input \jobname.aux %
390     \if@tempswa

```

```

391     \@warning{%
392         Label(s) may have changed. %
393         Rerun to get cross-references right%
394     }%
395     \fi
396 \fi
397 \Call@AtVeryEndDocument
398 \csname @dofilelist\endcsname
399 \Call@AtEndAfterFileList
400 \endgroup
401 \deadcycles\z@
402 \Call@AtVeryVeryEnd
403 \@@end
404 }

```

### 2.3.6 Testing and redefining

\AtVeryEnd@Test

```

405 \def\AtVeryEnd@Test#1#2{%
406     \expandafter\ifx\csname AtVeryEnd@test##2\endcsname#1%
407     \expandafter\let\expandafter#1%
408     \csname AtVeryEnd@enddocument##2\endcsname
409     \begingroup
410         \let\online\@empty
411         \PackageInfo{atveryend}{%
412             \string#1 detected (#2)%
413         }%
414     \endgroup
415     \expandafter\AtVeryEnd@SkipToNil
416 \fi
417 }

```

\AtVeryEnd@SkipToNil

```

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

```

\AtVeryEnd@RedefEndDocument

```

419 \def\AtVeryEnd@RedefEndDocument#1{%
420     \ifx#1\@undefined
421     \else
422         \AtVeryEnd@Test#1{standard}%
423         \AtVeryEnd@Test#1{booklet}%
424         \AtVeryEnd@Test#1{dinbrief}%
425         \AtVeryEnd@Test#1{combine}%
426         \AtVeryEnd@Test#1{jpsj}%
427         \AtVeryEnd@SkipToNil
428     \@nil
429 \fi
430 }

431 \AtVeryEnd@RedefEndDocument\enddocument
432 \AtVeryEnd@RedefEndDocument\AP@enddocument % afterpage.sty
433 \AtVeryEnd@RedefEndDocument\hyper@back@cite@enddocument % htx-bc.sty
434 \AtVeryEnd@RedefEndDocument\hyper@enddocument % hyper.sty
435 \AtVeryEnd@RedefEndDocument\hyper@fn@enddocument % hyper.sty
436 \AtVeryEnd@RedefEndDocument\cweb@save@enddocument % cweb.cls
437 \AtVeryEnd@RedefEndDocument\prev@enddocument % flushend.sty
438 \AtVeryEnd@RedefEndDocument\endorigdocument % gaceta.cls
439 \AtVeryEnd@RedefEndDocument\keependdoc % aguplus.sty
440 \AtVeryEnd@RedefEndDocument\EM@enddocument % t-angles.sty
441 \AtVeryEnd@RedefEndDocument\docmute@enddocument % docmute.sty
442 \AtVeryEnd@RedefEndDocument\@a@enddocument % alatex.sty
443 \AtVeryEnd@RedefEndDocument\enddocumentasusual % frenchle.sty
444 \AtVeryEnd@RedefEndDocument\old@enddocument % uwthesis.cls

```

## 2.4 Hack into \enddocument

```
445 \def\AtVeryEnd@document{document}%
446 \def\AtVeryEnd@RedefCheckEnd{%
447   \expandafter\def\expandafter\@checkend
448   \expandafter##\expandafter1\expandafter{%
449     \@checkend{##1}%
450     \def\AtVeryEnd@temp{##1}%
451     \ifx\AtVeryEnd@temp\AtVeryEnd@document
452       \let\AtVeryEnd@OrgClearpage\clearpage
453       \def\clearpage{%
454         \let\clearpage\AtVeryEnd@OrgClearpage
455         \Call@BeforeClearDocument
456         \clearpage
457         \Call@AfterLastShipout
458       }%
459     \fi
460   }%
461 \aftergroup\AtVeryEnd@RedefCheckEnd
462 }%
463 \AtBeginDocument{%
464   \AtEndDocument{%
465     \AtVeryEnd@RedefCheckEnd
466   }%
467 }
468 \AtEndDocument{%
469   \@ifundefined{@dofilelist}{%
470     \gdef@dofilelist{%
471       \Call@AtVeryEndDocument
472       \Call@AtEndAfterFileList
473     }%
474   }{%
475     \begingroup
476     \toks@\expandafter{\@dofilelist}%
477     \xdef@dofilelist{%
478       \noexpand\Call@AtVeryEndDocument
479       \the\toks@
480       \noexpand\Call@AtEndAfterFileList
481     }%
482     \endgroup
483   }%
484 }
```

## 2.5 Using hooks of other packages

### 2.5.1 Package scrfile

```
485 \AtBeginDocument{%
486   \@ifpackageloaded{scrfile}{%
487     \AtVeryEnd@ifundefined{BeforeClosingMainAux}{-}{%
488       \BeforeClosingMainAux{\Call@AfterLastShipout}%
489     }%
490     \AtVeryEnd@ifundefined{AfterReadingMainAux}{-}{%
491       \AfterReadingMainAux{\Call@AtVeryEndDocument}%
492     }%
493   }{-}%
}
```

### 2.5.2 Package etoolbox

```
494 \@ifpackageloaded{etoolbox}{%
495   \AtVeryEnd@ifundefined{AfterEndDocument}{-}{%
496     \AfterEndDocument{\Call@AtVeryEndDocument}%
497   }%
498 }{-}%
}
```



```

555         }%
556         \x
557     }%
558     \let\AtVeryEnd@PatchLetter=Y%
559     \fi
560 \fi
561 }%
562 \expandafter\AtVeryEnd@TestEndLetter\endletter
563     \@auxout{}\AtVeryEnd@Nil
564 \fi
565 \ifx\AtVeryEnd@PatchLetter Y%
566     \begingroup
567     \let\on@line\@empty
568     \PackageInfo{atveryend}{%
569         \@backslashchar makelabels detected. %
570         Moving labels\MessageBreak
571         from '.aux' file to \@backslashchar AtEndDocument%
572     }%
573 \endgroup
574 \def\makelabels{%
575     \AtBeginDocument{%
576         \let\@startlabels\startlabels
577         \let\@mlabel\mlabel
578     }%
579 }%
580 \AtEndDocument{%
581     \AtVeryEnd@ifundefined{@startlabels}{%
582     }{%
583         \clearpage
584         \@startlabels
585     }%
586 }%
587 \AfterLastShipout{%
588     \let\@startlabels\relax
589     \let\@mlabel\@gobbletwo
590 }%
591 \else
592     \PackageWarningNoLine{atveryend}{%
593         \@backslashchar makelabels detected, but labels cannot\MessageBreak
594         be moved to \@backslashchar AtEndDocument, because\MessageBreak
595         \@backslashchar endletter is not in expected form%
596     }%
597 \fi
598 \AtVeryEnd@AtEnd%
599 </package>

```

## 3 Test

### 3.1 Catcode checks for loading

```

600 <*test1>
601 \catcode'\{=1 %
602 \catcode'\}=2 %
603 \catcode'\#=6 %
604 \catcode'\@=11 %
605 \expandafter\ifx\csname count@\endcsname\relax
606     \countdef\count@=255 %
607 \fi
608 \expandafter\ifx\csname @gobble\endcsname\relax
609     \long\def\@gobble#1{%
610 \fi

```

```

611 \expandafter\ifx\csname @firstofone\endcsname\relax
612 \long\def\@firstofone#1{#1}%
613 \fi
614 \expandafter\ifx\csname loop\endcsname\relax
615 \expandafter\@firstofone
616 \else
617 \expandafter\@gobble
618 \fi
619 {%
620 \def\loop#1\repeat{%
621 \def\body{#1}%
622 \iterate
623 }%
624 \def\iterate{%
625 \body
626 \let\next\iterate
627 \else
628 \let\next\relax
629 \fi
630 \next
631 }%
632 \let\repeat=\fi
633 }%
634 \def\RestoreCatcodes{}
635 \count@=0 %
636 \loop
637 \edef\RestoreCatcodes{%
638 \RestoreCatcodes
639 \catcode\the\count@=\the\catcode\count@\relax
640 }%
641 \ifnum\count@<255 %
642 \advance\count@ 1 %
643 \repeat
644
645 \def\RangeCatcodeInvalid#1#2{%
646 \count@=#1\relax
647 \loop
648 \catcode\count@=15 %
649 \ifnum\count@<#2\relax
650 \advance\count@ 1 %
651 \repeat
652 }
653 \def\RangeCatcodeCheck#1#2#3{%
654 \count@=#1\relax
655 \loop
656 \ifnum#3=\catcode\count@
657 \else
658 \errmessage{%
659 Character \the\count@\space
660 with wrong catcode \the\catcode\count@\space
661 instead of \number#3%
662 }%
663 \fi
664 \ifnum\count@<#2\relax
665 \advance\count@ 1 %
666 \repeat
667 }
668 \def\space{ }
669 \expandafter\ifx\csname LoadCommand\endcsname\relax
670 \def\LoadCommand{\input atveryend.sty\relax}%
671 \fi
672 \def\Test{%

```

```

673 \RangeCatcodeInvalid{0}{47}%
674 \RangeCatcodeInvalid{58}{64}%
675 \RangeCatcodeInvalid{91}{96}%
676 \RangeCatcodeInvalid{123}{255}%
677 \catcode'\@=12 %
678 \catcode'\=0 %
679 \catcode'\%=14 %
680 \LoadCommand
681 \RangeCatcodeCheck{0}{36}{15}%
682 \RangeCatcodeCheck{37}{37}{14}%
683 \RangeCatcodeCheck{38}{47}{15}%
684 \RangeCatcodeCheck{48}{57}{12}%
685 \RangeCatcodeCheck{58}{63}{15}%
686 \RangeCatcodeCheck{64}{64}{12}%
687 \RangeCatcodeCheck{65}{90}{11}%
688 \RangeCatcodeCheck{91}{91}{15}%
689 \RangeCatcodeCheck{92}{92}{0}%
690 \RangeCatcodeCheck{93}{96}{15}%
691 \RangeCatcodeCheck{97}{122}{11}%
692 \RangeCatcodeCheck{123}{255}{15}%
693 \RestoreCatcodes
694 }
695 \Test
696 \csname @@end\endcsname
697 \end
698 </test1>

```

## 4 Installation

### 4.1 Download

**Package.** This package is available on CTAN<sup>1</sup>:

[CTAN:macros/latex/contrib/oberdiek/atveryend.dtx](#) The source file.

[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  $\TeX$  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/
```

---

<sup>1</sup><http://ftp.ctan.org/tex-archive/>



### 4.3 Package installation

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

```
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):

```
atveryend.sty      → tex/latex/oberdiek/atveryend.sty
atveryend.pdf      → doc/latex/oberdiek/atveryend.pdf
test/atveryend-test1.tex → doc/latex/oberdiek/test/atveryend-test1.tex
atveryend.dtx      → source/latex/oberdiek/atveryend.dtx
```

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  $\TeX$  distribution (`te $\TeX$` , `mik $\TeX$` , ...) relies on file name databases, you must refresh these. For example, `te $\TeX$`  users run `texhash` or `mktextlsr`.

### 4.5 Some details for the interested

**Attached source.** The PDF documentation on CTAN also includes the `.dtx` source file. It can be extracted by AcrobatReader 6 or higher. Another option is `pdftk`, e.g. unpack the file into the current directory:

```
pdftk atveryend.pdf unpack_files output .
```

**Unpacking with  $\LaTeX$ .** The `.dtx` chooses its action depending on the format:  
**plain  $\TeX$ :** Run `docstrip` and extract the files.

**$\LaTeX$ :** Generate the documentation.

If you insist on using  $\LaTeX$  for `docstrip` (really, `docstrip` does not need  $\LaTeX$ ), 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 `pdf $\LaTeX$` :

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

## 5 Acknowledgement

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

## 6 References

- [1] The L<sup>A</sup>T<sub>E</sub>X3 Project: *L<sup>A</sup>T<sub>E</sub>X2<sub>ε</sub> 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/>.

## 7 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.

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

## 8 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> .....                              | 603   |
| <code>\%</code> .....                              | 679   |
| <code>\@</code> .....                              | 604, 677  |
| <code>\@end</code> .....                           | 168,<br>208, 233, 256, 275, 298, 371, 403                                       |
| <code>\@auxout</code> .....                        | 522, 563  |
| <code>\@backslashchar</code> .....                 | 569, 571, 593, 594, 595   |
| <code>\@checkend</code> .....                      | 138, 173, 219,<br>236, 260, 279, 351, 377, 447, 449                             |
| <code>\@defaultsubs</code> .....                   | 154, 193, 308, 332  |
| <code>\@dofilelist</code> .....                    | 149, 187, 301, 324, 470, 476, 477   |
| <code>\@empty</code> .....                         | 58, 59, 60, 61, 62,<br>80, 91, 102, 114, 126, 410, 524, 567                     |
| <code>\@enddocumenthook</code> .....               | 137, 172, 259, 278  |
| <code>\@firstofone</code> .....                    | 79,<br>90, 101, 113, 125, 136, 171, 612, 615                                    |
| <code>\@firstoftwo</code> .....                    | 53  |
| <code>\@font@warning</code> .....                  | 151, 190, 303, 327  |
| <code>\@gobble</code> .....                        | 530, 553, 609, 617  |
| <code>\@gobbletwo</code> .....                     | 143, 152,<br>180, 191, 266, 287, 305, 329, 589                                  |
| <code>\@ifpackageloaded</code> .....               | 486, 494  |
| <code>\@ifundefined</code> .....                   | 469   |
| <code>\@latex@warning@no@line</code> .....         | 159, 198, 312, 336  |
| <code>\@mainaux</code> .....                       | 142, 179, 229,<br>248, 264, 285, 355, 383, 505, 510                             |
| <code>\@mainlbl</code> .....                       | 224, 243  |
| <code>\@mlabel</code> .....                        | 503, 529, 550, 577, 589   |
| <code>\@multiplelabels</code> .....                | 157,<br>163, 196, 202, 310, 318, 334, 342                                       |
| <code>\@namedef</code> .....                       | 356, 384  |
| <code>\@newl@bel</code> .....                      | 144, 181, 267, 288  |
| <code>\@nil</code> .....                           | 418, 428, 535, 542  |
| <code>\@onelevel@sanitize</code> .....             | 526   |
| <code>\@outputdblcol</code> .....                  | 349, 375  |
| <code>\@partaux</code> .....                       | 265, 286  |
| <code>\@refundefined</code> .....                  | 155, 194, 272, 294  |
| <code>\@secondoftwo</code> .....                   | 55  |
| <code>\@setckpt</code> .....                       | 143, 180, 266, 287  |
| <code>\@startlabels</code> .....                   | 502, 505, 576, 584, 588   |
| <code>\@tempswafalse</code> .....                  | 145, 182, 268, 289, 359, 387  |
| <code>\@testdef</code> .....                       | 144,<br>181, 267, 288, 357, 358, 385, 386                                       |
| <code>\@undefined</code> ..                        | 86, 97, 108, 120, 132, 420  |
| <code>\@unexpandable@protect</code> .....          | 549   |
| <code>\@warning</code> .....                       | 363, 391  |
| <code>\@</code> .....                              | 548, 678  |
| <code>\{</code> .....                              | 530, 601  |
| <code>\}</code> .....                              | 602   |
| <b>A</b>   |   |
| <code>\a@enddocument</code> .....                  | 442   |
| <code>\advance</code> .....                        | 642, 650, 665   |
| <code>\AfterEndDocument</code> .....               | 496   |
| <code>\aftergroup</code> .....                     | 461   |
| <code>\AfterLastShipout</code> .....               | 2, 66, 90, 587  |
| <code>\AfterReadingMainAux</code> .....            | 491   |
| <code>\AP@enddocument</code> .....                 | 432   |
| <code>\AtBeginDocument</code> ..                   | 463, 485, 501, 575  |
| <code>\AtEndAfterFileList</code> .....             | 2, 72, 113  |
| <code>\AtEndDocument</code> .....                  | 136, 171, 464, 468, 508, 552, 580   |
| <code>\AtVeryEnd@AfterLastShipoutHook</code> ..    | 59, 67, 91, 95, 97  |
| <code>\AtVeryEnd@AtEnd</code> ..                   | 28, 29, 46, 516, 598  |
| <code>\AtVeryEnd@AtEndAfterFileListHook</code> ..  | 61, 73, 114, 118, 120   |
| <code>\AtVeryEnd@AtVeryEndDocumentHook</code> ..   | 60, 70, 102, 106, 108   |
| <code>\AtVeryEnd@AtVeryEndHook</code> ...          | 62, 76, 126, 130, 132   |
| <code>\AtVeryEnd@BeforeClearDocumentHook</code> .. | 58, 64, 80, 84, 86  |
| <code>\AtVeryEnd@c@lenddoca</code> .....           | 322   |
| <code>\AtVeryEnd@CatchFirst</code> .....           | 532, 539  |
| <code>\AtVeryEnd@CatchSecond</code> .....          | 533, 535  |
| <code>\AtVeryEnd@document</code> .....             | 445, 451  |
| <code>\AtVeryEnd@enddocument@booklet</code> ..     | 214   |
| <code>\AtVeryEnd@enddocument@combine</code> ..     | 277   |
| <code>\AtVeryEnd@enddocument@dinbrief</code> ..    | 235   |
| <code>\AtVeryEnd@enddocument@jpsj</code> ....      | 373   |
| <code>\AtVeryEnd@enddocument@standard</code> ..    | 170, 216  |
| <code>\AtVeryEnd@ifundefined</code> .....          | 50, 487, 490, 495, 581  |
| <code>\AtVeryEnd@Nil</code> .....                  | 522, 563  |
| <code>\AtVeryEnd@OrgClearpage</code> ...           | 452, 454  |
| <code>\AtVeryEnd@PatchLetter</code> ..             | 518, 558, 565   |
| <code>\AtVeryEnd@RedefCheckEnd</code> ..           | 446, 461, 465   |
| <code>\AtVeryEnd@RedefEndDocument</code> .....     | 419, 431,<br>432, 433, 434, 435, 436, 437,<br>438, 439, 440, 441, 442, 443, 444 |
| <code>\AtVeryEnd@SkipToNil</code> ..               | 415, 418, 427   |

\AtVeryEnd@StringMlabel . . . 527, 544  
\AtVeryEnd@temp . . . 450, 451, 500,  
514, 523, 524, 526, 538, 539, 544  
\AtVeryEnd@Test . . . . . 405, 422, 423, 424, 425, 426  
\AtVeryEnd@test@booklet . . . . . 210  
\AtVeryEnd@test@c@lenddoca . . . . . 300  
\AtVeryEnd@test@combine . . . . . 258  
\AtVeryEnd@test@dinbrief . . . . . 218  
\AtVeryEnd@test@jpsj . . . . . 347  
\AtVeryEnd@test@standard . . . . . 135, 212  
\AtVeryEnd@TestEndLetter . . . . . 522, 562  
\AtVeryEndDocument . . . . . 2, 69, 101  
\AtVeryVeryEnd . . . . . 2, 75, 125

**B**

\balancing@outputdblcol . . . . . 349, 375  
\BeforeClearDocument . . . . . 2, 63, 79  
\BeforeClosingMainAux . . . . . 488  
\bibcite . . . . . 358, 386  
\body . . . . . 621, 625

**C**

\c@labelgen . . . . . 223, 242  
\c@lenddoca . . . . . 271, 293, 322  
\c@lmainauxfile . . . . . 269, 290  
\Call@AfterLastShipout . . . . .  
. . . . . 89, 176, 239, 282, 380, 457, 488  
\Call@AtEndAfterFileList . . . . . 111,  
124, 188, 252, 325, 399, 472, 480  
\Call@AtVeryEndDocument . . . . .  
. . . . . 100, 112, 186,  
250, 292, 397, 471, 478, 491, 496  
\Call@AtVeryVeryEnd . . . . .  
. . . . . 123, 207, 255, 297, 402  
\Call@BeforeClearDocument . . . . .  
. . . . . 78, 174, 237, 280, 378, 455  
\catcode 2, 3, 5, 6, 7, 11, 12, 13, 14,  
15, 16, 17, 20, 21, 23, 24, 25,  
26, 30, 32, 601, 602, 603, 604,  
639, 648, 656, 660, 677, 678, 679  
\clearpage . . . . . 139,  
175, 227, 246, 261, 281, 352,  
379, 452, 453, 454, 456, 510, 583  
\closeout . 142, 179, 224, 229, 243,  
248, 264, 265, 285, 286, 355, 383  
\count@ . . . . . 606, 635,  
639, 641, 642, 646, 648, 649,  
650, 654, 656, 659, 660, 664, 665  
\countdef . . . . . 606  
\csname . . 9, 52, 251, 398, 406, 408,  
520, 605, 608, 611, 614, 669, 696  
\cweb@save@enddocument . . . . . 436

**D**

\deadcycles . . . . . 167,  
206, 232, 254, 274, 296, 370, 401  
\docmute@enddocument . . . . . 441

**E**

\EMenddocument . . . . . 440  
\end . . . . . 697

\endcsname 9, 52, 251, 398, 406, 408,  
520, 605, 608, 611, 614, 669, 696  
\enddocument . . . . . 431  
\enddocumentasusual . . . . . 443  
\endinput . . . . . 46  
\endletter . . . . . 545, 546, 562  
\endlinechar . . . . . 4, 10, 22  
\endorigdocument . . . . . 438  
\errmessage . . . . . 658

**F**

\font@submax . . . . . 150,  
152, 189, 191, 302, 305, 326, 329  
\fontsubfuzz . . . . . 150, 189, 302, 326

**G**

\g@addto@macro . . . . . 64, 67, 70, 73, 76  
\gdef . . . . . 470

**H**

\hyper@back@cite@enddocument . . . . . 433  
\hyper@enddocument . . . . . 434  
\hyper@fn@enddocument . . . . . 435

**I**

@if@filesw . . . . . 141,  
156, 178, 195, 222, 241, 263,  
284, 309, 333, 354, 382, 504, 509  
@if@lastpagebalancing . . . . . 348, 374  
@if@tempswa 158, 197, 311, 335, 362, 390  
\ifdim . . . . . 150, 189, 302, 326  
\ifnum . . . . . 223, 242, 641, 649, 656, 664  
\ifx . . . . . 52, 80, 91, 102, 114,  
126, 157, 196, 310, 322, 334,  
406, 420, 451, 514, 520, 524,  
544, 565, 605, 608, 611, 614, 669  
\immediate . . . . . 142,  
179, 224, 229, 243, 248, 264,  
265, 285, 286, 355, 383, 505, 510  
\input . . . . . 147, 184,  
226, 245, 269, 290, 361, 389, 670  
\iterate . . . . . 622, 624, 626

**J**

\jobname . . . . . 147, 184, 361, 389  
\jobname@lbl . . . . . 226, 245

**K**

\keependdoc . . . . . 439

**L**

\LoadCommand . . . . . 670, 680  
\loop . . . . . 620, 636, 647, 655

**M**

\makeatletter . . . . . 146,  
183, 225, 244, 269, 290, 360, 388  
\makelabels . . . . . 514, 574  
\MessageBreak . . . . .  
. . . . . 151, 190, 304, 328, 570, 593, 594  
\mlabel . . . . . 503, 577

**N**

\NeedsTeXFormat . . . . . 47

|  |                                       |                                    |  |
|--|---------------------------------------|------------------------------------|--|
| <code>\newcommand</code> .....           | 63,                                   | <code>\RestoreCatcodes</code> ..   | 634, 637, 638, 693                     |
|  | 66, 69, 72, 75, 78, 89, 100, 111, 123 |                                    |  |
| <code>\newlabel</code> .....             | 357, 385                              |                                    |  |
| <code>\newpage</code> .....              | 220, 238                              |                                    |  |
| <code>\next</code> .....                 | 626, 628, 630                         |                                    |  |
| <code>\number</code> .....               | 661                                   |                                    |  |
|  |                                       |                                    |  |
|  | <b>O</b>                              |                                    | <b>S</b>                               |
| <code>\old@enddocument</code> .....      | 444                                   | <code>\space</code>                | 152, 191, 305, 329, 659, 660, 668      |
| <code>\on@line</code> .....              | 410, 567                              | <code>\startlabels</code> .....    | 502, 576                               |
|  |                                       |                                    |  |
|  | <b>P</b>                              |                                    | <b>T</b>                               |
| <code>\PackageInfo</code> ...            | 81, 83, 92, 94, 103,                  | <code>\Test</code> .....           | 672, 695                               |
|  | 105, 115, 117, 127, 129, 411, 568     | <code>\the</code> .....            | 10, 11, 12, 13,                        |
| <code>\PackageWarningNoLine</code> ..... | 592                                   |                                    | 14, 15, 16, 17, 30, 479, 639, 659, 660 |
| <code>\prev@enddocument</code> .....     | 437                                   | <code>\TMP@EnsureCode</code> ..... | 27, 34, 35,                            |
| <code>\protect</code> .....              | 549                                   |                                    | 36, 37, 38, 39, 40, 41, 42, 43, 44, 45 |
| <code>\ProvidesPackage</code> .....      | 48                                    | <code>\toks@</code> .....          | 476, 479                               |
|  |                                       | <code>\twoclearpage</code> .....   | 215                                    |
|  |                                       | <code>\twoupclearpage</code> ..... | 211                                    |
|  |                                       |                                    |  |
|  | <b>R</b>                              |                                    | <b>W</b>                               |
| <code>\RangeCatcodeCheck</code> .....    |                                       | <code>\write</code> .....          | 505, 510                               |
|  | 653, 681, 682, 683, 684, 685,         |                                    |  |
|  | 686, 687, 688, 689, 690, 691, 692     |                                    |  |
| <code>\RangeCatcodeInvalid</code> .....  |                                       |                                    |  |
|  | 645, 673, 674, 675, 676               |                                    |  |
| <code>\repeat</code> .....               | 620, 632, 643, 651, 666               |                                    |  |
|  |                                       |                                    |  |
|  |                                       |                                    | <b>X</b>                               |
|  |                                       | <code>\x</code> .....              | 8, 20, 551, 556                        |
|  |                                       |                                    |  |
|  |                                       |                                    | <b>Z</b>                               |
|  |                                       | <code>\z@</code> .....             | 167, 206,                              |
|  |                                       |                                    | 232, 242, 254, 274, 296, 370, 401      |