

The L^AT_EX 2_ε Sources

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Contents

a	ltdirchk.dtx	1
1	L^AT_EX System Dependent Initialisations	1
2	Initialisation	2
2.1	INITEX	2
2.2	Some bits of 2e	3
3	texsys.cfg	3
3.1	texsys.cfg	4
3.2	UNIX (web2c)	5
3.3	UNIX (other)	5
3.4	MSDOS (emtex)	5
3.5	MSDOS (other)	5
3.6	VMS (DECUS T _E X, PD VMS 3.6)	5
3.7	VMS (???)	6
3.8	MACINTOSH (OzTeX 1.6)	6
3.9	MACINTOSH (other)	6
3.10	FAKE EXAMPLE	6
4	Setting \@currdir	7
5	Setting \input@path	8
6	Filename Parsing	9
7	T_EX Versions	10
8	ltxcheck.tex	10
b	ltplain.dtx	11
9	Plain T_EX	11
c	ltvers.dtx	21

10 Version Identification	21
d ltdefns.dtx	22
11 Definitions	22
11.1 Initex initialisations	22
11.2 Saved versions of T _E X primitives	22
11.3 Command definitions	23
11.4 Robust commands and protect	29
11.5 Internal defining commands	32
11.6 Commands for Autoloading	33
e ltalloc.dtx	34
12 Counters	34
f ltcntrl.dtx	35
13 Program control structure	35
g lterror.dtx	38
14 Error handling	38
14.1 General commands	38
14.2 Specific errors	42
h ltpar.dtx	46
15 Paragraphs	46
15.1 Implementation	46
i ltspace.dtx	48
16 Spacing	48
16.1 User Commands	48
16.2 Chris' comments	48
16.3 Some immediate actions	50
16.4 The code	50
16.5 Vertical spacing	54
16.6 Horizontal space (and breaks)	56
j ltlogos.dtx	59
17 Logos	59
k ltfiles.dtx	60
18 File Handling	60
18.1 Safe Input Macros	65
18.2 Listing files	67

l	ltoutenc.dtx	69
19	Font encodings	69
19.1	Removing encoding-specific commands	71
19.2	The order of declarations	71
19.3	Docstrip modules	72
19.4	Definitions for the kernel	72
19.4.1	Declaration commands	72
19.4.2	Hyphenation	78
19.4.3	Miscellania	78
19.4.4	Default encodings	78
19.4.5	Math material	80
19.5	Definitions for the OT1 encoding	81
19.6	Definitions for the T1 encoding	82
19.7	Definitions for the OMS encoding	86
19.8	Definitions for the OML encoding	87
19.9	Definitions for the OT4 encoding	87
19.10	Definitions for the TS1 encoding	89
20	Package files	92
20.1	The fontenc package	93
20.2	The textcomp package	94
20.2.1	Supporting oldstyle digits	100
20.2.2	Subset encoding defaults	101
m	ltcounts.dtx	103
21	Counters and Lengths	103
21.1	Environment Counter Macros	103
n	ltnlength.dtx	106
22	Lengths	106
o	ltfssbas.dtx	107
23	Autoloading parts of NFSS	107
24	Preliminary macros	107
25	Macros for setting up the tables	108
26	Selecting a new font	112
26.1	Macros for the user	112
26.2	Macros for loading fonts	115
27	Assigning math fonts to <i>versions</i>	120
p	ltfsstrc.dtx	125
28	Introduction	125
29	A driver for this document	125
30	The Implementation	125

31 Handling Options	126
32 Macros common to fam.tex and tracefmt.sty	127
32.1 General font loading	127
32.2 Math fonts setup	131
32.2.1 Outline of algorithm for math font sizes	131
32.2.2 Code for math font size setting	132
32.2.3 Other code for math	133
33 Scaled font extraction	135
33.1 Sizefunctions	141
 q ltfsscmp.dtx	 145
34 Compatibility code for NFSS release 1	145
 r ltfssdcl.dtx	 149
35 Interface Commands	149
 s ltfssini.dtx	 168
36 NFSS Initialisation	168
36.1 Providing math <i>versions</i>	168
36.2 Miscellaneous	169
 t fontdef.dtx	 173
37 Introduction	173
38 Customization	173
39 The docstrip modules	174
40 A driver for this document	174
41 The fonttext.ltx file	174
41.1 Encodings	174
41.2 Defaults	176
42 The fontmath.ltx file	176
42.1 The font encodings used	176
42.1.1 Symbolfont and Alphabet declarations	177
42.2 Math font sizes	177
42.3 The math symbol assignments	178
42.3.1 The letters	178
42.3.2 The digits	179
42.3.3 Punctuation, brace, etc. keys	179
42.3.4 Delimitercodes for characters	179
42.4 Symbols accessed via control sequences	180
42.4.1 Greek letters	180
42.4.2 Ordinary symbols	181
42.4.3 Large Operators	181
42.4.4 Binary symbols	181
42.4.5 Relations	182
42.4.6 Arrows	183

42.4.7 Punctuation symbols	184
42.4.8 Math accents	184
42.4.9 Radicals	185
42.4.10 Over and under something, etc	185
42.4.11 Delimiters	185
42.5 Math versions of text commands	186
42.6 Other special functions and parameters	186
42.6.1 Biggggg	186
42.6.2 The log-like functions	187
42.6.3 Parameters	187
43 Default cfg files	187
 u preload.dtx	 188
44 Overview	188
45 Customization	188
46 Module switches for the DOCSTRIP program	188
47 A driver for this document	189
48 The code	189
 v ltfntcmd.dtx	 191
49 Introduction	191
50 The implementation	193
51 Initialization	197
 w ltpageno.dtx	 198
52 Page Numbering	198
 x ltxref.dtx	 199
53 Cross Referencing	199
53.1 Cross Referencing	199
53.2 An extension of counter referencing	201
 y ltmiscen.dtx	 202
54 Miscellaneous Environments	202
54.1 Environments	202
54.2 Center, Flushright, Flushleft	205
54.3 Verbatim	207
 z ltmath.dtx	 210

55 Math setup	210
55.1 Math commands based on plain TeX	210
55.1.1 The log-like functions	210
55.1.2 Biggggg	211
55.1.3 The UNSORTED Rest	211
55.2 Math Environments	214
55.3 External options to the standard document classes	216
55.3.1 Left equation numbering	216
55.3.2 Flush left equations	217
 A ltlists.dtx	 219
56 List, and related environments	219
56.1 List and Trivlist	220
56.2 Vertical Spacing (skips)	220
56.3 Penalties	221
56.4 Horizontal Spacing (dimens)	221
56.5 Default Values	221
56.6 Itemize and Enumerate	229
 B ltboxes.dtx	 232
57 LaTeX Box commands	232
57.1 Some low-level constructs	240
 C lttab.dtx	 241
58 Tabbing, Tabular and Array Environments	241
58.1 tabbing	241
58.2 array and tabular environments	248
 D ltpictur.dtx	 260
59 Picture Mode	260
59.1 Curves	276
 E ltthm.dtx	 279
60 Theorem Environments	279
 F ltsect.dtx	 282
61 Sectioning Commands	282
61.1 The Title	282
61.2 Sectioning	283
61.2.1 Initializations	288
61.3 Table of Contents etc.	288
61.3.1 Convention	288
61.3.2 Commands	288
 G ltfloat.dtx	 291

62 Floats	291
62.1 Floating Environments	291
62.2 Footnotes	300
 H ltidxglo.dtx	 305
63 Index and Glossary Generation	305
 I ltbibl.dtx	 307
64 Bibliography Generation	307
64.1 Default definitions	309
 J ltpage.dtx	 311
65 Page styles and related commands	311
65.1 Page Style Commands	311
65.2 How a page style makes running heads and feet	311
65.3 marking conventions	311
 K ltoutput.dtx	 314
66 Output Routine	314
66.1 Floats	314
66.1.1 Kludgeins	349
66.1.2 Float control	352
66.1.3 Float placement parameters	360
 L ltclass.dtx	 363
67 Introduction	363
68 User interface	363
68.1 Option processing	364
69 Class and Package interface	364
69.1 Class name and version	364
69.2 Package name and version	364
69.3 Requiring other packages	364
69.4 Declaring new options	365
69.5 Safe Input Macros	366
70 Implementation	366
70.1 Hooks	375
70.2 Providing shipment	376
71 After Preamble	378
 M lthyphen.dtx	 379
 N ltfinal.dtx	 380

72 Final settings	380
72.1 Debugging	380
72.2 Typesetting parameters	380
72.3 Lccodes for hyphenation	380
72.4 Hyphenation	381
72.5 Font loading	382
72.6 Input encoding	382
72.7 Lccodes and uccodes	383
72.8 Applying Patch files	384
72.9 Freeing Memory	385
72.10 Initialise file list	386
72.11 Dumping the format	386
 O ltpatch	 387
 Change History	 388
 Index	 433

File a

ltdirchk.dtx

1 L^AT_EX System Dependent Initialisations

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

The macros that must be defined are:

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

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

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

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

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

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

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

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

`\@TeXversion` `\@TeXversion` is now set automatically by the initialisation tests in this file. You should not need to set it in `texsys.cfg`, however the following documentation is left for information. L^AT_EX does not set this variable exactly, the automatic tests set it to:

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

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

`⟨undefined⟩` otherwise.

However these values are accurate enough for L^AT_EX to take appropriate action for these old T_EXs.

If your T_EX is older than version 3.141, then you should define `\@TeXversion`

(using `\def`) to be the version number. If you do not do this¹, \LaTeX will not work around a bug in old \TeX versions, and so error messages will appear in a very strange format, with `^^J` appearing instead of line breaks:

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

```
1.3 \renewcommand{\rubbish}
      {}
?
```

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

```
! LaTeX Error: \rubbish undefined.

See the LaTeX manual or LaTeX Companion for explanation.
Type H <return> for immediate help.
! .
...
```

```
1.3 \renewcommand{\rubbish}
      {}
?
```

Note that this has an extra line `! .` which does not appear in error messages that use the default settings with a current version of \TeX , but this should not cause any confusion we hope.

2 Initialisation

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

2.1 INITEX

```
1 <*dircheck>
2 <*initex>
3 <initex>\ifnum\catcode'\{=1
4 <initex> \errmessage
5 <initex> {LaTeX must be made using an initex with no format preloaded}
6 <initex>\fi
7 \catcode'\{=1
8 \catcode'\}=2
9 \catcode'\#=6
10 \catcode'\^=7
11 \chardef\active=13
12 \catcode'\@=11
13 \countdef\count@=255
14 \let\bgroup={ \let\egroup=}
15 \ifx\@@input\@undefined\let\@@input\input\fi
16 \ifx\@@end\@undefined\let\@@end\end\fi
17 \chardef\inputcheck0
18 \chardef\sixt@@n=16
19 \newlinechar'\^^J
20 \def\typeout{\immediate\write17}
21 \def\dospecials{\do\ \do\\\do\{\do\}\do\$\do\&\%
22 \do\#\do\^{\do\_ \do\% \do\~}
23 \def\@makeother#1{\catcode'#1=12\relax}
```

¹Actually if your \TeX is really old, version 2, \LaTeX can detect this, and sets `\@TeXversion` to 2 if it is not set in the `cfg` file.

```

24 \def\space{ }
25 \def\@tempswafalse{\let\if@tempswa\iffalse}
26 \def\@tempswatrue{\let\if@tempswa\iftrue}
27 \let\if@tempswa\iffalse
28 \def\loop#1\repeat{\def\iterate{#1\relax\expandafter\iterate\fi}%
29   \iterate \let\iterate\relax}
30 \let\repeat\fi
31 \</initex>

```

2.2 Some bits of 2e

```

32 \<*2ekernel>
33 \def\two@digits#1{\ifnum#1<10 0\fi\number#1}
34 \long\def\@firstoftwo#1#2{#1}
35 \long\def\@secondoftwo#1#2{#2}

```

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

```

36 \def\ProvidesFile#1{%
37   \begingroup
38     \catcode'\ 10 %
39     \ifnum \endlinechar<256 %
40       \ifnum \endlinechar>\m@ne
41         \catcode\endlinechar 10 %
42       \fi
43     \fi
44     \@makeother\/%
45     \@ifnextchar[{\@providesfile{#1}}{\@providesfile{#1}[]}]
46 \def\@providesfile#1[#2]{%
47   \wlog{File: #1 #2}%
48   \@addtofilelist{ #2}%
49   \endgroup}
50 \long\def\@addtofilelist#1{}
51 \def\@empty{}
52 \catcode'\%=12
53 \def\@percentchar{%}
54 \catcode'\%=14
55 \let\@currdir\@undefined
56 \let\input@path\@undefined
57 \let\filename@parse\@undefined

```

\strip@prefix

```

58 \def\strip@prefix#1>{}
59 \</2ekernel>

```

3 texsys.cfg

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

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

```

60 \<*docstrip>
61 \openin15=texsys.cfg-not-found
62 \ifeof15
63 \typeout{** Writing a default texsys.cfg}
64 \immediate\openout15=texsys.cfg
65 \begingroup
66 \catcode'\^M\active%

```

```

67 \let~M\par%
68 \def\reserved@a#1~M{%
69   \def\reserved@b{#1}%
70   \ifx\reserved@b\reserved@c\endgroup\else%
71     \immediate\write15{#1}%
72     \expandafter\reserved@a\fi}%
73 \def\reserved@d#1START~M{\let\do\@makeother\dospecials\reserved@a}%
74 \catcode'\%=12
75 \def\reserved@c{%END}
76 \reserved@d
START

```

3.1 texsys.cfg

This file contains the site specific definitions of the four macros

`\@currdir`, `\input@path`, `\filename@parse` and `\TeXversion`.

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

The macros that must be defined are:

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

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

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

`<dir><filename><space>`

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

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

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

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

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

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

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

3.2 UNIX (web2c)

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

```
77 %\def\@currdir{./}
78 %\let\input@path\@undefined
```

3.3 UNIX (other)

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

```
79 % \def\@currdir{./}
80 % \def\input@path{%
81 %   {/usr/local/lib/tex/inputs/distrib/}%
82 %   {/usr/local/lib/tex/inputs/contrib/}%
83 %   {/usr/local/lib/tex/inputs/local/}%
84 % }
```

3.4 MSDOS (emtex)

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

```
85 % \def\@currdir{./}
86 % \let\input@path\@undefined
```

3.5 MSDOS (other)

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

```
87 % \def\@currdir{./}
88 % \def\input@path{%
89 %   {c:/tex/inputs/distrib/}%
90 %   {c:/tex/inputs/contrib/}%
91 %   {c:/tex/inputs/local/}%
92 % }
```

3.6 VMS (DECUS \TeX , PD VMS 3.6)

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

```
93 % \def\@currdir{[] }
94 % \let\input@path\@undefined
```

3.7 VMS (???)

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

```
95 % \def\@currdir{[]}  
96 % \def\input@path{%  
97 %   {tex_inputs:}%  
98 %   {SOMEDISK:[SOME.TEX.DIRECTORY]}%  
99 % }
```

3.8 MACINTOSH (OzTeX 1.6)

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

```
100 % \def\@currdir{:}  
101 % \let\input@path\@undefined
```

3.9 MACINTOSH (other)

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

```
102 % \def\@currdir{:}  
103 % \def\input@path{%  
104 %   {Hard-Disk:Applications:TeX:TeX-inputs:}%  
105 %   {Hard-Disk:Applications:TeX:My-inputs:}%  
106 % }
```

3.10 FAKE EXAMPLE

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

the following code would possibly work:

```
107 % \def\@dir#1#2 {%  
108 %   \@d@r{#1}#2..\@nil}  
109 % \def\@d@r#1#2.#3.#4\@nil{%  
110 %   <\ifx\@dir#1\@dir\else#1\ifx\@dir#3\@dir\else.\fi\fi#3>#2 }  
111 %  
112 % \def\@currdir{\@dir{}}  
113 % \def\input@path{%  
114 %   {\@dir{area.one}}%  
115 %   {\@dir{area.two}}%  
116 % }
```

END

```
117 \immediate\closeout15
```

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

```
118 \else  
119 \typeout{** Using the existing texsys.cfg}  
120 \closein15  
121 \input texsys.cfg  
122 \fi  
123 </docstrip>
```

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

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

4 Setting \@currdir

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

```
125 \begingroup
126 \count@ \time
127 \divide \count@ 60
128 \count2 = - \count@
129 \multiply \count2 60
130 \advance \count2 \time
```

`\today` The current date and time stamp.

```
131 \edef \today {%
132   \the \year / \two@digits {\the \month} / \two@digits {\the \day} : %
133   \two@digits {\the \count@} : \two@digits {\the \count2} }
```

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

```
134 \immediate \openout15 = texsys.aux
135 \immediate \write15 {\today ^^J}
136 \immediate \closeout15 %
```

#1 is the file to try, #2 is what to do on success, #3 on failure.

```
137 \def \IfFileExists #1#2#3 {%
138   \openin \@inputcheck #1 %
139   \ifeof \@inputcheck
140     #3 \relax
141   \else
142     \read \@inputcheck to \reserved@a
143     \ifx \reserved@a \today
144       \typeout {#1 found} #2 \relax
145     \else
146       \typeout {BAD: old file \reserved@a (should be \today)} %
147       #3 \relax
148     \fi
149   \fi
150   \closein \@inputcheck}
151 \endlinechar = -1
```

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

```
152 \ifx \@currdir \@undefined
153   \IfFileExists {./texsys.aux} {\gdef \@currdir {./}} %
154   {\IfFileExists {[]texsys.aux} {\gdef \@currdir {[]}} %
155   {\IfFileExists {:texsys.aux} {\gdef \@currdir {:}} {}}}
```

If it is still undefined at this point, all the above tests failed. Earlier versions interactively prompted for a definition at this point, but it seems impossible to reliably obtain information from users at this point in the installation. This version of the file produces a format with no user-interaction. Later if the format is not suitable for the system, `texsys.cfg` may be edited and the format re-made.

```
156 \ifx \@currdir \@undefined
157   \global \let \@currdir \empty
158   \typeout {^^J^^J%}
```

```

159      !! No syntax for the current directory could be found^^J%
160    }%
161  \fi

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

162 \else
163   \IfFileExists{\@currdir texsys.aux}{-}{%
164     \edef\reserved@a{\errhelp{%
165       texsys.cfg specifies the current directory syntax to be^^J%
166       \meaning\@currdir^^J%
167       but this does not work on this system.^^J%
168       Remove texsys.cfg and restart.}}\reserved@a
169     \errmessage{Bad texsys.cfg file: \noexpand\@currdir}\@end}

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

170 \fi

171 \immediate\closeout15 %
172 \endgroup

173 \typeout{^^J^^J%
174     \noexpand\@currdir set to:
175     \expandafter\strip@prefix\meaning\@currdir.^^J%
176   }

Stop here if the file is being used unstripped.

177 <*docstrip>
178 \relax\endinput
179 </docstrip>

```

5 Setting \input@path

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

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

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

```

180   \typeout{^^J%
181     Assuming \noexpand\openin and \noexpand\input^^J%
182     \ifx\input@path\@undefined

\input@path has not been pre-defined.

183       have the same search path.^^J%
184     \else

\input@path has been defined in texsys.cfg.

185       have different search paths.^^J%
186       LaTeX will use the path specified by \noexpand\input@path:^^J%
187     \fi
188   }

```


6 Filename Parsing

```

\filename@parse Split a filename into its components.

189 \ifx\filename@parse\@undefined
190   \def\reserved@a{.}\ifx\@currdir\reserved@a

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

191   \typeout{^^JDefining UNIX/DOS style filename parser.^^J}
192   \def\filename@parse#1{%
193     \let\filename@area\@empty
194     \expandafter\filename@path#1/\}

Search for the last /.

195   \def\filename@path#1/#2\{%
196     \ifx\#2\%
197       \def\reserved@a{\filename@simple#1.\}%
198     \else
199       \edef\filename@area{\filename@area#1/}%
200       \def\reserved@a{\filename@path#2\}%
201     \fi
202     \reserved@a}

203   \else\def\reserved@a{[]}\ifx\@currdir\reserved@a

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

204   \typeout{^^JDefining VMS style filename parser.^^J}
205   \def\filename@parse#1{%
206     \let\filename@area\@empty
207     \expandafter\filename@path#1]\}

Search for the last ].

208   \def\filename@path#1]#2\{%
209     \ifx\#2\%
210       \def\reserved@a{\filename@simple#1.\}%
211     \else
212       \edef\filename@area{\filename@area#1]}%
213       \def\reserved@a{\filename@path#2\}%
214     \fi
215     \reserved@a}

216   \else\def\reserved@a{:}\ifx\@currdir\reserved@a

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

217   \typeout{^^JDefining Mac style filename parser.^^J}
218   \def\filename@parse#1{%
219     \let\filename@area\@empty
220     \expandafter\filename@path#1:\}

Search for the last :.

221   \def\filename@path#1:#2\{%
222     \ifx\#2\%
223       \def\reserved@a{\filename@simple#1.\}%
224     \else
225       \edef\filename@area{\filename@area#1:}%
226       \def\reserved@a{\filename@path#2\}%
227     \fi
228     \reserved@a}

229   \else

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

230   \typeout{^^JDefining generic filename parser.^^J}

```

```

231 \def\filename@parse#1{%
232 \let\filename@area@empty
233 \expandafter\filename@simple#1.\}
234 \fi\fi\fi

\filename@simple is used by all three versions. Finally we can split off the
extension.
235 \def\filename@simple#1.#2\{%
236 \ifx\#2\%
237 \let\filename@ext\relax
238 \else
239 \edef\filename@ext{\filename@dot#2\}%
240 \fi
241 \edef\filename@base{#1}}

Remove a final dot, added earlier.
242 \def\filename@dot#1.\{#1}
243 \else

Otherwise, \filename@parse was specified in texsys.cfg.
244 \typeout{^^J^^J%
245 \noexpand\filename@parse was defined in texsys.cfg:^^J%
246 \expandafter\strip@prefix\meaning\filename@parse.^^J%
247 }
248 \fi

```

7 T_EX Versions

`\@TeXversion` T_EX versions older than than 3.141 require `\@TeXversion` to be set. This can be determined automatically due to a trick suggested by Bernd Raichle. (Actually this will not always get the correct version number, eg T_EX3.14 would be detected as T_EX3, but L^AT_EX only needs to take account of T_EX's older than 3, or between 3 and 3.14.

```

249 \ifx\@TeXversion\undefined
250 \ifx\undefined\inputlineno
251 \def\@TeXversion{2}
252 \else
253 {\catcode'\^^J=\active
254 \def\reserved@a#1#2\@@{\if#1\string^3\fi}
255 \edef\reserved@a{\expandafter\reserved@a\string^^J\@@}
256 \ifx\reserved@a\empty\else\gdef\@TeXversion{3}\fi}
257 \fi
258 \fi

259 </dircheck>

```

8 ltxcheck.tex

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

File b

ltplain.dtx

9 Plain T_EX

L^AT_EX includes almost all of the functionality of Knuth's original 'Basic Macros'. That is, the plain T_EX format described in Appendix B of the T_EXBook. However, some of the user commands are not much use so, in order to save memory, we may remove them from the kernel into a package. Here is a list of the commands that may be removed (PROBABLY NOT COMPLETE).

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

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

L^AT_EX font definitions are done using NFSS2 so none of PLAIN's font definitions are in L^AT_EX.

L^AT_EX has its own tabbing environment, so PLAIN's is disabled.

L^AT_EX uses its own output routine, so most of the plain one was removed.

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

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

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

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

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

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

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

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

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

```

\@ne Small constants are defined using \chardef.
\tw@ 16 \chardef\@ne=1
\thr@@ 17 \chardef\tw@=2
\sixt@@n 18 \chardef\thr@@=3
\@cclv 19 \chardef\sixt@@n=16
        20 \chardef\@cclv=255

\@cclvi Constants above 255 defined using \mathchardef.
\@m 21 \mathchardef\@cclvi=256
\@M 22 \mathchardef\@m=1000
\@MM 23 \mathchardef\@M=10000
      24 \mathchardef\@MM=20000

```

Allocation of registers

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

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

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

The following counters are reserved:

- 0 to 9 page numbering
- 10 count allocation
- 11 dimen allocation
- 12 skip allocation
- 13 muskip allocation
- 14 box allocation
- 15 toks allocation
- 16 read file allocation
- 17 write file allocation
- 18 math family allocation
- 19 language allocation
- 20 insert allocation
- 21 the most recently allocated number
- 22 constant -1

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

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

1, 3, 5, 7, 9,

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

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

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

```

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

\insc@unt The insertion counter and most recent allocation.
\allocationnumber 37 \countdef\insc@unt=20
38 \countdef\allocationnumber=21

\m@ne The constant -1.
39 \countdef\m@ne=22 \m@ne=-1

\wlog Write on log file (only)
40 \def\wlog{\immediate\write\m@ne}

\count@ Here are abbreviations for the names of scratch registers that don't need to be
\dimen@ allocated.
\dimen@i 41 \countdef\count@=255
\dimen@ii 42 \dimendef\dimen@=0
\skip@ 43 \dimendef\dimen@i=1 % global only
\toks@ 44 \dimendef\dimen@ii=2
45 \skipdef\skip@=0
46 \toksdef\toks@=0

\newcount Now, we define \newcount, \newbox, etc. so that you can say \newcount\foo and
\newdimen \foo will be defined (with \countdef) to be the next counter.
\newskip To find out which counter \foo is, you can look at \allocationnumber.
\newmuskip Since there's no \boxdef command, \chardef is used to define a \newbox,
\newbox \newinsert, \newfam, and so on.
\newhelp LATEX change: remove \outer from \newcount and \newdimen (FMi) This is
\newtoks necessary to use \newcount inside \if... later on. Also remove from \newskip,
\newbox \newwrite and \newfam (DPC) to save later redefinition.
47 \def\newcount{\alloc@0\count\countdef\insc@unt}
48 \def\newdimen{\alloc@1\dimen\dimendef\insc@unt}
49 \def\newskip{\alloc@2\skip\skipdef\insc@unt}
50 \def\newmuskip{\alloc@3\muskip\muskipdef\@cclvi}
51 \def\newbox{\alloc@4\box\chardef\insc@unt}
52 \def\newhelp#1#2{\newtoks#1#1\expandafter{\csname#2\endcsname}}
53 \def\newtoks{\alloc@5\toks\toksdef\@cclvi}

\newread
\newwrite 54 \def\newread{\alloc@6\read\chardef\sixt@@n}
55 \def\newwrite{\alloc@7\write\chardef\sixt@@n}

LATEX defines \newfam in ltfss.dtx.

\def\newfam{\alloc@8\fam\chardef\sixt@@n}

\newlanguage
56 \def\newlanguage{\alloc@9\language\chardef\@cclvi}

```

```

\alloc@
57 \def\alloc@#1#2#3#4#5{\global\advance\count1#1\@ne
58 \ch@ck#1#4#2% make sure there's still room
59 \allocationnumber\count1#1%
60 \global#3#5\allocationnumber
61 \wlog{\string#5=\string#2\the\allocationnumber}}

\newinsert
62 \def\newinsert#1{\global\advance\insc@unt \m@ne
63 \ch@ck0\insc@unt\count
64 \ch@ck1\insc@unt\dimen
65 \ch@ck2\insc@unt\skip
66 \ch@ck4\insc@unt\box
67 \allocationnumber\insc@unt
68 \global\chardef#1\allocationnumber
69 \wlog{\string#1=\string\insert\the\allocationnumber}}

\ch@ck
70 \</2kernel | autoloading
71 \<*2kernel | autoloading | autoerr)
72 \gdef\ch@ck#1#2#3{%
73 \ifnum\count1#1<#2\else
74 \!autoloading \errmessage{No room for a new #3}%
75 \!autoloading \!autoerr\ch@ck#1#2#3%
76 \fi}
77 \</2kernel | autoloading | autoerr)
78 \<*2kernel | autoloading)

\maxdimen Here are some examples of allocation.
\hideskip 79 \newdimen\maxdimen \maxdimen=16383.99999pt % the largest legal <dimen>
80 \newskip\hideskip \hideskip=-1000pt plus 1fill % negative but can grow

\p@
\z@ 81 \newdimen\p@ \p@=1pt % this saves macro space and time
\z@skip 82 \newdimen\z@ \z@=0pt % can be used both for 0pt and 0
\voidb@x 83 \newskip\z@skip \z@skip=0pt plus 0pt minus 0pt
84 \newbox\voidb@x % permanently void box register

85 \message{compatibility for TeX 2, }

If this file is used in an old TeX we define the new features of TeX 3.0 as simple
macros or counters so that files that uses these features can be processed in such
an environment (They will however produce some other results).

86 \ifx\@undefined\inputlineno
87 \newcount\inputlineno

This could be used to detect that an old TeX is in force
88 \inputlineno-1
Extra test for MLTeX 2, RmS 91/11/07.
89 \ifx\@undefined\language
90 \newcount\language
91 \fi
92 \newcount\lefthyphenmin
93 \newcount\righthyphenmin
94 \newcount\errorcontextlines
95 \newcount\holdinginserts
96 \newdimen\emergencystretch
97 \newcount\badness
98 \let\noboundary\relax
99 \newcount\setlanguage
100 \fi

```

Assign initial values to T_EX's parameters

```
101 \message{parameters,}

    All of TEX's numeric parameters are listed here, but the code is commented
    out if no special value needs to be set. INITEX makes all parameters zero except
    where noted.

102 \pretolerance=100
103 \tolerance=200 % INITEX sets this to 10000
104 \hbadness=1000
105 \vbadness=1000
106 \linepenalty=10
107 \hyphenpenalty=50
108 \exhyphenpenalty=50
109 \binoppenalty=700
110 \relpenalty=500
111 \clubpenalty=150
112 \widowpenalty=150
113 \displaywidowpenalty=50
114 \brokenpenalty=100
115 \predisplaypenalty=10000

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

116 \doublehyphendemerits=10000
117 \finalhyphendemerits=5000
118 \adjdemerits=10000

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

119 \tracinglostchars=1

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

120 \uchyph=1

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

121 \defaultthyphenchar='\-
122 \defaultskewchar=-1

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

123 \delimiterfactor=901
```

```

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

```

In L^AT_EX we don't want box information in the transcript unless we do a full tracing.

```

124 \showboxbreadth=-1
125 \showboxdepth=-1
126 \errorcontextlines=-1

127 \hfuzz=0.1pt
128 \vfuzz=0.1pt
129 \overfullrule=5pt
130 \maxdepth=4pt
131 \splitmaxdepth=\maxdimen
132 \boxmaxdepth=\maxdimen

\lineskiplimit=0pt, changed by \normalbaselines

133 \delimitershortfall=5pt
134 \nulldelimiterspace=1.2pt
135 \scriptspace=0.5pt

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

136 \parindent=20pt

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

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

137 \parskip=0pt plus 1pt
138 \abovedisplayskip=12pt plus 3pt minus 9pt
139 \abovedisplayshortskip=0pt plus 3pt
140 \belowdisplayskip=12pt plus 3pt minus 9pt
141 \belowdisplayshortskip=7pt plus 3pt minus 4pt

\leftskip=0pt
\rightskip=0pt

142 \topskip=10pt
143 \splittopskip=10pt

\tabskip=0pt
\spaceskip=0pt
\xspaceskip=0pt

144 \parfillskip=0pt plus 1fil

```

`\normalbaselineskip` We also define special registers that function like parameters:

```

\normallineskip 145 \newskip\normalbaselineskip \normalbaselineskip=12pt
\normallineskiplimit 146 \newskip\normallineskip \normallineskip=1pt
147 \newdimen\normallineskiplimit \normallineskiplimit=0pt

```

`\interfootlinepenalty`

```

148 \newcount\interfootnotelinepenalty \interfootnotelinepenalty=100

```

Definitions for preloaded fonts

`\magstephalf`

```
\magstep 149 \def\magstephalf{1095 }
150 \def\magstep#1{\ifcase#1 \@m\or 1200\or 1440\or 1728\or
151 2074\or 2488\fi\relax}
```

Macros for setting ordinary text

`\frenchspacing`

```
\nonfrenchspacing 152 \def\frenchspacing{\sfcode'\.\@m \sfcode'\?@m \sfcode'\!@m
153 \sfcode'\:@m \sfcode'\;@m \sfcode'\,@m}
154 \def\nonfrenchspacing{\sfcode'\.3000\sfcode'\?3000\sfcode'\!3000%
155 \sfcode'\:2000\sfcode'\;1500\sfcode'\,1250 }
```

`\normalbaselines`

```
156 \def\normalbaselines{\lineskip\normallineskip
157 \baselineskip\normalbaselineskip \lineskiplimit\normallineskiplimit}
```

`\M` Save a bit of space by using `\let` here.

```
\I 158 \def\^M{\ } % control <return> = control <space>
159 \let\^I\^M % same for <tab>
```

`\lq`

```
\rq 160 \def\lq{' }
161 \def\rq{' }
```

`\lbrack`

```
\rbrack 162 \def\lbrack{[ }
163 \def\rbrack{[ }
```

`\aa` These are not from plain.tex but they are similar to other commands found here

`\AA` and nowhere else, being alternate input forms for characters.

```
164 \def \aa {\r a}
165 \def \AA {\r A}
```

`\endgraf`

```
\endline 166 \let\endgraf=\par
167 \let\endline=\cr
```

`\space`

```
168 \def\space{ }
```

`\empty` This probably ought to go altogether, but let it to the L^AT_EX version to save space.

```
169 \let\empty\@empty
```

`\null`

```
170 \def\null{\hbox{ }}
```

`\bgroup`

```
\egroup 171 \let\bgroup={
172 \let\egroup=}
```

`\obeylines` In `\obeylines`, we say `\let\^M=\par` instead of `\def\^M{\par}` since this allows,
`\obeyspaces` for example, `\let\par=\cr \obeylines \halign{...`

```
173 {\catcode'\^M=\active % these lines must end with %
174 \gdef\obeylines{\catcode'\^M\active \let\^M\par}%
175 \global\let\^M\par} % this is in case ^M appears in a \write
176 \def\obeyspaces{\catcode'\ \active}
177 {\obeyspaces\global\let \space}
```

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

```
178 \long\def \loop #1\repeat{%
179   \def\iterate{#1\relax % Extra \relax
180               \expandafter\iterate\fi
181             }%
182   \iterate
183   \let\iterate\relax
184 }
```

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

```
185 \let\repeat=\fi
```

L^AT_EX defines `\smallskip`, etc. in `ltspace.dtx`.

`\nointerlineskip`

```
\offinterlineskip 186 \def\nointerlineskip{\prevdepth-\@m\p@}
187 \def\offinterlineskip{\baselineskip-\@m\p@
188   \lineskip\z@ \lineskiplimit\maxdimen}
```

`\vglue`

```
\hglue 189 \def\vglue{\afterassignment\vgl@ \skip@=}
190 \def\vgl@{\par \dimen@ \prevdepth \hrule \@height\z@
191   \nobreak\vskip\skip@ \prevdepth\dimen@}
192 \def\hglue{\afterassignment\hgl@ \skip@=}
193 \def\hgl@{\leavevmode \count@ \spacefactor \vrule \@width\z@
194   \nobreak\hskip\skip@ \spacefactor\count@}
```

L^AT_EX defines `~` in `ltdefns.dtx`.

`\slash`

```
195 \def\slash{/\penalty\exhyphenpenalty} % a '/' that acts like a '-'
```

`\break`

```
\nobreak 196 \def\break{\penalty-\@M}
\allowbreak 197 \def\nobreak{\penalty \@M}
198 \def\allowbreak{\penalty \z@}
```

`\filbreak`

```
\goodbreak 199 \def\filbreak{\par\vfil\penalty-200\vfilneg}
200 \def\goodbreak{\par\penalty-500 }
```

`\eject` Define `\eject` as in plain T_EX but define `\supereject` only in the compatibility file.

```
201 \def\eject{\par\break}
```

`\removelastskip`

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

`\smallbreak`

```
\medbreak 203 \def\smallbreak{\par\ifdim\lastskip<\smallskipamount
\bigbreak 204   \removelastskip\penalty-50\smallskip\fi}
205 \def\medbreak{\par\ifdim\lastskip<\medskipamount
206   \removelastskip\penalty-100\medskip\fi}
207 \def\bigbreak{\par\ifdim\lastskip<\bigskipamount
208   \removelastskip\penalty-200\bigskip\fi}
```

`\m@th`

```
209 \def\m@th{\mathsurround\z@}
```

`\underbar` Due to L^AT_EX's redefinition of `\underline` plain T_EX's `\underbar` can be done in a simpler fashion (but do we need it at all?).

```
210 \def\underbar#1{\underline{\sbox\tw@{#1}\dp\tw@\z@ \box\tw@}}
```

`\strutbox` L^AT_EX sets `\strutbox` in `\set@fontsize`.

```
\strut 211 \newbox\strutbox
212 \def\strut{\relax\ifmmode\copy\strutbox\else\unhcopy\strutbox\fi}
```

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

```
213 \def\hidewidth{\hskip\hideskip}
```

`\narrower`

```
214 \def\narrower{%
215   \advance\leftskip\parindent
216   \advance\rightskip\parindent}
```

L^AT_EX defines `\ae` and similar commands elsewhere.

```
217 \chardef\%='\'
218 \chardef\&='&
219 \chardef\#='&#
```

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

`\leavevmode` begins a paragraph, if necessary

```
220 \def\leavevmode{\unhbox\voidb@x}
```

`\mathhexbox`

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

`\ialign`

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

`\oalign`

```
\o@lign 223 \def\oalign#1{\leavevmode\top{\baselineskip\z@skip \lineskip.25ex%
\oalign 224   \ialign{##\crrc#1\crrc}}}%
225 \def\o@lign{\lineskiplimit\z@ \oalign}
226 \def\oalign{\lineskiplimit-\maxdimen \oalign}
```

`\sh@ft` The definition of this macro in plain.tex was improved in about 1997; but as a result its usage was changed and its new definition is not appropriate for L^AT_EX.

Since the version given here has been in use by L^AT_EX for many years it does not seem prudent to remove it now. As far as we can tell it has only been used to define `\b` and `\d` but this cannot be certain.

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

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

```
229 \def\ltx@sh@ft #1{%
230   \dimen@ #1%
231   \kern \strip@pt
232   \fontdimen1\font \dimen@
233 } % kern by #1 times the current slant
```

L^AT_EX change: the text commands such as `\d`, `\b`, `\c`, `\copyright`, `\TeX` are now defined elsewhere.

L^AT_EX change: Make `\t` work in a moving argument. Now defined elsewhere.

`\hrulefill` L^AT_EX change: `\kern\z@` added to end of `\hrulefill` and `\dotfill` to make them work in ‘tabular’ and ‘array’ environments. (Change made 24 July 1987). L^AT_EX change: `\leavevmode` added at beginning of `\dotfill` and `\hrulefill` so that they work as expected in vertical mode.

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

The box in `\dotfill` originally contained (in `plain.tex`): `\mkern 1.5mu .\mkern 1.5mu`; the width of `.44em` differs from this by `.04pt` which is probably an acceptable difference within leaders.

235 `\def\dotfill{%`
236 `\leavevmode`
237 `\cleaders \hb@xt@ .44em{\hss.\hss}\hfill`
238 `\kern\z@}`

INITEX sets `\sfcode x=1000` for all `x`, except that `\sfcode‘X=999` for upper-case letters. The following changes are needed:

239 `\sfcode‘\)=0 \sfcode‘\’=0 \sfcode‘\]=0`

The `\nonfrenchspacing` macro will make further changes to `\sfcode` values.
Definitions related to output
`\magnification` doesn’t work in L^AT_EX.

`\def\magnification{\afterassignment\m@g\count@}`
`\def\m@g{\mag\count@`
`\hspace6.5truein\vspace8.9truein\dimen\footins8truein}`

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

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

`\showoutput`

`\loggingoutput` 241 `\</2kernel | autoloading>`
242 `\<*/2kernel | autoerr>`
243 `\gdef\loggingoutput{\tracingoutput\@ne`
244 `\showboxbreadth\maxdimen\showboxdepth\maxdimen\errorstopmode}`
245 `\gdef\showoutput{\loggingoutput\showoverfull}`
246 `\</2kernel | autoerr>`
247 `\autoloading\def\showoutput{\@autoerr\showoutput}`

`\tracingall`

`\loggingall` 248 `\<*/2kernel | autoerr>`
249 `\gdef\loggingall{\tracingcommands\tw@\tracingstats\tw@`
250 `\tracingpages\@ne\tracinglostchars\@ne`
251 `\tracingmacros\tw@\tracingparagraphs\@ne\tracingrestores\@ne`
252 `\errorcontextlines\maxdimen\loggingoutput}`
253 `\gdef\tracingall{\loggingall\showoverfull}`
254 `\</2kernel | autoerr>`
255 `\autoloading\def\tracingall{\@autoerr\tracingall}`

L^AT_EX change: `\showhyphens` Defined later.
Punctuation affects the spacing.

256 `\<*/2kernel | autoloading>`
257 `\nonfrenchspacing`
258 `\</2kernel | autoloading>`

File c

ltvers.dtx

10 Version Identification

First we identify the date and version number of this release of L^AT_EX, and set `\everyjob` so that it is printed at the start of every L^AT_EX run.

```
\fmtname
\fmtversion 1 <*2ekernel>
              2 \def\fmtname{LaTeX2e}
              3 \edef\fmtversion{2009/09/24}
```

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

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

```
4 \iffalse
5 \def\reserved@a#1/#2/#3\@nil{%
6   \count@ \year
7   \advance\count@-#1\relax
8   \multiply\count@ by 12\relax
9   \advance\count@\month
10  \advance\count@-#2\relax}
11 \expandafter\reserved@a\fmtversion\@nil
\count@ is now the age of this file in months. Take a generous definition of ‘year’
so this message is not generated too often.
12 \ifnum\count@>65
13   \typeout{^^J%
14   !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J%
15   !   You are attempting to make a LaTeX format from a source file^^J%
16   !   That is more than five years old.^^J%
17   !^^J%
18   !   If you enter <return> to scroll past this message then the format^^J%
19   !   will be built, but please consider obtaining newer source files^^J%
20   !   before continuing to build LaTeX.^^J%
21   !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J%
22 }
23   \errhelp{To avoid this error message, obtain new LaTeX sources.}
24   \errmessage{LaTeX source files more than 5 years old!}
25 \fi
26 \let\reserved@a\relax
27 \fi
```

This startup banner may be further modified by the code in `ltfinal.dtx` if a patch file is present.

```
28 \everyjob{\typeout{\fmtname
29 <autoload>\space(autoload version)%
30                                     \space<\fmtversion>}}
31 \immediate\write16{\fmtname
32 <autoload>\space(autoload version)%
33                                     \space<\fmtversion>}
34 </2ekernel>
```

File d

ltdefns.dtx

11 Definitions

This section contains commands used in defining other macros.

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

11.1 Initex initialisations

```
\two@digits Prefix a number less than 10 with '0'.
2 \def\two@digits#1{\ifnum#1<10 0\fi\number#1}

\typeout Display something on the terminal.
3 \def\typeout#1{\begingroup\set@display@protect
4 \immediate\write\@unused{#1}\endgroup}

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

11.2 Saved versions of T_EX primitives

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

```
\@@par
6 \let\@@par=\par
7 %\let\@@input=\input      %%% moved earlier
8 %\let\@@end=\end          %%%

\@@hyph The following comment was added when these commands were first set up, 19
\-- April 1986: the \- command is redefined to allow it to work in the \ttfamily
type style, where automatic hyphenation is suppressed by setting \hyphenchar
to -1. The original primitive TEX definition is saved as \@@hyph just in case
anyone needs it.
```

There is a need for a robust command for a discretionary hyphen since its exact representation depends on the glyphs available in the current font. For example, with suitable fonts and the T1 font encoding it is possible to use hanging hyphens.

A suitable robust definition that allows for many possible types of font and encoding may be as follows:

```
\DeclareRobustCommand {\-}{%
\discretionary {%
\char \ifnum\hyphenchar\font<\z@
\defaultshyphenchar
\else
\hyphenchar\font
\fi
}{-}{-}%
}
```

The redefinition (via `\let`) of `\-` within tabbing also makes the use of a robust command advisable since then any redefinition of `\-` via `\DeclareRobustCommand` will not cause a conflict.

Therefore, macro writers should be hereby warned that these internals will probably change! It is likely that a future release of L^AT_EX will make `\-` effectively an encoding specific text command.

```

9 \let\@@hyph=\-          % Save original primitive definition
10 \def\-\{\discretionary{-}{-}{-}\}

\@dischyph
11 \let\@dischyph=\-

\@italiccorr Save the original italic correction.
12 \let\@italiccorr=\/

\@height The following definitions save token space. E.g., using \@height instead of height
\@depth saves 5 tokens at the cost in time of one macro expansion.
\@width 13 \def\@height{height} \def\@depth{depth} \def\@width{width}
\@minus 14 \def\@minus{minus}
\@plus 15 \def\@plus{plus}

\hb@xt@ The next one is another 100 tokens worth.
16 \def\hb@xt@{\hbox to}

17 \message{hacks,}

```

11.3 Command definitions

This section defines the following commands:

<code>\@namedef</code>	<code>{\langle NAME \rangle}</code> Expands to <code>\def\{\langle NAME \rangle}</code> , except name can contain any characters.
<code>\@nameuse</code>	<code>{\langle NAME \rangle}</code> Expands to <code>\{\langle NAME \rangle\}</code> .
<code>\@ifnextchar</code>	<code>X{\langle YES \rangle}{\langle NO \rangle}</code> Expands to <code>\langle YES \rangle</code> if next character is an ‘X’, and to <code>\langle NO \rangle</code> otherwise. (Uses <code>\reserved@a</code> – <code>\reserved@c</code> .) NOTE: GOBBLES ANY SPACE FOLLOWING IT.
<code>\@ifstar</code>	<code>{\langle YES \rangle}{\langle NO \rangle}</code> Gobbles following spaces and then tests if next the character is a ‘*’. If it is, then it gobbles the ‘*’ and expands to <code>\langle YES \rangle</code> , otherwise it expands to <code>\langle NO \rangle</code> .
<code>\@dblarg</code>	<code>{\langle CMD \rangle}{\langle ARG \rangle}</code> Expands to <code>\{\langle CMD \rangle\}[\langle ARG \rangle]{\langle ARG \rangle}</code> . Use <code>\@dblarg\CS</code> when <code>\CS</code> takes arguments <code>[ARG1]{ARG2}</code> , where default is <code>ARG1 = ARG2</code> .
<code>\@ifundefined</code>	<code>{\langle NAME \rangle}{\langle YES \rangle}{\langle NO \rangle}</code> : If <code>\NAME</code> is undefined then it executes <code>\langle YES \rangle</code> , otherwise it executes <code>\langle NO \rangle</code> . More precisely, true if <code>\NAME</code> either undefined or <code>= \relax</code> .
<code>\@ifdefinable</code>	<code>\NAME{\langle YES \rangle}</code> Executes <code>\langle YES \rangle</code> if the user is allowed to define <code>\NAME</code> , otherwise it gives an error. The user can define <code>\NAME</code> if <code>\@ifundefined{NAME}</code> is true, ‘NAME’ \neq ‘relax’ and the first three letters of ‘NAME’ are not ‘end’, and if <code>\endNAME</code> is not defined.
<code>\newcommand</code>	<code>*{\langle FOO \rangle}[\langle i \rangle]{\langle TEXT \rangle}</code> User command to define <code>\FOO</code> to be a macro with <i>i</i> arguments (<i>i</i> = 0 if missing) having the definition <code>\langle TEXT \rangle</code> . Produces an error if <code>\FOO</code> already defined. Normally the command is defined to be <code>\long</code> (ie it may take multiple paragraphs in its argument). In the star-form, the command is not defined as <code>\long</code> and a blank line in any argument to the command would generate an error.
<code>\renewcommand</code>	<code>*{\langle FOO \rangle}[\langle i \rangle]{\langle TEXT \rangle}</code> Same as <code>\newcommand</code> , except it checks if <code>\FOO</code> already defined.
<code>\newenvironment</code>	<code>*{\langle FOO \rangle}[\langle i \rangle]{\langle DEF1 \rangle}{\langle DEF2 \rangle}</code> equivalent to: <code>\newcommand{\FOO}[i]{DEF1} \def{\endFOO}{DEF2}</code> (or the appropriate star forms).
<code>\renewenvironment</code>	Obvious companion to <code>\newenvironment</code> .

<code>\@cons</code>	: See description of <code>\output</code> routine.
<code>\@car</code>	<code>\@car T1 T2 ... Tn\@nil == T1</code> (unexpanded)
<code>\@cdr</code>	<code>\@cdr T1 T2 ... Tn\@nil == T2 ... Tn</code> (unexpanded)
<code>\typeout</code>	<code>{\message}</code> Produces a warning message on the terminal.
<code>\typein</code>	<code>{\message}</code> Types message, asks the user to type in a command, then executes it
<code>\typein</code>	<code>[\CS]{MSG}</code> Same as above, except defines <code>\CS</code> to be the input instead of executing it.
<code>\typein</code>	<pre> 18 \def\typein{% 19 \let\@typein\relax 20 \@testopt\@xtypein\@typein} 21 \def\@xtypein[#1]#2{% 22 \typeout{#2}% 23 \advance\endlinechar\@M 24 \read\@inputcheck to#1% 25 \advance\endlinechar-\@M 26 \@typein} </pre>
<code>\@namedef</code>	<pre> 27 \def\@namedef#1{\expandafter\def\csname #1\endcsname} </pre>
<code>\@nameuse</code>	<pre> 28 \def\@nameuse#1{\csname #1\endcsname} </pre>
<code>\@cons</code>	<pre> 29 \def\@cons#1#2{\begingroup\let\@elt\relax\xdef#1{#1\@elt #2}\endgroup} </pre>
<code>\@car</code>	
<code>\@cdr</code>	<pre> 30 \def\@car#1#2\@nil{#1} 31 \def\@cdr#1#2\@nil{#2} </pre>
<code>\@carcube</code>	<pre> \@carcube T1 ... Tn\@nil = T1 T2 T3 , n > 3 32 \def\@carcube#1#2#3#4\@nil{#1#2#3} </pre>
<code>\@onlypreamble</code>	This macro adds its argument to the list of commands stored in <code>\@preamblecmds</code>
<code>\@preamblecmds</code>	to be disabled after <code>\begin{document}</code> . These commands are redefined to generate <code>\@notprerr</code> at this point.
	<pre> 33 \def\@preamblecmds{} 34 \def\@onlypreamble#1{% 35 \expandafter\gdef\expandafter\@preamblecmds\expandafter{% 36 \@preamblecmds\do#1}} 37 \@onlypreamble\@onlypreamble 38 \@onlypreamble\@preamblecmds </pre>
<code>\@star@or@long</code>	Look ahead for a <code>*</code> . If present reset <code>\l@ngrel@x</code> so that the next definition, <code>#1</code> , will be non-long.
	<pre> 39 \def\@star@or@long#1{% 40 \@ifstar 41 {\let\l@ngrel@x\relax#1}% 42 {\let\l@ngrel@x\long#1}} </pre>
<code>\l@ngrel@x</code>	This is either <code>\relax</code> or <code>\long</code> depending on whether the <code>*</code> -form of a definition command is being executed.
	<pre> 43 \let\l@ngrel@x\relax </pre>

`\newcommand` User level `\newcommand`.

```
44 \def\newcommand{\@star@or@long\new@command}
```

`\new@command`

```
45 \def\new@command#1{%
```

```
46   \@testopt{\@newcommand#1}0}
```

`\@newcommand` Handling arguments for `\newcommand`.

```
\@argdef 47 \def\@newcommand#1[#2]{%
```

```
\@xargdef 48   \kernel@ifnextchar [{\@xargdef#1[#2]}%
```

```
49           {\@argdef#1[#2]}}
```

Define #1 if it is definable.

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

```
50 \long\def\@argdef#1[#2]#3{%
```

```
51   \@ifdefinable #1{\@yargdef#1\@ne{#2}{#3}}}
```

Handle the second optional argument.

```
52 \long\def\@xargdef#1[#2][#3]#4{%
```

```
53   \@ifdefinable#1{%
```

Define the actual command to be:

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

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

The `\autoglobal` command below is only used in the autoload format. If it is `\global` then a global definition will be made.

```
54 \autoload\autoglobal
```

```
55   \expandafter\def\expandafter#1\expandafter{%
```

```
56       \expandafter
```

```
57       \@protected@testopt
```

```
58       \expandafter
```

```
59       #1%
```

```
60       \csname\string#1\endcsname
```

```
61       {#3}}%
```

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

```
62   \expandafter\@yargdef
```

```
63   \csname\string#1\endcsname
```

```
64   \tw@
```

```
65   {#2}%
```

```
66   {#4}}}
```

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

```
67 \long\def\@testopt#1#2{%
```

```
68   \kernel@ifnextchar[{#1}{#1[{#2}]}}
```

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

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

```
69 \def\@protected@testopt#1{%
70   \ifx\protect\@typesetprotect
71     \expandafter\@testopt
72   \else
73     \@xprotect#1%
74   \fi}
```

`\@yargdef` These generate a primitive argument specification, from a L^AT_EX [*digit*] form; in fact *digit* can be anything such that `\number <digit>` is single digit.

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

Recall that L^AT_EX 2.09 goes into an infinite loop with `\renewcommand[1]{\@tempa}{foo}` (DPC 6 October 93).

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

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

```
75 \long \def \@yargdef #1#2#3{%
76   \ifx#2\tw@
77     \def\reserved@b##11{####1}%
78   \else
79     \let\reserved@b\@gobble
80   \fi
81   \expandafter
82     \@yargdef \expandafter{\number #3}#1%
83 }
```

The `\autoglobal` command below is only used in the autoload format. If it is `\global` then a global definition will be made.

```
84 \long \def \@yargdef#1#2{%
85   \def \reserved@a ##1#1##2##{%
86     \autoload\autoglobal
87     \expandafter\def\expandafter#2\reserved@b ##1#1%
88   }%
89   \l@ngrel@x \reserved@a 0##1##2##3##4##5##6##7##8##9##1%
90 }
```

`\@reargdef`

```
91 \long\def\@reargdef#1[#2]{%
92   \@yargdef#1\@ne{#2}}
```

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

```
93 \def\renewcommand{\@star@or@long\renew@command}
```

`\renew@command`

```
94 \def\renew@command#1{%
95   \begingroup \escapechar\m@ne\xdef\@gtempa{\string#1}\endgroup
96   \expandafter\@ifundefined\@gtempa
97     {\@latexerror{\noexpand#1undefined}\@ehc}%
98   \relax
99   \let\@ifdefinable\@rc@ifdefinable
100  \new@command#1}
```

```

\@ifdefinable Test is user is allowed to define a command.
\@@ifdefinable 101 \long\def\@ifdefinable #1#2{%
\@rc@ifdefinable 102 \edef\reserved@a{\expandafter\@gobble\string #1}%
103 \ifundefined\reserved@a
104 {\edef\reserved@b{\expandafter\@carcube \reserved@a xxx\@nil}%
105 \ifx \reserved@b\@qend \@notdefinable\else
106 \ifx \reserved@a\@qrelax \@notdefinable\else
107 #2%
108 \fi
109 \fi}%
110 \@notdefinable}
Saved definition of \@ifdefinable.
111 \let\@@ifdefinable\@ifdefinable
Version of \@ifdefinable for use with \renewcommand. Does not do the check
this time, but restores the normal definition.
112 \long\def\@rc@ifdefinable#1#2{%
113 \let\@ifdefinable\@@ifdefinable
114 #2}

\newenvironment Define a new user environment. #1 is the environment name. #2# Grabs all the
tokens up to the first {. These will be any optional arguments. They are not
parsed at this point, but are just passed to \@newenv which will eventually call
\newcommand. Any optional arguments will then be parsed by \newcommand as it
defines the command that executes the ‘begin code’ of the environment.
This #2# trick removed with version 1.2i as it fails if a { occurs in the optional
argument. Now use \@ifnextchar directly.
115 \def\newenvironment{\@star@or@long\new@environment}

\new@environment
116 \def\new@environment#1{%
117 \@testopt{\@newenva#1}0}

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

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

\renewenvironment Redefine an environment. For \renewenvironment disable \@ifdefinable and
then call \newenvironment. It is OK to \let the argument to \relax here as
there should not be a @temp... environment.
121 \def\renewenvironment{\@star@or@long\renew@environment}

\renew@environment
122 \def\renew@environment#1{%
123 \@ifundefined{#1}%
124 {\@latexerror{Environment #1 undefined}\@ehc
125 }\relax
126 \expandafter\let\csname#1\endcsname\relax

127 \autoload\aut@global
128 \expandafter\let\csname end#1\endcsname\relax
129 \new@environment{#1}}

\@newenv The internal version of \newenvironment.
Call \newcommand to define the <begin-code> for the environment. \def is used
for the <end-code> as it does not take arguments. (but may contain \pars)
Make sure that an attempt to define a ‘graf’ or ‘group’ environment fails.

```

```

130 \long\def\@newenv#1#2#3#4{%
131   \@ifundefined{#1}%
132     {\expandafter\let\csname#1\expandafter\endcsname
133       \csname end#1\endcsname}%
134     \relax
135   \expandafter\new@command
136     \csname #1\endcsname#2#{#3}%

137 \autoload\aut@global
138   \l@ngrel@x\expandafter\def\csname end#1\endcsname{#4}}

```

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

```

139 \def\newif#1{%
140   \count@\escapechar \escapechar\m@ne
141 \autoload\aut@global
142   \let#1\iffalse
143   \@if#1\iftrue
144   \@if#1\iffalse
145   \escapechar\count@}

```

`\@if`

```

146 \def\@if#1#2{%
147 \autoload\aut@global
148   \expandafter\def\csname\expandafter\@gobbletwo\string#1%
149     \expandafter\@gobbletwo\string#2\endcsname
150     {\let#1#2}}

```

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

```

151 \def\providecommand{\@star@or@long\provide@command}

```

`\provide@command`

```

152 \def\provide@command#1{%
153   \begingroup
154     \escapechar\m@ne\xdef\@gtempa{\string#1}%
155   \endgroup
156   \expandafter\@ifundefined\@gtempa
157     {\def\reserved@a{\new@command#1}}%
158     {\def\reserved@a{\renew@command\reserved@a}}%
159   \reserved@a}%

```

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

```

160 \def\CheckCommand{\@star@or@long\check@command}

```

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

```

161 \@onlypreamble\CheckCommand

```

`\check@command`

```

162 \def\check@command#1#2#{\@check@c#1{#2}}
163 \@onlypreamble\check@command

```

```

\@check@c \CheckCommand itself just grabs all the arguments we need, without actually look-
ing for [ optional argument forms. Now define \reserved@a. If \reserved@a is
then defined, compare it with the “\#1’ otherwise compare \reserved@a with #1.
164 \long\def\@check@c#1#2#3{%
165   \expandafter\let\csname\string\reserved@a\endcsname\relax
166   \renewcommand\reserved@a#2{#3}%
167   \@ifundefined{\string\reserved@a}%
168     {\@check@eq#1\reserved@a}%
169     {\expandafter\@check@eq
170       \csname\string#1\expandafter\endcsname
171       \csname\string\reserved@a\endcsname}}
172 \@onlypreamble\@check@c

\@check@eq Complain if #1 and #2 are not \ifx equal.
173 \def\@check@eq#1#2{%
174   \ifx#1#2\else
175     \@latex@warning@no@line
176       {Command \noexpand#1 has
177         changed.\MessageBreak
178         Check if current package is valid}%
179   \fi}
180 \@onlypreamble\@check@eq

\@gobble The \@gobble macro is used to get rid of its argument.
\@gobbletwo 181 \long\def \@gobble #1{}
\@gobblefour 182 \long\def \@gobbletwo #1#2{}
183 \long\def \@gobblefour #1#2#3#4{}

\@firstofone Some argument-grabbers.
\@firstoftwo 184 \long\def\@firstofone#1{#1}
\@secondoftwo 185 \long\def\@firstoftwo#1#2{#1}
186 \long\def\@secondoftwo#1#2{#2}

\@iden \@iden is another name for \@firstofone for compatibility reasons.
187 \let\@iden\@firstofone

\@thirdofthree Another grabber now used in the encoding specific section.
188 \long\def\@thirdofthree#1#2#3{#3}

\@expandtwoargs A macro to totally expand two arguments to another macro
189 \def\@expandtwoargs#1#2#3{%
190   \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}

\@backslashchar A category code 12 backslash.
191 \edef\@backslashchar{\expandafter\@gobble\string\\}

```

11.4 Robust commands and protect

Fragile and robust commands are one of the thornier issues in L^AT_EX’s commands. Whilst typesetting documents, L^AT_EX makes use of many of T_EX’s features, such as arithmetic, defining macros, and setting variables. However, there are (at least) three different occasions when these commands are not safe. These are called ‘moving arguments’ by L^AT_EX, and consist of:

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

The method L^AT_EX uses for making fragile commands robust is to precede them with `\protect`. This can have one of five possible values:

- `\relax`, for normal typesetting. So `\protect\foo` will execute `\foo`.
- `\string`, for writing to the screen. So `\protect\foo` will write `\foo`.
- `\noexpand`, for writing to a file. So `\protect\foo` will write `\foo` followed by a space.
- `\@unexpandable@protect`, for writing a moving argument to a file. So `\protect\foo` will write `\protect\foo` followed by a space. This value is also used inside `\edefs`, `\marks` and other commands which evaluate their arguments fully.
- `\@unexpandable@noexpand`, for performing a deferred write inside an `\edef`. So `\protect\foo` will write `\foo` followed by a space. If you want `\protect\foo` to be written, you should use `\@unexpandable@protect`. (Removed as never used).

```
\@unexpandable@protect These commands are used for setting \protect inside \edefs.
\@unexpandable@noexpand 192 \def\@unexpandable@protect{\noexpand\protect\noexpand}
193 %\def\@unexpandable@noexpand{\noexpand\noexpand\noexpand}
```

```
\DeclareRobustCommand This is a package-writers command, which has the same syntax as \newcommand,
\declare@robustcommand but which declares a protected command. It does this by having
\DeclareRobustCommand\foo
define \foo to be \protect\foo<space>,
and then use \newcommand\foo<space>.
Since the internal command is \foo<space>, when it is written to an auxiliary
file, it will appear as \foo.
```

We have to be a bit cleverer if we're defining a short command, such as `_`, in order to make sure that the auxiliary file does not include a space after the command, since `_ a` and `_a` aren't the same. In this case we define `_` to be:

```
\x@protect\_ \protect\_<space>
```

which expands to:

```
\ifx\protect\@typeset@protect\else
  \x@protect@\_
\fi
\protect\_<space>
```

Then if `\protect` is `\@typeset@protect` (normally `\relax`) then we just perform `_<space>`, and otherwise `\x@protect@` gobbles everything up and expands to `\protect_`.

Note: setting `\protect` to any value other than `\relax` whilst in 'typesetting' mode will cause commands to go into an infinite loop! In particular, setting `\relax` to `\@empty` will cause `_` to loop forever. It will also break lots of other things, such as protected `\ifmmodes` inside `\haligns`. If you really really have to do such a thing, then please set `\@typeset@protect` to be `\@empty` as well. (This is what the code for `\patterns` does, for example.)

More fun with `\expandafter` and `\csname`.

```
194 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
195 \def\declare@robustcommand#1{%
196   \ifx#1\@undefined\else\ifx#1\relax\else
197     \@latex@info{Redefining \string#1}%
198     \fi\fi
199   \edef\reserved@a{\string#1}%
200   \def\reserved@b{#1}%
201   \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%

```

```

202 \autoload\aut@global
203   \edef#1{%
204     \ifx\reserved@a\reserved@b
205       \noexpand\x@protect
206       \noexpand#1%
207     \fi
208     \noexpand\protect
209     \expandafter\noexpand\csname
210       \expandafter\@gobble\string#1 \endcsname
211   }%
212   \let\@ifdefinable\@rc@ifdefinable
213   \expandafter\new@command\csname
214     \expandafter\@gobble\string#1 \endcsname
215 }

\@x@protect
\@x@protect 216 \def\x@protect#1{%
217   \ifx\protect\@typeset@protect\else
218     \@x@protect#1%
219   \fi
220 }
221 \def\@x@protect#1\fi#2#3{%
222   \fi\protect#1%
223 }

\@typeset@protect
224 \let\@typeset@protect\relax

\set@display@protect These macros set \protect appropriately for typesetting or displaying.
\set@typeset@protect 225 \def\set@display@protect{\let\protect\string}
226 \def\set@typeset@protect{\let\protect\@typeset@protect}

\protected@edef The commands \protected@edef and \protected@xdef perform ‘safe’ \edefs
\protected@xdef and \xdefs, saving and restoring \protect appropriately. For cases where restoring
\unrestored@protected@xdef \protect doesn’t matter, there’s an ‘unsafe’ \unrestored@protected@xdef,
\restore@protect useful if you know what you’re doing!
227 \def\protected@edef{%
228   \let\@@protect\protect
229   \let\protect\@unexpandable@protect
230   \afterassignment\restore@protect
231   \edef
232 }
233 \def\protected@xdef{%
234   \let\@@protect\protect
235   \let\protect\@unexpandable@protect
236   \afterassignment\restore@protect
237   \xdef
238 }
239 \def\unrestored@protected@xdef{%
240   \let\protect\@unexpandable@protect
241   \xdef
242 }
243 \def\restore@protect{\let\protect\@@protect}

\protect The normal meaning of \protect
244 \set@typeset@protect

```

11.5 Internal defining commands

These commands are used internally to define other L^AT_EX commands.

`\@ifundefined` Check if first arg is undefined or `\relax` and execute second or third arg depending,

```
245 \def\@ifundefined#1{%
246   \expandafter\ifx\csname#1\endcsname\relax
247     \expandafter\@firstoftwo
248   \else
249     \expandafter\@secondoftwo
250   \fi}
```

`\@qend` The following define `\@qend` and `\@qrelax` to be the strings ‘end’ and ‘relax’
`\@qrelax` with the characters `\catcoded 12`.

```
251 \edef\@qend{\expandafter\@cdr\string\end\@nil}
252 \edef\@qrelax{\expandafter\@cdr\string\relax\@nil}
```

`\@ifnextchar` `\@ifnextchar` peeks at the following character and compares it with its first argument. If both are the same it executes its second argument, otherwise its third.

```
253 \long\def\@ifnextchar#1#2#3{%
254   \let\reserved@d=#1%
255   \def\reserved@a{#2}%
256   \def\reserved@b{#3}%
257   \futurelet\@let@token\@ifnch}
```

`\kernel@ifnextchar` This macro is the kernel version of `\@ifnextchar` which is used in a couple of places to prevent the AMS variant from being used since in some places this produced chaos (for example if an `fd` file is loaded in a random place then the optional argument to `\ProvidesFile` could get printed there instead of being written only in the log file. This happened when there was a space or a newline between the mandatory and optional arguments! It should really be fixed in the `amsmath` package one day, but...

Note that there may be other places in the kernel where this version should be used rather than the original, but variable, version.

```
258 \let\kernel@ifnextchar\@ifnextchar
```

`\@ifnch` `\@ifnch` is a tricky macro to skip any space tokens that may appear before the character in question. If it encounters a space token, it calls `xifnch`.

```
259 \def\@ifnch{%
260   \ifx\@let@token\@sptoken
261     \let\reserved@c\@xifnch
262   \else
263     \ifx\@let@token\reserved@d
264       \let\reserved@c\reserved@a
265     \else
266       \let\reserved@c\reserved@b
267     \fi
268   \fi
269   \reserved@c}
```

`\@sptoken` The following code makes `\@sptoken` a space token. It is important here that the control sequence `\:` consists of a non-letter only, so that the following whitespace is significant. Together with the fact that the equal sign in a `\let` may be followed by only one optional space the desired effect is achieved. NOTE: the following hacking must precede the definition of `\:` as math medium space.

```
270 \def\:{\let\@sptoken= } \: % this makes \@sptoken a space token
```

`\@xifnch` In the following definition of `\@xifnch`, `\:` is again used to get a space token as delimiter into the definition.

```
271 \def\:{\@xifnch} \expandafter\def\: {\futurelet\@let@token\@ifnch}
```


`\makeatletter` Make internal control sequences accessible or inaccessible.

```

\makeatother 272 \def\makeatletter{\catcode'\@11\relax}
              273 \def\makeatother{\catcode'\@12\relax}

\@ifstar The new implementation below avoids passing the <true code> Through one more
          \def than the <false code>, which previously meant that # had to be written as
          #### in one argument, but ## in the other. The * is gobbled by \@firstoftwo.
          274 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}{}}

\@dblarg
\@xdblarg 275 \long\def\@dblarg#1{\kernel@ifnextchar[{\#1}{\@xdblarg{#1}}}{\#2}}
          276 \long\def\@xdblarg#1#2{\#1[\#2][\#2]}

\@sanitize The command \@sanitize changes the catcode of all special characters except
            for braces to 'other'. It can be used for commands like \index that want to write
            their arguments verbatim. Needless to say, this command should only be executed
            within a group, or chaos will ensue.

            277 \def\@sanitize{\@makeother\ \@makeother\\\@makeother\$\@makeother\&%
            278 \@makeother\#\@makeother\~\@makeother\_ \@makeother\%\@makeother\~}

\@onelevel@sanitize This makes the whole “meaning” of #1 (its one-level expansion) into catcode 12
                    tokens: it could be used in \DeclareRobustCommand.
                    If it is to be used on default float specifiers, this should be done when they are
                    defined.

                    279 \def \@onelevel@sanitize #1{%
                    280   \edef #1{\expandafter\strip@prefix
                    281     \meaning #1}%
                    282 }

                    283 </2kernel>

```

11.6 Commands for Autoloading

```

284 <*autoload>

\aut@global This command is only defined in the 'autoload' format. It is normally \relax
            but may be set to \global, in which case \newif and the commands based on
            \newcommand will all make global definitions.

            285 \let\aut@global\relax

\@autoload This macro is only defined in the 'autoload' format. It inputs a package
            'auto#1.sty' within a local group, and with normalised catcodes. \aut@global is
            set to \global so that \newif \newcommand and related commands make global
            definitions.

            286 \def\@autoload#1{%
            287   \begingroup
            288   \makeatletter
            289   \let\aut@global\global
            290   \nfss@catcodes
            291   \catcode'\ =10
            292   \let\@latex@e@error@gobble
            293   \@@input auto#1.sty\relax
            294   \endgroup}

            295 </autoload>

```

File e

ltxalloc.dtx

12 Counters

This section deals with counter and other variable allocation.

1 \langle *2ekernel \rangle

The following are from plain T_EX:

$\backslash z@$ A zero dimen or number. It's more efficient to write $\backslash parindent\ z@$ than $\backslash parindent 0pt$.

$\backslash @ne$ The number 1.

$\backslash m@ne$ The number -1 .

$\backslash tw@$ The number 2.

$\backslash sixt@@n$ The number 16.

$\backslash @m$ The number 1000.

$\backslash @MM$ The number 20000.

$\backslash @xxxii$ The constant 32.

2 $\backslash chardef\ @xxxii=32$

$\backslash @Mi$ Constants 1001–1004.

$\backslash @Mii$ 3 $\backslash mathchardef\ @Mi=10001$

$\backslash @Miii$ 4 $\backslash mathchardef\ @Mii=10002$

$\backslash @miv$ 5 $\backslash mathchardef\ @Miii=10003$

6 $\backslash mathchardef\ @Miv=10004$

$\backslash @tempcnta$ Scratch count registers used by L^AT_EX kernel commands.

$\backslash @tempcntb$ 7 $\backslash newcount\ @tempcnta$

8 $\backslash newcount\ @tempcntb$

$\backslash if@tempswa$ General boolean switch used by L^AT_EX kernel commands.

9 $\backslash newif\ if@tempswa$

$\backslash @tempdima$ Scratch dimen registers used by L^AT_EX kernel commands.

$\backslash @tempdimb$ 10 $\backslash newdimen\ @tempdima$

$\backslash @tempdimc$ 11 $\backslash newdimen\ @tempdimb$

12 $\backslash newdimen\ @tempdimc$

$\backslash @tempboxa$ Scratch box register used by L^AT_EX kernel commands.

13 $\backslash newbox\ @tempboxa$

$\backslash @tempskipa$ Scratch skip registers used by L^AT_EX kernel commands.

$\backslash @tempskipb$ 14 $\backslash newskip\ @tempskipa$

15 $\backslash newskip\ @tempskipb$

$\backslash @temptokena$ Scratch token register used by L^AT_EX kernel commands.

16 $\backslash newtoks\ @temptokena$

$\backslash @flushglue$ Glue used for $\backslash right-$ & $\backslash leftskip = 0pt$ plus 1fil

17 $\backslash newskip\ @flushglue\ @flushglue = 0pt$ plus 1fil

18 \langle /2ekernel \rangle

File f

ltcntrl.dtx

13 Program control structure

This section defines a number of control structure macros, such as while-loops and for-loops.

```
1 \<*2kernel>
2 \message{control,}
```

```
\@whilenum TEST \do {BODY}
\@whiledim TEST \do {BODY} : These implement the loop
    while TEST do BODY od
    where TEST is a TeX \ifnum or \ifdim test, respectively.
    They are optimized for the normal case of TEST initially false.
```

```
\@whilesw SWITCH \fi {BODY} : Implements the loop
    while SWITCH do BODY od
    Optimized for normal case of SWITCH initially false.
```

```
\@for NAME := LIST \do {BODY} : Assumes that LIST expands to
A1,A2,
... ,An .
    Executes BODY n times, with NAME = Ai on the i-th
iteration.
    Optimized for the normal case of n = 1. Works for n=0.
```

```
\@tfor NAME := LIST \do {BODY}
    if, before expansion, LIST = T1 ... Tn where each Ti is a
    token or {...}, then executes BODY n times, with NAME = Ti
    on the i-th iteration. Works for n=0.
```

NOTES: 1. These macros use no \@temp sequences.
2. These macros do not work if the body contains anything that looks syntactically to TeX like an improperly balanced \if \else \fi.

```
\@whilenum TEST \do {BODY} ==
BEGIN
    if TEST
    then BODY
        \@iwhilenum{TEST \relax BODY}
    END
```

```
\@iwhilenum {TEST BODY} ==
BEGIN
    if TEST
    then BODY
        \@nextwhile = def(\@iwhilenum)
    else \@nextwhile = def(\@whilenoop)
    fi
    \@nextwhile {TEST BODY}
END
```

```
\@whilesw SWITCH \fi {BODY} ==
BEGIN
```

```

        if SWITCH
        then BODY
            \@iwhilesw {SWITCH BODY}\fi
        fi
    END

\@iwhilesw {SWITCH BODY} \fi ==
BEGIN
    if SWITCH
    then BODY
        \@nextwhile = def(\@iwhilesw)
    else \@nextwhile = def(\@whileswnoop)
    fi
    \@nextwhile {SWITCH BODY} \fi
END

\@whilenoop
\@whilenum 3 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@whilenum{#1\relax
\@iwhilenum 4 #2\relax}\fi}
5 \long\def\@whilenum#1{\ifnum #1\expandafter\@whilenum
6 \else\expandafter\@gobble\fi{#1}}

\@whiledim
\@iwhiledim 7 \long\def\@whiledim#1\do #2{\ifdim #1\relax#2\@whiledim{#1\relax#2}\fi}
8 \long\def\@whiledim#1{\ifdim #1\expandafter\@whiledim
9 \else\expandafter\@gobble\fi{#1}}

\@whileswnoop
\@whilesw 10 \long\def\@whilesw#1\fi#2{#1#2\@iwhilesw{#1#2}\fi\fi}
\@iwhilesw 11 \long\def\@iwhilesw#1\fi{#1\expandafter\@iwhilesw
12 \else\@gobbletwo\fi{#1}\fi}

\@for NAME := LIST \do {BODY} ==
BEGIN \@forloop expand(LIST),\@nil,\@nil \@@ NAME {BODY}
END

\@forloop CAR, CARCDR, CDRCDR \@@ NAME {BODY} ==
BEGIN
    NAME = CAR
    if def(NAME) = def(\@nnil)
    else BODY;
        NAME = CARCDR
        if def(NAME) = def(\@nnil)
        else BODY
            \@iforloop CDRCDR \@@ NAME \do {BODY}
        fi
    fi
END

\@iforloop CAR, CDR \@@ NAME {BODY} =
    NAME = CAR
    if def(NAME) = def(\@nnil)
    then \@nextwhile = def(\@fornoop)
    else BODY ;
        \@nextwhile = def(\@iforloop)
    fi

```

```

\@nextwhile name cdr {body}

\@tfor NAME := LIST \do {BODY}
= \@tforloop LIST \@nil \@@ NAME {BODY}

\@tforloop car cdr \@@ name {body} =
  name = car
  if def(name) = def(\@nnil)
    then \@nextwhile == \@fornoop
    else body ;
    \@nextwhile == \@forloop
  fi
  \@nextwhile name cdr {body}

\@nnil
13 \def\@nnil{\@nil}

\@empty
14 \def\@empty{}

\@fornoop
15 \long\def\@fornoop#1\@@#2#3{}

\@for
16 \long\def\@for#1:=#2\do#3{%
17   \expandafter\def\expandafter\@fortmp\expandafter{#2}%
18   \ifx\@fortmp\@empty \else
19     \expandafter\@forloop#2,\@nil,\@nil\@@#1{#3}\fi}

\@forloop
20 \long\def\@forloop#1,#2,#3\@@#4#5{\def#4{#1}\ifx #4\@nnil \else
21   #5\def#4{#2}\ifx #4\@nnil \else#5\@iforloop #3\@@#4{#5}\fi\fi}

\@iforloop
22 \long\def\@iforloop#1,#2\@@#3#4{\def#3{#1}\ifx #3\@nnil
23   \expandafter\@fornoop \else
24   #4\relax\expandafter\@iforloop\fi#2\@@#3{#4}}

\@tfor
25 \def\@tfor#1:={\@tf@r#1 }
26 \long\def\@tf@r#1#2\do#3{\def\@fortmp{#2}\ifx\@fortmp\space\else
27   \@tforloop#2\@nil\@nil\@@#1{#3}\fi}
28 \long\def\@tforloop#1#2\@@#3#4{\def#3{#1}\ifx #3\@nnil
29   \expandafter\@fornoop \else
30   #4\relax\expandafter\@tforloop\fi#2\@@#3{#4}}

\@break@tfor Break out of a \@tfor loop. This should be called inside the scope of an \if. See
\@iffileonpath for an example.
31 \long\def\@break@tfor#1\@@#2#3{\fi\fi}

\@removeelement Removes an element from a comma-separated list and puts it into a control se-
quence, called as \@removeelement{<element>}{<list>}{<cs>}.
32 \def\@removeelement#1#2#3{%
33   \def\reserved@a##1,#1,##2\reserved@a{##1,##2\reserved@b}%
34   \def\reserved@b##1,\reserved@b##2\reserved@b{%
35     \ifx,##1\@empty\else##1\fi}%
36   \edef#3{%
37     \expandafter\reserved@b\reserved@a,#2,\reserved@b,#1,\reserved@a}}

38 </2ekernel>

```

File g

lterror.dtx

14 Error handling

This section defines L^AT_EX's error commands.

The ‘2ekernel’ code ensures that a `\usepackage{autoerr}` is essentially ignored if a ‘full’ format is being used that has the error messages already in the format.

```
1 <2ekernel>\expandafter\let\csname ver@autoerr.sty\endcsname\fmtversion
2 <*2ekernel | autoload>
```

14.1 General commands

\MessageBreak This command prints a new-line inside a message, followed by a continuation line begun with `\@msg@continuation`. Normally it is defined to be `\relax`, but inside messages, it is let to `\@message@break`.

```
3 \let\MessageBreak\relax
```

\GenericInfo This takes two arguments: a continuation and a message, and sends the result to the log file.

```
4 \DeclareRobustCommand{\GenericInfo}[2]{%
5   \begingroup
6     \def\MessageBreak{^^J#1}%
7     \set@display@protect
8     \immediate\write\m@ne{#2\on@line.}%
9   \endgroup
10 }
```

\GenericWarning This takes two arguments: a continuation and a message, and sends the result to the screen.

```
11 \DeclareRobustCommand{\GenericWarning}[2]{%
12   \begingroup
13     \def\MessageBreak{^^J#1}%
14     \set@display@protect
15     \immediate\write\@unused{^^J#2\on@line.^^J}%
16   \endgroup
17 }
18 </2ekernel | autoload>
```

\GenericError This macro takes four arguments: a continuation, an error message, where to go for further information, and the help information. It displays the error message, and sets the error help (the result of typing `h` to the prompt), and does a horrible hack to turn the last context line (which by default is the only context line) into just three dots. This could be made more efficient.

```
19 <autoload>\def\GenericError{\@autoerr\GenericError}
20 <*2ekernel | def>
21 \bgroup
22 \lccode'\@=' \ %
23 \lccode'\~=' \ %
24 \lccode'\}=' \ %
25 \lccode'\{=' \ %
26 \lccode'\T=' \T%
27 \lccode'\H=' \H%
28 \catcode'\ =11\relax%
29 \lowercase{%
30 \egroup%
```

Unfortunately T_EX versions older than 3.141 have a bug which means that `^^J` does not force a linebreak in `\message` and `\errmessage` commands. So for these old T_EX's we use `\typeout` to produce the message, and then have an empty `\errmessage` command. This causes an extra line of the form

! .

To appear on the terminal, but if you do not like it, you can always upgrade your T_EX! In order for your format to use this version, you must define the macro `\@TeXversion` to be the version number, e.g., 3.14 of the underlying T_EX. See the comments in `ltdircheck.dtx`.

```
31 \dimen@ \ifx\@TeXversion\@undefined4\else\@TeXversion\fi\p@%
32 \ifdim\dimen@>3.14\p@%
```

First the 'standard case'.

```
33 \DeclareRobustCommand{\GenericError}[4]{%
34 \begingroup%
35 \immediate\write\@unused{}}%
36 \def\MessageBreak{^^J}%
37 \set@display@protect%
38 \edef%
39 %    %<-----do not delete this space!----->%
40 \@err@                                     %
41 {{#4}}%
42 \errhelp
43 %    %<-----do not delete this space!----->%
44 \@err@                                     %
45 \let
46 %    %<-----do not delete this space!----->%
47 \@err@                                     %
48 \@empty
49 \def\MessageBreak{^^J#1}%
50 \def~{\errmessage{%
51 #2.^^J^^J%
52 #3^^J%
53 Type H <return> for immediate help%
54 %    %<-----do not delete this space!----->%
55 \@err@                                     %
56 }}%
57 ~%
58 \endgroup}%
59 \else%
```

Secondly the version for old T_EX's.

```
60 \DeclareRobustCommand{\GenericError}[4]{%
61 \begingroup%
62 \immediate\write\@unused{}}%
63 \def\MessageBreak{^^J}%
64 \set@display@protect%
65 \edef%
66 %    %<-----do not delete this space!----->%
67 \@err@                                     %
68 {{#4}}%
69 \errhelp
70 %    %<-----do not delete this space!----->%
71 \@err@                                     %
72 \let
73 %    %<-----do not delete this space!----->%
74 \@err@                                     %
75 \errmessage
76 \def\MessageBreak{^^J#1}%
77 \def~{\typeout{! %
78 #2.^^J^^J%
```

```

79 #3^^J%
80 Type H <return> for immediate help.}%
81 % %<-----do not delete this space!----->%
82 \@err@ %
83 {}}%
84 ~%
85 \endgroup}%
86 \fi}%
87 </2ekernel | def>

```

<pre> \PackageError \PackageWarning \PackageWarningNoLine \PackageInfo \ClassError \ClassWarning \ClassWarningNoLine \ClassInfo </pre>	<pre> These commands are intended for use by package and class writers, to give infor- mation to authors. The syntax is: \PackageError{<package>}{<error>}{<help>} \PackageWarning{<package>}{<warning>} \PackageWarningNoLine{<package>}{<warning>} \PackageInfo{<package>}{<info>} </pre>
--	--

and similarly for classes. The `Error` commands print the `<error>` message, and present the interactive prompt; if the author types `h`, then the `<help>` information is displayed. The `Warning` commands produce a warning but do not present the interactive prompt. The `WarningNoLine` commands do the same, but don't print the input line number. The `Info` commands write the message to the `log` file. Within the messages, the command `\MessageBreak` can be used to break a line, `\protect` can be used to protect command names, and `\space` is a space, for example:

```

\newcommand{\foo}{F00}
\PackageWarning{ethel}{%
  Your hovercraft is full of eels,\MessageBreak
  and \protect\foo\space is \foo}

```

produces:

```

Package ethel warning: Your hovercraft is full of eels,
(ethel)                and \foo is F00 on input line 54.

```

```

88 <autoload>\def\PackageError{\@autoerr\PackageError}
89 <*2ekernel | def>
90 \gdef\PackageError#1#2#3{%
91   \GenericError{%
92     (#1)\@spaces\@spaces\@spaces\@spaces
93   }{%
94     Package #1 Error: #2%
95   }{%
96     See the #1 package documentation for explanation.%
97   }{#3}%
98 }
99 </2ekernel | def>
100 <*2ekernel | autoload>
101 \def\PackageWarning#1#2{%
102   \GenericWarning{%
103     (#1)\@spaces\@spaces\@spaces\@spaces
104   }{%
105     Package #1 Warning: #2%
106   }%
107 }
108 \def\PackageWarningNoLine#1#2{%
109   \PackageWarning{#1}{#2@gobble}%
110 }
111 \def\PackageInfo#1#2{%

```



```

112 \GenericInfo{%
113     (#1) \@spaces\@spaces\@spaces
114 }{%
115     Package #1 Info: #2%
116 }%
117 }
118 </2ekernel | autoload>

119 <autoload>\def\ClassError{\@autoerr\ClassError}
120 <*2ekernel | def>
121 \gdef\ClassError#1#2#3{%
122     \GenericError{%
123         (#1) \space\@spaces\@spaces\@spaces
124     }{%
125         Class #1 Error: #2%
126     }{%
127         See the #1 class documentation for explanation.%
128     }{#3}%
129 }
130 </2ekernel | def>

131 <*2ekernel | autoload>
132 \def\ClassWarning#1#2{%
133     \GenericWarning{%
134         (#1) \space\@spaces\@spaces\@spaces
135     }{%
136         Class #1 Warning: #2%
137     }%
138 }
139 \def\ClassWarningNoLine#1#2{%
140     \ClassWarning{#1}{#2\@gobble}%
141 }
142 \def\ClassInfo#1#2{%
143     \GenericInfo{%
144         (#1) \space\space\@spaces\@spaces
145     }{%
146         Class #1 Info: #2%
147     }%
148 }
149 </2ekernel | autoload>

```

\@latex@error Errors and other info, for use in the L^AT_EX core.

```

\@latex@warning 150 <autoload>\def\@latex@error{\@autoerr\@latex@error}
\@latex@warning@no@line 151 <*2ekernel | def>
\@latex@info 152 \gdef\@latex@error#1#2{%
\@latex@info@no@line 153     \GenericError{%
154         \space\space\space\@spaces\@spaces\@spaces
155     }{%
156         LaTeX Error: #1%
157     }{%
158         See the LaTeX manual or LaTeX Companion for explanation.%
159     }{#2}%
160 }
161 </2ekernel | def>

162 <*2ekernel | autoload>
163 \def\@latex@warning#1{%
164     \GenericWarning{%
165         \space\space\space\@spaces\@spaces\@spaces
166     }{%
167         LaTeX Warning: #1%
168     }%
169 }

```

```

170 \def\@latex@warning@no@line#1{%
171   \@latex@warning{#1\@gobble}}

172 \def\@latex@info#1{%
173   \GenericInfo{%
174     \@spaces\@spaces\@spaces
175   }{%
176     LaTeX Info: #1%
177   }%
178 }

```

```

179 \def\@latex@info@no@line#1{%
180   \@latex@info{#1\@gobble}}

```

`\@font@warning` and `\@font@info` are defined later since they have to be redefined by the `tracefnt` package.

```

\def\@font@warning#1{%
  \GenericWarning{%
    {(font)\@spaces\@spaces}%
    {Font Warning: #1}%
  }
\def\@font@info#1{%
  \GenericInfo{%
    (font)\space\@spaces
  }{%
    Font Info: #1%
  }%
}

```

`\c@errorcontextlines` `\errorcontextlines` as a L^AT_EX counter, so that it may be manipulated with `\setcounter` (once it is defined :-)

```

181 \let\c@errorcontextlines\errorcontextlines
182 \c@errorcontextlines=-1

```

`\on@line` The message ‘on input line *n*’, if possible.

```

183 \ifnum\inputlineno=\m@ne
184   \let\on@line\@empty
185 \else
186   \def\on@line{ on input line \the\inputlineno}
187 \fi

```

`\@warning` Older L^AT_EX messages. For the moment, these `\let` to the new message commands.
`\@@warning` They may be changed later, once only obsolete packages and classes contain them.
`\@latexerr`

```

188 \let\@warning\@latex@warning
189 \let\@@warning\@latex@warning@no@line
190 \</2ekernel | autoload>
191 \global\let\@latexerr\@latex@error

```

`\@spaces` Four spaces.

```

192 \< *2ekernel | autoload>
193 \def\@spaces{\space\space\space\space}
194 \</2ekernel | autoload>

```

14.2 Specific errors

`\@eha` The more common error help messages.

```

\@ehb 195 \< *2ekernel | def>
\@ehc 196 \gdef\@eha{%
\@ehd 197   Your command was ignored.\MessageBreak
198   Type \space I <command> <return> \space to replace it %

```

```

199 with another command,\MessageBreak
200 or \space <return> \space to continue without it.}
201 \gdef\@ehb{%
202 You've lost some text. \space \@ehc}
203 \gdef\@ehc{%
204 Try typing \space <return> %
205 \space to proceed.\MessageBreak
206 If that doesn't work, type \space X <return> \space to quit.}
207 \gdef\@ehd{%
208 You're in trouble here. \space \@ehc}
209 \</2kernel | def>

```

As `\latex@error` triggers the autoload, these definitions should not be needed in the autoload format, but just to be safe...

```

210 \< *autoload>
211 \let\@eha\@empty\let\@ehb\@empty\let\@ehc\@empty\let\@ehd\@empty
212 \< /autoload>

```

Here are most of the error message-generating commands of L^AT_EX.

\@autoerr Make this autoload command robust, as it may be read in at unpredictable times.

```

213 \< autoload>\def\@autoerr{\protect\@autoload{err}\protect}

```

\@notdefinable Error message generated in `\@ifdefinable` from calls to one of the commands `\newcommand`, `\newlength` or `\newtheorem` specifying an already-defined command name or one that begins `\end...`

```

214 \gdef\@notdefinable{%
215 \< !autoload> \latex@error{%
216 \< !autoload> Command \@backslashchar\reserved@a\space
217 \< !autoload> already defined.\MessageBreak
218 \< !autoload> Or name \@backslashchar\@qend... illegal,
219 \< !autoload> see p.192 of the manual}\@eha}
220 \< autoload> \@autoerr\@notdefinable}

```

\@nolnerr Generated by `\newline` and `\\` when called in vertical mode.

```

221 \gdef\@nolnerr{%
222 \< !autoload> \latex@error{There's no line here to end}\@eha}
223 \< autoload> \@autoerr\@nolnerr}

```

\@nocounterr Generated by `\setcounter`, `\addtocounter` or `\newcounter` if applied to an undefined counter *<cnt>*.

\@nocnterr Obsolete error message generated in L^AT_EX2.09 by `\setcounter`, `\addtocounter` or `\newcounter` for undefined counter. DO NOT use for L^AT_EX 2_ε it MIGHT vanish! Use `\@nocounterr{<cnt>}` instead.

```

224 \gdef\@nocounterr#1{%
225 \< !autoload> \latex@error{No counter '#1' defined}\@eha}
226 \< autoload> \@autoerr\@nocounterr}
227 \gdef\@nocnterr{\@nocounterr?}

```

\@ctrerr Called when trying to print the value of a counter numbered by letters that's greater than 26.

```

228 \gdef\@ctrerr{%
229 \< !autoload> \latex@error{Counter too large}\@ehb}
230 \< autoload> \@autoerr\@ctrerr}

```

\@nodocument Error produced if paragraphs are typeset in the preamble.

```

231 \< !def>\gdef\@nodocument{%
232 \< !def> \latex@error{Missing \protect\begin{document}}\@ehd}

```

`\@badend` Called by `\end` that doesn't match its `\begin`. RmS 1992/08/24: added code to `\@badend` to display position of non-matching `\begin`. FMi 1993/01/14: missing space added.

```

233 \gdef\@badend#1{%
234 \!autoload \!latex@error{\protect\begin{\@currenvir}\@currenvline
235 \!autoload \space ended by \protect\end{#1}}\@eha}
236 \!autoload \!autoerr\@badend}

```

`\@badmath` Called by `\[, \], \((` or `\)` when used in wrong mode.

```

237 \gdef\@badmath{%
238 \!autoload \!latex@error{Bad math environment delimiter}\@eha}
239 \!autoload \!autoerr\@badmath}

```

`\@toodeep` Called by a list environment nested more than six levels deep, or an `enumerate` or `itemize` nested more than four levels.

```

240 \gdef\@toodeep{%
241 \!autoload \!latex@error{Too deeply nested}\@ehd}
242 \!autoload \!autoerr\@toodeep}

```

`\@badpoptabs` Called by `\endtabbing` when not enough `\poptabs` have occurred, or by `\poptabs` when too many have occurred.

```

243 \gdef\@badpoptabs{%
244 \!autoload \!latex@error{\protect\pushtabs\space and \protect\poptabs
245 \!autoload \space don't match}\@ehd}
246 \!autoload \!autoerr\@badpoptabs}

```

`\@badtab` Called by `\>`, `\+`, `\-` or `\<` when stepping to an undefined tab.

```

247 \gdef\@badtab{%
248 \!autoload \!latex@error{Undefined tab position}\@ehd}
249 \!autoload \!autoerr\@badtab}

```

`\@preamerr` This error is special: it appears in places where we normally have to `\protect` expansions. However, to prevent a protection of the error message itself (which would result in the message getting printed not issued on the terminal) we need to locally reset `\protect` to `\relax`.

```

250 \gdef\@preamerr#1{%
251 \begingroup
252 \let\protect\relax
253 \!autoload
254 \!latex@error{\ifcase #1 Illegal character\or
255 Missing @-exp\or Missing p-arg\fi\space
256 in array arg}\@ehd
257 \!autoload
258 \!autoload \!autoerr\@preamerr{#1}%
259 \endgroup}

```

`\@badlinearg` Occurs in `\line` and `\vector` command when a bad slope argument is encountered.

```

260 \gdef\@badlinearg{%
261 \!autoload \!latex@error{%
262 \!autoload Bad \protect\line\space or \protect\vector
263 \!autoload \space argument}\@ehb}
264 \!autoload \!autoerr\@badlinearg}

```

`\@parmoderr` Occurs in a float environment or a `\marginpar` when encountered in inner vertical mode.

```

265 \gdef\@parmoderr{%
266 \!autoload \!latex@error{Not in outer par mode}\@ehb}
267 \!autoload \!autoerr\@parmoderr}

```

`\@fltovf` Occurs in float environment or `\marginpar` when there are no more free boxes for storing floats.

```

268 \gdef\@fltovf{%
269 \!autoload \!latex@error{Too many unprocessed floats}\@ehb}
270 \!autoload \!autoerr\@fltovf}

```

`\@latexbug` Occurs in output routine. This is bad news.

```

271 \gdef\@latexbug{%
272 \!autoload \!latex@error{This may be a LaTeX bug}{Call for help}}
273 \!autoload \!autoerr\@latexbug}

```

`\@badcrerr` This error was removed and replaced by `\@nolnerr`.

```

274 %\def\@badcrerr {\!latex@error{Bad use of \protect}\!@ehc}

```

`\@noitemerr` `\addvspace` or `\addpenalty` was called when not in vmode. Probably caused by a missing `\item`.

```

275 \gdef\@noitemerr{%
276 \!autoload \!latex@error{Something's wrong--perhaps a missing %
277 \!autoload \!protect\item}\!@ehc}
278 \!autoload \!autoerr\@noitemerr}

```

`\@notprerr` A command that can be used only in the preamble appears after the command `\begin{document}`.

```

279 \gdef\@notprerr{%
280 \!autoload \!latex@error{Can be used only in preamble}\!@eha}
281 \!autoload \!autoerr\@notprerr}

```

`\@inmatherr` Issued by commands that don't work correctly within math (like `\item`). There is no real error recovery happening, e.g., the user might get additional errors afterwards.

```

282 \gdef\@inmatherr#1{%
283 \relax
284 \ifmmode
285 \!autoload \!latex@error{Command \protect#1 invalid in math mode}\!@ehc
286 \!autoload \!autoerr\@inmatherr#1%
287 \fi}

```

`\@invalidchar` An error for use with invalid characters. This is commented out, since we decided to use chatcode 15 instead.

```

288 %\def\@invalidchar{\!latex@error{Invalid character in input}\!@ehc}

```

As well as the above error commands some error messages are directly coded to save space. The Messages already present in L^AT_EX2.09 included:

Environment --- undefined

Issued by `\begin` for undefined environment.

tab overflow

Occurs in `\=` when maximum number of tabs exceeded.

\< in mid line

Occurs in `\<` when it appears in middle of line.

Float(s) lost

In output routine, caused by a float environment or `\marginpar` occurring in inner vertical mode.

File h

ltpar.dtx

15 Paragraphs

This section of the kernel declares the commands used to set `\par` and `\everypar` when ever their function needs to be changed for a long time.

15.1 Implementation

There are two situations in which `\par` may be changed:

- Long-term changes, in which the new value is to remain in effect until the current environment is left. The environments that change `\par` in this way are the following:
 - All list environments (itemize, quote, etc.)
 - Environments that turn `\par` into a noop: tabbing, array and tabular.
- Temporary changes, in which `\par` is restored to its previous value the next time it is executed. The following are all such uses.
 - `\end` when preceded by `\@endparenv`, which is called by `\endtrivlist`
 - The mechanism for avoiding page breaks and getting the spacing right after section heads.

`\@setpar` To permit the proper interaction of these two situations, long-term changes are made by the `\@setpar{<VAL>}` command. It's function is:

To set `\par`. It `\def`'s `\par` and `\@par` to `<VAL>`.

`\@restorepar` Short-term changes are made by the usual `\def\par` commands. The original values are restored after a short-term change by the `\@restorepar` commands.

`\@@par` `\@@par` always is defined to be the original T_EX `\par`.

`\everypar` `\everypar` is changed only for the short term. Whenever `\everypar` is set non-null, it should restore itself to null when executed.

The following commands change `\everypar` in this way:

- `\item`
- `\end` when preceded by `\@endparenv`, which is called by `endtrivlist`
- `\minipage`

When dealing with `\par` and `\everypar` remember the following two warnings:

1. Commands that make short-term changes to `\par` and `\everypar` must take account of the possibility that the new commands and the ones that do the restoration may be executed inside a group. In particular, `\everypar` is executed inside a group whenever a new paragraph begins with a left brace. The `\everypar` command that restores its definition should be local to the current group (in case the command is inside a minipage used inside someplace where `\everypar` has been redefined). Thus, if `\everypar` is redefined to do an `\everypar{}` it could take several executions of `\everypar` before the restoration “holds”. This usually causes no problem. However, to prevent the extra executions from doing harm, use a global switch to keep anything harmful in the new `\everypar` from being done twice.
2. Commands that change `\everypar` should remember that `\everypar` might be supposed to set the following switches false:

- @nobreak
- @minipage

they should do the setting if necessary.

```
1 \<*2ekernel>
2 \message{par,}
```

`\@setpar` Initiate a long-term change to `\par`.

```
\@par 3 \def\@setpar#1{\def\par{#1}\def\@par{#1}}
```

The default definition of `\@par` will ensure that if `\@restorepar` defines `\par` to execute `\@par` it will redefine itself to the primitive `\@@par` after one iteration.

```
4 \def\@par{\let\par\@par\par}
5 \</2ekernel>
```

`\@restorepar` Restore from a short-term change to `\par`.

```
6 \def\@restorepar{\def\par{\@par}}
```

File i

ltspace.dtx

16 Spacing

This section deals with spacing, and line- and page-breaking.

16.1 User Commands

```

\NOPAGEBREAK [\langle i \rangle] : \langle i \rangle = 0,...,4.
    Default argument = 4. Puts a penalty into the vertical list output as follows:
0 : penalty = 0
1 : penalty = \@lowpenalty
2 : penalty = \@medpenalty
3 : penalty = \@highpenalty
4 : penalty = 10000
\PAGEBREAK [\langle i \rangle] : same as except negatives of its penalty
\LINEBREAK [\langle i \rangle] : analog of the above
\NOLINEBREAK [\langle i \rangle] : analog of the above
\SAMEPAGE : inhibits page breaking most places by setting the following penalties to 10000:
\interlinepenalty
\postdisplaypenalty
\interdisplaylinepenalty
\@beginparpenalty
\@endparpenalty
\@itempenalty
\@secpenalty
\interfootnotelinepenalty
\\ : initially defined to be \newline
\\[\langle length \rangle] : initially defined to be \vspace{\langle length \rangle}\newline
Note: \\* adds a \vadjust{\penalty 10000}
    OBSOLETE COMMANDS (which never made it into the manual):
    \obeycr : defines \CR_i == \\relax
    \restorecr : restores \CR_i to its usual meaning.

```

16.2 Chris' comments

There are several aspects of the handling of space in horizontal mode that are inconsistent or do not work well in some cases. These are largely concerned with ignoring the effect of space tokens that would otherwise typeset an inter-word space.

Negating the effect of such space tokens is achieved by two mechanisms:

- `\unskip` is used to remove the glue just added by a space that has already had its effect; it is sometimes invoked after an `\ifdim` test on `\lastskip` (see below);
- `\ignorespaces` is used to ignore space-tokens yet to come.

The test done on `\lastskip` is sometimes for equality with zero and sometimes for being positive. Recall also that the test is only on the natural length of the glue and that no glue cannot be distinguished from glue whose natural length is zero: to summarise, a pretty awful test. It is not clear why these tests are not all the same; I think that they should all be for equality. One place where `\unskip` is often used is just before a `\par` (which itself internally does an `\unskip`) and one bit of code (in `\@item`) even has two `\unskips` before a `\par`. These uses may be fossil code but if they are necessary, maybe `\@killglue` would be even safer.

Such removal of glue by `\unskip` may sometimes have the wrong result, removing not the glue from a space-token but other explicit glue; this is sometimes not what is intended.

A common way to prevent such removal is to add an `\hskip\z@` after the glue that should not be removed. This protects that glue against one `\unskip` with no test but not against more than one. It does work for ‘tested `\unskips`’. This is used by `\hspace*` but not by `\hspace`; this is inconsistent as the star is supposed to prevent removal only at the beginning of a line, not at the end, or in a tabular, etc.

If this reason for removing glue were the only consideration then a tested-`\unskip` and protection by `\hskip\z@` would suffice but would need to be consistently implemented.

However, the class of invisibles, commands and environments tries to be even cleverer: one of these tries to leave only one inter-word space whenever there is one before it and one after it; and it does this quite well.

But problems can arise when there is not a space-token on both sides of it; in particular, when an invisible appears at the beginning or end of a piece of text the method still leaves one space token whereas usually in these cases it should leave none.

Also, the current rules do not work well when more than one such command appears consecutively, separated by space-tokens; it leaves glue between every other invisible.

There is also a question about what these commands should do when they occur next to spaces that do not come from space tokens but, for example, from `\hspace`. Should they still produce ‘just one space’? If so, which one? It is good to note that the manual is sufficiently cautious about invisibles that we are not obliged to make anything work.

Another interesting side-road to explore is whether the space-tokens either side of an `\hspace{...}` should be ignored.

One alternative to the current algorithm that is often suggested is that all glue around the invisible should be consolidated into a space after it (usually without stating how much glue should be put there). The command `\nolinebreak` is implemented this way (and `\linebreak` should also be). This does not work correctly for the following common case:

```
... some text
\index{some-word}
some-word and more text.
```

This is optimal coding since it is normal to index a word that gets split across a page-break on its starting page. This would, on the other hand, fix another common (and documented) failure of the current system: when the invisible is the last thing in a paragraph the space before it is not removed and, worse, it is also hidden from the paragraph-ending mechanism so that an ‘empty’ line can be created at the end of the paragraph.

Another deficiency (I think) of the current system is that the following is treated as having the `\index` command between the paragraphs, which is probably not what the author intended (since there is no empty line after it).

```
\index{beginnings}
Beginnings of paragraphs ...
```

I know of no algorithm that will handle satisfactorily even all the most common cases; note that it could be that the best algorithm may be different for different invisibles since, for example, the common uses and expected behaviour of `\index`, `\marginpar`, `\linebreak`, `\pagebreak` and `\vspace` are somewhat different. [For example, is `\vspace` ever used in the middle of a paragraph?]

One method that can (and is) used to make invisible commands produce no space when used at the beginning of text is to put in some glue that is nearly enough the same as no glue or glue of zero length in all respects except for the precise test for not being exactly equal to zero; examples of such glue are `\hskip 1sp` and, possibly better but more complex, `\hskip -1sp \hskip 1sp`. However, this only works when it is known that user-supplied text is about to start.

Some similar concerns apply to the handling of space and penalties in vertical mode; there is an extra hurdle here as `\unskip` does not work on the main vertical list. The complexity of the tests done by `\addvspace` have never been explained.

The implementation of space hacks etc for vertical mode is another major area that needs further attention; my earlier experiments did not produce much improvement over the current unsatisfactory situation.

One particular problem is what happens when the following very natural coding is used (part of the problem here is that this looks like an hmode problem, but it is not):

```
... end of text.

\begin{enumerate}
  \item \label{item:xxx} Item text.
\end{enumerate}
```

16.3 Some immediate actions

- Fix bug in `\linebreak`.
- Fix bug in `*`.
- Reimplement `\\`, etc, removing extra `\vadjusts` and getting better error trapping (this seems to involve a lot more tokens).
- Investigate whether `\\`, etc need to be errors in vmode; I think that they could be noops (maybe with a warning).
- Make all(?) `\unskips` include test for zero skip (rather than other tests or no test).
- Consider replacing `\hskip 1sp` by something better (here called an ‘infinitesimal’ skip).
- Look at all `\hskip\z@` (or similar) to see if they should be changed to an ‘infinitesimal’ skip.
- Resolve the inconsistency between `\hspace` and `\hspace*`.
- Remove unnecessary `\unskips`.
- Investigate and rationalise the ‘newline’ code.
- Find better algorithms for all sorts of things or, easier(?), fix `TEX` itself.

16.4 The code

```
1 \<*2kernel>
2 \message{spacing,}

\pagebreak
\nopagebreak 3 \def\pagebreak{\@testopt{\@no@pgbk-}4}
4 \def\nopagebreak{\@testopt{\@no@pgbk4}}
```

```

\@no@pgbk
5 \def\@no@pgbk #1[#2]{%
6   \ifvmode
7     \penalty #1\@getpen{#2}%
8   \else
9     \@bsphack
10    \vadjust{\penalty #1\@getpen{#2}}%
11    \@esphack
12  \fi}

\linebreak
\nolinebreak 13 \def\linebreak{\@testopt{\@no@lnbk-}4}
14 \def\nolinebreak{\@testopt\@no@lnbk4}

\@no@lnbk
15 \def\@no@lnbk #1[#2]{%
16   \ifvmode
17     \@nolnerr
18   \else
19     \@tempskipa\lastskip
20     \unskip
21     \penalty #1\@getpen{#2}%
22     \ifdim\@tempskipa>z@
23       \hskip\@tempskipa
24       \ignorespaces
25     \fi
26   \fi}

\samepage
27 \def\samepage{\interlinepenalty\@M
28   \postdisplaypenalty\@M
29   \interdisplaylinepenalty\@M
30   \@beginparpenalty\@M
31   \@endparpenalty\@M
32   \@itempenalty\@M
33   \@secpenalty\@M
34   \interfootnotelinepenalty\@M}

```

\\ The purpose of the new code is to fix a few bugs; however, it also attempts to optimize the following, in order of priority:

1. efficient execution of plain \\;
2. efficient execution of \\[...];
3. memory use;
4. name-space use.

The changes should make no difference to the typeset output. It appears to be safe to use `\reserved@e` and `\reserved@f` here (other reserved macros are somewhat disastrous).

These changes made `\newline` even less robust than it had been, so now it is explicitly robust, like \\.

```

\@normalcr The internal definition of the ‘normal’ definition of \\.
35 \DeclareRobustCommand\\{%
36   \let \reserved@e \relax
37   \let \reserved@f \relax
38   \@ifstar{\let \reserved@e \vadjust \let \reserved@f \nobreak
39     \xnewline}%
40     \xnewline}
41 \expandafter\let\expandafter\@normalcr
42   \csname\expandafter\@gobble\string\\ \endcsname

```

`\newline` A simple form of the ‘normal’ definition of `\\`.

```
43 \DeclareRobustCommand\newline{\@normalcr\relax}
```

`\@xnewline`

```
44 \def\@xnewline{\@ifnextchar[% ] bracket matching
45             \newline
46             {\@gnewline\relax}}
```

`\@newline`

```
47 \def\@newline[#1]{\let \reserved@e \vadjust
48             \@gnewline {\vskip #1}}
```

`\@gnewline` The `\nobreak` added to prevent null lines when `\\` ends an overfull line. Change made 24 May 89 as suggested by Frank Mittelbach and Rainer Schöpf

```
49 \def\@gnewline #1{%
50     \ifvmode
51         \@nolnerr
52     \else
53         \unskip \reserved@e {\reserved@f#1}\nobreak \hfil \break
54     \fi}
```

`\@getpen`

```
55 \def\@getpen#1{\ifcase #1 \z@ \or \@lowpenalty\or
56     \@medpenalty \or \@highpenalty
57     \else \@M \fi}
```

`\if@nobreak` Switch used to avoid page breaks caused by `\label` after a section heading, etc. It should be **GLOBALLY** set true after the `\nobreak` and **globally** set false by the next invocation of `\everypar`.

Commands that reset `\everypar` should globally set it false if appropriate.

```
58 \def\@nobreakfalse{\global\let\if@nobreak\iffalse}
59 \def\@nobreaktrue {\global\let\if@nobreak\iftrue}
60 \@nobreakfalse
```

`\@savsk` Registers used to save the space factor and last skip.

`\@savsf`

```
61 \newdimen\@savsk
62 \newcount\@savsf
```

`\@bsphack` `\@bsphack` and `\@esphack` used by macros such as `\index` and `\begin{@float}` ... `\end{@float}` that want to be invisible — i.e., not leave any extra space when used in the middle of text. Such a macro should begin with `\@bsphack` and end with `\@esphack` The macro in question should not create any text, nor change the mode.

Before giving the current definition we give an extended definition that is currently not used (because it doesn't work as advertised:-)

These are generalised hacks which attempt to do sensible things when ‘invisible commands’ appear in vmode too.

They need to cope with space in both hmode (plus spacefactor) and vmode, and also cope with breaks etc. In vmode this means ensuring that any following `\addvspace`, etc sees the correct glue in `\lastskip`.

In fact, these improved versions should be used for other cases of ‘whatsits, thingies etc’ which should be invisible. They are only for commands, not environments (see notes on `\@Esphack`).

BTW, anyone know why the standard hacks are surrounded by `\ifmmode\else` rather than simply `\ifhmode`?

And are there any cases where saving the spacefactor is essential? I have some extensions where it is, but it does not appear to be so in the standard uses.

```
\def \@bsphack{%
```

```

\relax \ifvmode
  \@savsk \lastskip
  \ifdim \lastskip=\z@
  \else
    \vskip -\lastskip
  \fi
\else
  \ifhmode
    \@savsk \lastskip
    \@savsf \spacefactor
  \fi
\fi
}

```

I think that, in vmode, it is the safest to put in a `\nobreak` immediately after such things since writes, inserts etc followed by glue give valid breakpoints and, in general, it is possible to create breaks but impossible to destroy them.

```

\def \@esphack{%
  \relax \ifvmode
    \nobreak
    \ifdim \@savsk=\z@
    \else
      \vskip \@savsk
    \fi
  \else
    \ifhmode
      \spacefactor \@savsf
      \ifdim \@savsk>\z@
        \ignorespaces
      \fi
    \fi
  \fi
}

```

For the moment we are going to ignore the vertical versions until they are correct.

```

63 \def \@bsphack{%
64   \relax
65   \ifhmode
66     \@savsk \lastskip
67     \@savsf \spacefactor
68   \fi}

```

`\@esphack` Companion to `\@bsphack`.

```

69 \def \@esphack{%
70   \relax
71   \ifhmode
72     \spacefactor \@savsf
73     \ifdim \@savsk>\z@
74       \ignorespaces
75     \fi
76   \fi}

```

`\@Esphack` A variant of `\@esphack` that sets the `@ignore` switch to true (as `\@esphack` used to do previously). This is currently used only for floats and similar environments.

```

77 \def \@Esphack{%
78   \relax
79   \ifhmode
80     \spacefactor \@savsf
81     \ifdim \@savsk>\z@
82       \@ignoretrue

```

```

83     \ignorespaces
84     \fi
85     \fi}

```

`\@vbsphack` Another variant which is useful for invisible things which should not live in vmode (this is how some people feel about marginals).

If it occurs in vmode then it enters hmode and ensures that `\@savsk` is nonzero so that the `\ignorespaces` is put in later. It is not used at present.

```

\def \@vbsphack{ %
  \relax \ifvmode
    \leavevmode
    \@savsk 1sp
    \@savsf \spacefactor
  \else
    \ifhmode
      \@savsk \lastskip
      \@savsf \spacefactor
    \fi
  \fi
}

```

16.5 Vertical spacing

L^AT_EX supports the plain T_EX commands `\smallskip`, `\medskip` and `\bigskip`. However, it redefines them using `\vspace` instead of `\vskip`.

Extra vertical space is added by the command `\addvspace{⟨skip⟩}`, which adds a vertical skip of `⟨skip⟩` to the document. The sequence `\addvspace{⟨s1⟩} \addvspace{⟨s2⟩}` is equivalent to `\addvspace{⟨maximum of s1, s2⟩}`.

`\addvspace` should be used only in vertical mode, and gives an error if it's not. The `\addvspace` command does *not* add vertical space if `@minipage` is true. The minipage environment uses this to inhibit the addition of extra vertical space at the beginning.

Penalties are put into the vertical list with the `\addpenalty{⟨penalty⟩}` command. It works properly when `\addpenalty` and `\addvspace` commands are mixed.

The `@nobreak` switch is set true used when in vertical mode and no page break should occur. (Right now, it is used only by the section heading commands to inhibit page breaking after a heading.)

```

\addvspace{SKIP} ==
BEGIN
  if vmode
    then if @minipage
      else if \lastskip =0
        then \vskip SKIP
      else if \lastskip < SKIP
        then \vskip -\lastskip
          \vskip SKIP
        else if SKIP < 0 and \lastskip >= 0
          then \vskip -\lastskip
            \vskip \lastskip + SKIP
          fi
        fi
      fi
    else useful error message (CAR).
  fi
END

```

`\@xaddvskip` Internal macro for `\vspace` handling the case that space has previously been added.

```

86 \def \@xaddvskip{%

```

```

87 \ifdim\lastskip<\@tempskipb
88 \vskip-\lastskip
89 \vskip\@tempskipb
90 \else
91 \ifdim\@tempskipb<\z@
92 \ifdim\lastskip<\z@
93 \else
94 \advance\@tempskipb\lastskip
95 \vskip-\lastskip
96 \vskip \@tempskipb
97 \fi
98 \fi
99 \fi}

```

`\addvspace` Add vertical space taking into account space already added, as described above.

```

100 \def\addvspace#1{%
101 \ifvmode
102 \if@minipage\else
103 \ifdim \lastskip =\z@
104 \vskip #1\relax
105 \else
106 \@tempskipb#1\relax
107 \xaddvskip
108 \fi
109 \fi
110 \else
111 \@noitemerr
112 \fi}

```

`\addpenalty`

```

113 \def\addpenalty#1{%
114 \ifvmode
115 \if@minipage
116 \else
117 \if@nobreak
118 \else
119 \ifdim\lastskip=\z@
120 \penalty#1\relax
121 \else
122 \@tempskipb\lastskip
123 \vskip -\lastskip
124 \penalty#1%
125 \vskip\@tempskipb
126 \fi
127 \fi
128 \fi
129 \else
130 \@noitemerr
131 \fi}

```

`\vspace` The new code for these commands depends on the following facts:

`\@vspace`
`\@vspacer`

- The value of `prevdepth` is changed only when a box or rule is created and added to a vertical list;
- The value of `prevdepth` is used only when a box is created and added to a vertical list;
- The value of `prevdepth` is always local to the building of one vertical list.

```

132 \DeclareRobustCommand\vspace{\@ifstar\@vspacer\@vspace}
133 \def\@vspace #1{%
134 \ifvmode

```

```

135 \vskip #1
136 \vskip\z@skip
137 \else
138 \@bsphack
139 \vadjust{\@restorepar
140 \vskip #1
141 \vskip\z@skip
142 }%
143 \@esphack
144 \fi}

145 \def\@vspacer#1{%
146 \ifvmode
147 \dimen@\prevdepth
148 \hrule \@height\z@
149 \nobreak
150 \vskip #1
151 \vskip\z@skip
152 \prevdepth\dimen@
153 \else
154 \@bsphack
155 \vadjust{\@restorepar
156 \hrule \@height\z@
157 \nobreak
158 \vskip #1
159 \vskip\z@skip}%
160 \@esphack
161 \fi}

```

\smallskip

\medskip 162 \def\smallskip{\vspace\smallskipamount}

\bigskip 163 \def\medskip{\vspace\medskipamount}

164 \def\bigskip{\vspace\bigskipamount}

\smallskipamount

\medskipamount 165 \newskip\smallskipamount \smallskipamount=3pt plus 1pt minus 1pt

\bigskipamount 166 \newskip\medskipamount \medskipamount =6pt plus 2pt minus 2pt

167 \newskip\bigskipamount \bigskipamount =12pt plus 4pt minus 4pt

16.6 Horizontal space (and breaks)

\nobreakdashes This idea is borrowed from the amsmath package but here we define a robust command.

This command is a low-level command designed for use only before hyphens or dashes (such as -, --, or ---).

It could probably be better implemented: it may need its own private token register and temporary command.

Setting the hyphen in a box and then unboxing it means that the normal penalty will not be added after it—and if the penalty is not there a break will not be taken (unless an explicit penalty or glue follows, thus the final \nobreak).

Note that even if it is not followed by a '-', it still leaves vmode and sets the spacefactor; so use it carefully!

```

168 \DeclareRobustCommand{\nobreakdashes}{%
169 \leavevmode
170 \toks@{}%
171 \def\reserved@a##1{\toks@\expandafter{\the\toks@-}%
172 \futurelet\@let@token \reserved@b}%
173 \def\reserved@b {\ifx\@let@token -%
174 \expandafter\reserved@a
175 \else
176 \setbox\z@ \hbox{\the\toks@\nobreak}%

```



```

177             \unhbox\z@
178             \spacefactor\sfcode'\-
179             \fi}%
180 \futurelet\@let@token \reserved@b
181 }

\nobreakspace This is a robust command that produces a horizontal space at which, in paragraph-
\@xobeysp mode, a line-break is not possible. We then define an active ~ to expand to it since
this is the documented behaviour of ~. One reason for introducing this is that some
8-bit input encodings have a slot for such a space and we do not want to use active
characters as the LATEX internal commands.

The braces in the definition of ~ are needed to ensure that a following space is
preserved when reading to/from internal files.

We need to keep \@xobeysp as it is widely used; so here it is let to the non-
robust command \nobreakspace .

182 \DeclareRobustCommand{\nobreakspace}{%
183   \leavevmode\nobreak\ }
184 \catcode '\~=13
185 \def~{\nobreakspace{}}
186 \expandafter\let\expandafter\@xobeysp\csname nobreakspace \endcsname

\, Used in paragraph mode produces a \thinspace. It has the ordinary definition
in math mode. Useful for quotes inside quotes, as in ‘\, ‘Foo’, he said.’’
187 \DeclareRobustCommand{\,}{%
188   \relax\ifmmode\mskip\thinmuskip\else\thinspace\fi
189 }

\@ Placed before a ‘.’, makes it a sentence-ending period. Does the right thing for
other punctuation marks as well. Does this by setting spacefactor to 1000.
190 \def\@{\spacefactor\@m}

\hspace
191 \DeclareRobustCommand\hspace{\@ifstar\@hspacer\@hspace}

\@hspace
192 \def\@hspace#1{\hskip #1\relax}

\@hspacer extra \hskip 0pt added 1985/17/12 to guard against a following \unskip \relax
added 13 Oct 88 for usual TEX lossage replaced both changes by \hskip\z@skip
27 Nov 91
193 \def\@hspacer#1{\vrule \@width\z@\nobreak
194   \hskip #1\hskip \z@skip}

\fill
195 \newskip\fill
196 \fill = 0pt plus 1fill

\stretch
197 \def\stretch#1{\z@ \@plus #1fill\relax}

\thinspace
\negthinspace 198 \def\thinspace{\kern .16667em }
\enspace 199 \def\negthinspace{\kern-.16667em }
200 \def\enspace{\kern.5em }

\enskip
\quad 201 \def\enskip{\hskip.5em\relax}
\qqquad 202 \def\quad{\hskip1em\relax}
203 \def\qqquad{\hskip2em\relax}

```

```

\obeycr   The following definitions will probably get deleted or moved to compatibility mode
\restorecr soon.

204 {\catcode'\^^M=13 \gdef\obeycr{\catcode'\^^M13 \def^^M{\\relax}%
205      \@gobblecr}%
206 {\catcode'\^^M=13 \gdef\@gobblecr{\@ifnextchar
207  \@gobble\ignorespaces}}
208 \gdef\restorecr{\catcode'\^^M5 }}

209 </2kernel>

```

File j

ltlogos.dtx

17 Logos

Various logos are defined here.

```
\TeX The TEX logo, adjusted so that a full stop after the logo counts as ending a
sentence.
1 <*2ekernel>
2 \def\TeX{T\kern-.1667em\lower.5ex\hbox{E}\kern-.125emX\@}

\LaTeX The LATEX logo.
3 \DeclareRobustCommand{\LaTeX}{L\kern-.36em%
4     {\sbox\z@ T%
5     \vbox to\ht\z@{\hbox{\check@mathfonts
6         \fontsize\sf@size\z@
7         \math@fontsfalse\selectfont
8         A}%
9         \vss}%
10    }%
11    \kern-.15em%
12    \TeX}

\LaTeXe The LATEX 2ε logo as proposed by A-W designers.
13 \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
14     \if b\expandafter\@car\@fseries\@nil\boldmath\fi
15     \LaTeX\kern.15em2$_{\textstyle\varepsilon}$}}
16 </2ekernel>
```

File k

ltfiles.dtx

18 File Handling

The following user commands are defined in this part:

<code>\document</code>	(ie <code>\begin{document}</code>)
<code>\nofiles</code>	Reads in the .AUX files and <code>\catcode</code> 's @ to 12.
<code>\includeonly</code>	Suppresses all file output by setting <code>\@filesw</code> false. <code>{\NAME1, ... ,NAMEn}</code> Causes only parts NAME1, ... ,NAMEn to be read by their <code>\include</code> commands. Works by setting <code>partsw</code> true and setting <code>\@partlist</code> to NAME1, ... ,NAMEn.
<code>\include</code>	<code>{\NAME}</code> Does an <code>\input</code> NAME unless <code>\@partsw</code> is true and NAME is not in <code>\@partlist</code> . If <code>\@filesw</code> is true, then it directs .AUX output to NAME.AUX, including a checkpoint at the end.
<code>\input</code>	<code>{\NAME}</code> The same as TeX's <code>\input</code> , except it allows optional braces around the file name. In $\text{\LaTeX 2}_{\epsilon}$, it also avoids the primitive 'missing file' error, if the file can not be found.
<code>\IfFileExists</code>	<code>{\NAME}{\then}{\else}</code> If the file exists on the system, execute <i>then</i> otherwise execute <i>else</i> .
<code>\InputIfFileExists</code>	<code>{\NAME}{\then}{\else}</code> If the file exists on the system, execute <i>then</i> and input NAME otherwise execute <i>else</i> .

```
1 (*2ekernel | autoload)
2 \message{files,}
```

VARIABLES, SWITCHES AND INTERNAL COMMANDS:

```
\@mainaux      : Output file number for main .AUX file.
\@partaux      : Output file number for current part's .AUX file.
\@auxout       : Either \@mainout or \@partout, depending on
                 which .AUX file output goes to.
\@input{foo}   : If file foo exists, then \input's it,
                 otherwise types a warning message.
@filesw        : Switch – set false if no .AUX, .TOC, .IDX etc
                 files are to be written
@partsw        : Set true by a \includeonly command.
\@partlist     : Set to the argument of the \includeonly command.

\cp@FOO        : The checkpoint for \include'd file FOO.TEX, written
                 by \@writeckpt at the end of file FOO.AUX
```

```
\includeonly{FILELIST} ==
BEGIN
  \@partsw := T
  \@partlist := FILELIST
END
```

```
\include{FILE} ==
BEGIN
  \clearpage
  if \@filesw = T
```

```

        then \immediate\write\@mainaux{\string\@input{FILE.AUX}}
      fi
    if \@partsw = T
      then \@tempswa := F
        \reserved@b == FILE
        for \reserved@a := \@partlist
          do if eval(\reserved@a) = eval(\reserved@b)
            then \@tempswa := T          fi
          od
        fi
      fi

    if \@tempswa = T
      then \@auxout := \@partaux
        if \@filesw = T
          then \immediate\openout\@partaux{FILE.AUX}
            \immediate\write\@partaux{\relax}
          fi
          \@input{FILE.TEX}
          \clearpage
          \@writeckpt{FILE}
          if @filesw then \closeout \@partaux fi
          \@auxout := \@mainaux
        else \cp@FILE
        fi
      END

    \@writeckpt{FILE} ==
    BEGIN
      if \@filesw = T
        \immediate\write on file \@partaux:
          \@setckpt{FILE}{                %% }
        for \reserved@a := \cl@ckpt
          do \immediate\write on file \@partaux:
            \global\string\setcounter

{eval(\reserved@a)}{eval(\c@eval(\reserved@a))}
          od
          \immediate\write on file \@partaux:  }
        fi
      END

    \@setckpt{FILE}{LIST} ==
    BEGIN
      G \cp@FILE := LIST
    END

    INITIALIZATION
      \@tempswa := T

\@inputcheck Allocate read stream for testing and output stream.
  \@unused 3 \newread\@inputcheck
            4 \newwrite\@unused

\@mainaux
\@partaux 5 \newwrite\@mainaux
           6 \newwrite\@partaux

```

```

\if@filesw
\if@partsw 7 \newif\if@filesw \@fileswtrue
            8 \newif\if@partsw \@partswfalse

\clubpenalty This stores the current normal (non-infinite) value of \clubpenalty; it should
              therefore be reset whenever the normal value is changed (as in the bibliography
              in the standard styles).
              9 \newcount\@clubpenalty
              10 \@clubpenalty \clubpenalty

\document Cancel the \begingroup from \begin
          11 \def\document{\endgroup
          If some options on \documentclass haven't been used by any package we will now
          give a warning since this is most certainly a misspelling.
          12 \ifx\@unusedoptionlist\@empty\else
          13   \latex@warning@no@line{Unused global option(s):^^J%
          14     \spaces[\@unusedoptionlist]]}%
          15 \fi
          16 \@colht\textheight
          17 \@colroom\textheight \vsize\textheight
          18 \@columnwidth\textwidth
          19 \@clubpenalty\clubpenalty
          20 \if@twocolumn
          21   \advance\columnwidth -\columnsep
          22   \divide\columnwidth\tw@ \hsize\columnwidth \@firstcolumntrue
          23 \fi
          24 \hsize\columnwidth \linewidth\hsize
          25 \begingroup\@floatplacement\@dblfloatplacement
          26   \makeatletter\let\@writefile\@gobbletwo

          27   \global \let \@multiplelabels \relax
          28   \input{\jobname.aux}%
          29 \endgroup
          30 \if@filesw
          31   \immediate\openout\@mainaux\jobname.aux
          32   \immediate\write\@mainaux{\relax}%
          33 \fi

          Dateline 1991/03/26: FMi added \process@table to support NFSS; This will
          also work with old lfonts if no other style defines \process@table. The following
          line forces the initialization of the math fonts.

          34 \process@table
          35 \let\glb@currsizel\@empty %% Force math initialization.

          36 \normalsize
          37 \everypar{}%

          So that punctuation in headings is not disturbed by verbatim or other local
          changes to the space factor codes, save the document default here. This will be
          locally reset by the output routine. For special cases a class may want to define
          \normalsfcodes directly, in case that definition will be used. (This is an old bug,
          problem existed in LATEX 2.0x and plain TEX.)

          38 \ifx\normalsfcodes\@empty
          39   \ifnum\sffcode'\.=\@m
          40     \let\normalsfcodes\frenchspacing
          41   \else
          42     \let\normalsfcodes\nonfrenchspacing
          43   \fi
          44 \fi

```

Way back in 1991 (08/26) FMi & RmS set the `\@noskipsec` switch to true in the preamble and to false here. This was done to trap lists and related text in the preamble but it does not catch everything; hence Change 1.1g was introduced.

```
45 \noskipsecfalse

46 \let \@refundefined \relax
```

Just before disabling the preamble commands we execute the begin document hook which contains any code contributed by `\AtBeginDocument`. Also disable the gathering of the file list, if no `\listfiles` has been issued. `\AtBeginDocument` is redefined at this point so that and such commands that get into the hook do not chase their tail...

```
47 \let\AtBeginDocument\@firstofone
48 \@begindocumenthook
```

Most of the following assignments will be done globally in case the user adds something like `\begin{multicols}` to the document hook, i.e. starts are group in `\begin{document}`.

Since a value of exactly 0pt for `\topskip` causes `\twocolumn` to misbehave, we add this check, hoping that it will not cause any problems elsewhere.

```
49 \ifdim\topskip<1sp\global\topskip 1sp\relax\fi
50 \global\@maxdepth\maxdepth
51 \global\let\@begindocumenthook\@undefined
52 \ifx\@listfiles\@undefined
53   \global\let\@filelist\relax
54   \global\let\@addtofilelist\@gobble
55 \fi
```

At the very end we disable all preamble commands. This has to happen after the begin document hooks was executed so that this hook can still use such commands.

```
56 \gdef\do##1{\global\let ##1\@notprerr}%
57 \@preamblecmds
```

The next line saves tokens and also allows `\@nodocument` to be used directly to trap preamble errors.

```
58 \global\let \@nodocument \relax
```

The next line is a pure safety measure in case a do list is ever expanded at the wrong place. In addition it will save a few tokens to get rid of the above definition.

```
59 \global\let\do\noexpand
```

Use of `\AtBeginDocument` hook might mean that we are already in horizontal mode, so ignore the space after `\begin{document}`.

```
60 \ignorespaces}
61 \@onlypreamble\document
```

`\normalsfcodes` The setting of `\@empty` is just a flag. This command may be defined in a class or package file. If it is still `\@empty` at `\begin{document}` it will be defined to be `\frenchspacing` or `\nonfrenchspacing`, depending on which of those appears to be in effect at that point.

```
62 \let\normalsfcodes\@empty
```

`\nofiles` Set `\@filesfalse` which suppresses the places where L^AT_EX makes `\immediate` writes. The `\makeindex` and `\makeglossary` are disabled. `\protected@write` is redefined not to write to the file specified, but rather to write a blank line to the log file. This ensures that a *⟨whatsit⟩* node is still created, and so spacing is not affected by the `\nofiles` command; to ensure this more generally, the `\if@nobreak` test is needed.

```
63 \def\nofiles{%
64   \@filesfalse
65   \typeout{No auxiliary output files.^^J}%
```

```

66 \long\def\protected@write##1##2##3%
67   {\write\m@ne{}\if@nobreak\ifvmode\nobreak\fi\fi}%
68 \let\makeindex\relax
69 \let\makeglossary\relax}
70 \@onlypreamble\nofiles

```

`\protected@write` This takes three arguments: an output stream, some initialization code, and some text to write. It then writes this, with appropriate handling of `\protect` and `\thepage`.

```

71 \long\def \protected@write#1#2#3{%
72   \begingroup
73   \let\thepage\relax
74   #2%
75   \let\protect\@unexpandable@protect
76   \edef\reserved@a{\write#1{#3}}%
77   \reserved@a
78   \endgroup
79   \if@nobreak\ifvmode\nobreak\fi\fi
80 }

81 \let\@auxout=\@mainaux

```

`\includeonly`

```

82 \def\includeonly#1{%
83   \@partswtrue
84   \edef\@partlist{\zap@space#1 \@empty}}
85 \@onlypreamble\includeonly

```

`\include` In the definition of `\include`, `\def\reserved@b` changed to `\edef\reserved@b` to be consistent with the `\edef` in `\includeonly`. (Suggested by Rainer Schöpf & Frank Mittelbach. Change made 20 Jul 88.)

Changed definition of `\include` to allow space at end of file name — otherwise, typing `\include{foo }` would cause L^AT_EX to overwrite `foo.tex`. Change made 24 May 89, suggested by Rainer Schöpf and Frank Mittelbach

Made `\include` check for being used inside an `\include`'d file, as this will not work and cause surprising results.

```

86 \def\include#1{\relax
87   \ifnum\@auxout=\@partaux
88     \@latex@error{\string\include\space cannot be nested}\@eha
89   \else \@include#1 \fi}

```

`\@include`

```

90 \def\@include#1 {%
91   \clearpage
92   \if@filesw
93     \immediate\write\@mainaux{\string\@input{#1.aux}}%
94   \fi
95   \@tempswtrue
96   \if@partsw
97     \@tempswafalse
98     \edef\reserved@b{#1}%
99     \@for\reserved@a:=\@partlist\do
100     {\ifx\reserved@a\reserved@b\@tempswtrue\fi}%
101   \fi
102   \if@tempswa
103     \let\@auxout\@partaux
104     \if@filesw
105       \immediate\openout\@partaux #1.aux
106       \immediate\write\@partaux{\relax}%
107     \fi
108     \@input@{#1.tex}%

```



```

109 \clearpage
110 \@writeckpt{#1}%
111 \if@filesw
112 \immediate\closeout\@partaux
113 \fi
114 \else
    If the file is not included, reset \deadcycles, so that a long list of non-included
    files does not generate an ‘Output loop’ error.
115 \deadcycles\z@
116 \@nameuse{cp@#1}%
117 \fi
118 \let\@auxout\@mainaux}

```

\@writeckpt

```

119 \def\@writeckpt#1{%
120 \if@filesw
121 \immediate\write\@partaux{\string\@setckpt{#1}\@charlb}%
122 {\let\@elt\@wckptelt \cl@ckpt}%
123 \immediate\write\@partaux{\@charrb}%
124 \fi}

```

\@wckptelt

```

125 \def\@wckptelt#1{%
126 \immediate\write\@partaux{%
127 \string\setcounter{#1}{\the\@nameuse{c@#1}}}}

```

\@setckpt RmS 93/08/31: introduced \@setckpt

```

128 \def\@setckpt#1{\global\@namedef{cp@#1}}

```

\@charlb The following defines \@charlb and \@charrb to be { and }, respectively with

\@charrb \catcode 11.

```

129 {\catcode'[=1 \catcode']=2
130 \catcode'{=11 \catcode'}=11
131 \gdef\@charlb[{
132 \gdef\@charrb[}]
133 ]% }brace matching

```

18.1 Safe Input Macros

\IfFileExists

```

134 \long\def \IfFileExists#1#2#3{%
135 \openin\@inputcheck#1 %
136 \ifeof\@inputcheck
137 \ifx\input@path\@undefined
138 \def\reserved@a{#3}%
139 \else
140 \def\reserved@a{\@iffileonpath{#1}{#2}{#3}}%
141 \fi
142 \else
143 \closein\@inputcheck
144 \edef\@filef@und{#1 }%
145 \def\reserved@a{#2}%
146 \fi
147 \reserved@a}

```

\@iffileonpath If the file is not found by \openin, and \input@path is defined, look in all the directories specified in \input@path.

```

148 \long\def\@iffileonpath#1{%
149 \let\reserved@a\@secondoftwo
150 \expandafter\@tfor\expandafter\reserved@b\expandafter

```

```

151         :\expandafter=\input@path\do{%
152     \openin\@inputcheck\reserved@a#1 %
153     \ifeof\@inputcheck\else
154         \edef\@filef@und{\reserved@a#1 }%
155         \let\reserved@a\@firstoftwo%
156         \closein\@inputcheck
157         \@break@tfor
158     \fi}%
159     \reserved@a}

```

\InputIfFileExists Now define `\InputIfFileExists` to input #1 if it seems to exist. Immediately prior to the input, #2 is executed. If the file #1 does not exist, execute ‘#3’.

```

160 \long\def \InputIfFileExists#1#2{%
161     \IfFileExists{#1}%
162     {#2\@addtofilelist{#1}\@input \@filef@und}}

```

\input Input a file: if the argument is given in braces use safe input macros, otherwise use TeX’s primitive `\input` command (which is called `\@input` in L^AT_EX).

```

163 \def\input{\@ifnextchar\bgroup\@input\@input}

```

\@input Define `\@input` (i.e., `\input`) in terms of `\InputIfFileExists`.

```

164 \def\@input#1{%
165     \InputIfFileExists{#1}{}%
166     {\filename@parse{#1}%
167     \edef\reserved@a{\noexpand\@missingfileerror
168         {\filename@area\filename@base}%
169         {\ifx\filename@ext\relax tex\else\filename@ext\fi}}%
170     \reserved@a}}

```

\@input Define `\@input` in terms of `\IfFileExists`. So this is a ‘safe input’ command, but the files input are not listed by `\listfiles`.

We don’t want .aux, .toc files etc be listed by `\listfiles`. However, something like .bbl probably should be listed and thus should be implemented not by `\@input`.

```

171 \def\@input#1{%
172     \IfFileExists{#1}{\@input\@filef@und}{\typeout{No file #1.}}}

```

\@input@ Version of `\@input` that does add the file to `\@filelist`.

```

173 \def\@input@#1{\InputIfFileExists{#1}{\typeout{No file #1.}}}

```

\@missingfileerror This ‘error’ command avoids TeX’s primitive missing file loop.

Missing file error. Prompt for a new filename, offering a default extension.

```

174 \autoload\def\@missingfileerror{\@autoerr\@missingfileerror}
175 \</2ekernel | autoload>
176 \<*2ekernel | autoerr>
177 \gdef\@missingfileerror#1#2{%
178     \typeout{^^J! LaTeX Error: File ‘#1.#2’ not found.^^J}%
179     Type X to quit or <RETURN> to proceed,^^J%
180     or enter new name. (Default extension: #2)^^J}%
181     \message{Enter file name: }%
182     {\endlinechar\m@ne
183     \global\read\m@ne to\@gtempa}%
184     \ifx\@gtempa\@empty
185     \else
186         \def\reserved@a{x}\ifx\reserved@a\@gtempa\batchmode\@end\fi
187         \def\reserved@a{X}\ifx\reserved@a\@gtempa\batchmode\@end\fi
188         \filename@parse\@gtempa
189         \edef\filename@ext{%
190             \ifx\filename@ext\relax#2\else\filename@ext\fi}%
191         \edef\reserved@a{%
192             \noexpand\input\@filef@und

```

```

193      {\filename@area\filename@base.\filename@ext}%
194      {}%
195      {\noexpand\@missingfileerror
196       {\filename@area\filename@base}{\filename@ext}}}%
197      \reserved@a
198      \fi}
199 \</2ekernel|autoerr)
200 \<*2ekernel|autoload)

```

`\@obsoletefile` For compatibility with L^AT_EX 2.09 document styles, we distribute files called `article.sty`, `book.sty`, `report.sty`, `slides.sty` and `letter.sty`. These use the command `\@obsoletefile`, which produces a warning message.

```

201 \def\@obsoletefile#1#2{%
202   \latex@warning@no@line{inputting ‘#1’ instead of obsolete ‘#2’}}
203 \onlypreamble\@obsoletefile

```

18.2 Listing files

`\@filelist` A list of files input so far. The initial value of `\@gobble` eats the comma before the first file name.

```

204 \let\@filelist\@gobble

```

`\@addtofilelist` Add to the list of files input so far. This ‘real’ definition is only used for ‘`cfg`’ files during `intex`. An initial definition of `\@gobble` has already been set.

```

205 %\def\@addtofilelist#1{\xdef\@filelist{\@filelist,#1}}

```

`\listfiles` A preamble command to cause `\end{document}` to list files input from the main file.

```

206 \def\listfiles{%
207   \let\listfiles\relax
208   \def\@listfiles##1##2##3##4##5##6##7##8##9\@{%
209     \def\reserved@d{\}%
210     \@tfor\reserved@c:=##1##2##3##4##5##6##7##8\do{%
211       \ifx\reserved@c\reserved@d
212         \edef\filename@area{ \filename@area}%
213         \fi}}%
214   \def\@dofilelist{%
215     \typeout{^^J *File List*}%
216     \@for\@currname:=\@filelist\do{%
217       \filename@parse\@currname
218       \edef\reserved@a{%
219         \filename@base.%
220         \ifx\filename@ext\relax tex\else\filename@ext\fi}%
221       \expandafter\let\expandafter\reserved@b
222         \csname ver@\reserved@a\endcsname
223       \expandafter\expandafter\expandafter\@listfiles\expandafter
224         \filename@area\filename@base\@
225       \typeout{%
226         \filename@area\reserved@a
227         \ifx\reserved@b\relax\else\@spaces\reserved@b\fi}}%
228     \typeout{ *****^^J}}

```

The `\@filelist` will be de-activated if `\listfiles` does not appear in the preamble. `\begin{document}` contains code equivalent to the following:

```

\AtBeginDocument{%
  \ifx\@listfiles\@undefined
    \let\@filelist\relax
    \let\@addtofilelist\@gobble
  \fi}

```

```

229 \onlypreamble\listfiles

```

```
\@dofilelist
230 \let\@dofilelist\relax
231 \</2kernel | autoloading
```

File 1

ltoutenc.dtx

19 Font encodings

This section of the kernel contains commands for declaring encoding-specific commands, such as accents. It also contains the code for some of the encoding files, including `omlenc.def`, `omsenc.def`, `t1enc.def` and `ot1enc.def` files, which define the OLM, OMS, T1 and OT1 encodings, and the `fontenc` package for selecting encodings.

The `fontenc` package has options for encodings, of which the last option is the default encoding. For example, to use the OT2, OT3 and T1 encodings, with T1 as the default, you say:

```
\usepackage[OT2,OT3,T1]{fontenc}
```

The standard kernel set-up loads font encoding files and selects an encoding as follows.

```
\input {omlenc.def}
\input {t1enc.def}
\input {ot1enc.def}
\input {omsenc.def}
\fontencoding{OT1}
```

Note that the files in the standard `inputenc` package depend on this behaviour of the kernel.

The syntax for declaring encoding-specific commands is:

```
\DeclareTextCommand{<command>}{<encoding>}
                        [ <number> ] [ <default> ] {<commands>}
```

This command is like `\newcommand`, except that it defines a command which is specific to one encoding. The resulting command is always robust, even if its definition is fragile. For example, the definition of `\l` in the OT1 encoding is:

```
\DeclareTextCommand{\l}{OT1}{\@xxxii l}
```

`\DeclareTextCommand` takes the same optional arguments as `\newcommand`.

```
\ProvideTextCommand{<command>}{<encoding>}
                        [ <number> ] [ <default> ] {<commands>}
```

This acts like `\DeclareTextCommand`, but does nothing if the command is already defined.

```
\DeclareTextSymbol{<command>}{<encoding>}{<slot>}
```

This command defines a text symbol, with a particular slot in that encoding. The commands:

```
\DeclareTextSymbol{\ss}{OT1}{25}
\DeclareTextCommand{\ss}{OT1}{\char25 }
```

have the same effect, but the `\DeclareTextSymbol` is faster.

```
\DeclareTextAccent{<command>}{<encoding>}{<slot>}
```

This command declares a text accent. The commands:

```
\DeclareTextAccent{"}{OT1}{127}
\DeclareTextCommand{"}{OT1}{\add@accent {127}}
```

have the same effect.

```
\DeclareTextComposite{<command>}
                        {<encoding>}{<argument>}{<slot>}
```

This command declares a composite letter, for example in the T1 encoding `\'a` is slot 225, which is declared by:

```
\DeclareTextComposite{\'}{T1}{a}{225}
```

The *command* will normally have been declared with `\DeclareTextAccent`, or as a one-argument `\DeclareTextCommand`.

`\DeclareTextComposite` is the most common example of using the more general declaration `\DeclareTextCompositeCommand`, which can define a composite to be an arbitrary piece of text.

```
\DeclareTextCompositeCommand{<command>}
                        {<encoding>}{<argument>}{<text>}
```

For example, in the OT1 encoding `Å` has a hand-crafted definition this is declared as follows

```
\DeclareTextCompositeCommand{\r}{OT1}{A}
{\leavevmode\setbox\z@\hbox{!}\dimen@ \ht\z@\advance\dimen@-1ex%
 \rlap{\raise.67\dimen@\hbox{\char23}}A}
```

The *command* will normally have been declared with `\DeclareTextAccent`, or as a one-argument `\DeclareTextCommand`.

The commands defined using the above declarations can be used in two ways. Normally they are used by just calling the command in the appropriate encoding, for example `\ss`. However, sometimes you may wish to use a command in an encoding where it is not defined. If the command has no arguments, then you can use it in another encoding by calling `\UseTextSymbol`:

```
\UseTextSymbol{<encoding>}{<command>}
```

For example, `\UseTextSymbol{OT1}{\ss}` has the same effect as:

```
{\fontencoding{OT1}\selectfont\ss}
```

If the command has one argument then you can use it in another encoding by calling `\UseTextAccent`:

```
\UseTextAccent{<encoding>}{<command>}{<text>}
```

For example, if the current encoding is OT2 then `\UseTextAccent{OT1}{\'a}` has the same effect as:

```
{\fontencoding{OT1}\selectfont\'{\fontencoding{OT2}\selectfont a}}
```

You can also declare a default definition for a text command, which will be used if the current encoding has no appropriate definition. Such use will also set the definition for this command in the current encoding to equal this default definition; this makes subsequent uses of the command much faster.

```
\DeclareTextCommandDefault{<command>}{<definition>}
```

For example, the default definition of the command `\textonequarter` (which produces the fraction $\frac{1}{4}$) could be built using math mode:

```
\DeclareTextCommandDefault{\textonequarter}{\ensuremath {\frac{1}{4}}}
```

There is a matching `\Provide` command which will not override an existing default definition:

```
\ProvideTextCommandDefault{<command>}{<definition>}
```

The most common use for these commands is to use symbols from other encodings, so there are some optimizations provided:

```
\DeclareTextSymbolDefault{<command>}{<encoding>}
\DeclareTextAccentDefault{<command>}{<encoding>}
```

are short for:

```
\DeclareTextCommandDefault{<command>}
      {\UseTextSymbol{<encoding>}{<command>}}
\DeclareTextCommandDefault[1]{<command>}
      {\UseTextAccent{<encoding>}{<command>}{#1}}
```

For example, to make OT1 the default encoding for `\ss` and `\'` you say:

```
\DeclareTextSymbolDefault{\ss}{OT1}
\DeclareTextAccentDefault{\'}{OT1}
```

Note that you can use these commands on any zero- or one-argument commands declared with `\DeclareText*` or `\ProvideText*`, not just those defined using `\DeclareTextSymbol` or `\DeclareTextAccent`.

19.1 Removing encoding-specific commands

In some cases encoding definitions are given to provide some limited support since nothing better is available, for example, the definition for `\textdollar` in OT1 is a hack since \$ and £ actually share the same slot in this encoding. Thus if such a glyph becomes available in a different encoding (e.g., TS1) one would like to get rid of the flacky one and make the default definition point to the new encoding. In such a case defining

```
\DeclareTextSymbol{\textdollar}{TS1}{36}
\DeclareTextSymbolDefault{\textdollar}{TS1}
```

is not enough since if typesetting in OT1 L^AT_EX will still find the encoding specific-definition for OT1 and therefore ignore the new default. Therefore to ensure that in this case the TS1 version is used we have to remove the OT1 declaration:

```
\UndeclareTextCommand{\textdollar}{OT1}
```

Since the \$ sign is a proper glyph in the T1 encoding there is no point removing its definition and forcing L^AT_EX to pick up the TS1 version if typesetting in this encoding. However, assume you want to use the variant dollar sign, i.e., \$ for your dollars. In that case you have to get rid of the T1 declaration as well, e.g., the following would do that for you:

```
\UndeclareTextCommand{\textdollar}{OT1}
\UndeclareTextCommand{\textdollar}{T1}
\DeclareTextCommandDefault{\textdollar}
      {\UseTextSymbol{TS1}\textdollaroldstyle}
```

19.2 The order of declarations

If an encoding-specific command is defined for more than one encoding, then it will execute fastest in the encoding in which it was defined last since its top-level definition will be set up to execute in that encoding without any overhead.

For this reason the file `fonttext.ltx` currently first loads the definitions for the T1 encoding and then those for the OT1 encoding so that typesetting in OT1 is optimized since that is (still) the default. However, when T1 is explicitly requested (via `\usepackage[T1]{fontenc}`) the top-level definitions are automatically changed to favour T1 since its declarations are reloaded in the process.

For the same reason default declarations should never come last since they are implemented as a special encoding themselves (with the name ?). Specifying them last would simply mean to make those encoding-specific commands equally inefficient in all encodings. Therefore the `textcomp` package, for example, first sets up all defaults to point to TS1 and then declares the commands in the TS1 encoding.

19.3 Docstrip modules

This `.dtx` file is be used to generate several related files containing font encoding definitions. The mutually exclusive docstrip options are listed here.

<code>T1</code>	generates <code>t1enc.def</code> for the Cork encoding.
<code>TS1</code>	generates <code>ts1enc.def</code> for the Text Companion encoding.
<code>TS1sty</code>	generates <code>textcomp.sty</code> , package that sets up use of the Text Companion encoding.
<code>OT1</code>	generates <code>ot1enc.def</code> for Knuth's CM encoding.
<code>OMS</code>	generates <code>omsenc.def</code> for Knuth's math symbol encoding.
<code>OML</code>	generates <code>omlenc.def</code> for Knuth's math letters encoding.
<code>OT4</code>	generates <code>ot4enc.def</code> for the Polish extension to the OT1 encoding, created by B. Jackowski and M. Ryćko for use with the Polish version of Computer Modern and Computer Concrete.
<code>package</code>	generates <code>fontenc.sty</code> for selecting encodings.
<code>2ekernel</code>	for the kernel commands.
<code>autoload</code>	for the 'autoload' kernel commands.
<code>autoerr</code>	for the <code>autoerr.sty</code> error message autoload file.

19.4 Definitions for the kernel

19.4.1 Declaration commands

This section contains definitions for commands such as accents which depend on the current encoding. These commands will usually be kept in `.def` files, for example `ot1enc.def` contains the definitions for the OT1 encoding.

```
1 (*2ekernel | autoload)
2 \message{font encodings,}

Far too many macros in one block here!
```

```
\DeclareTextCommand If you say:
\ProvideTextCommand
\DeclareTextSymbol
\@dec@text@cmd then \foo is defined to be \T1-cmd \foo \T1\foo, where \T1\foo is one control
\chardef@text@cmd sequence, not two! We then call \newcommand to define \T1\foo.
\@changed@cmd 3 \def\DeclareTextCommand{%
\@changed@x 4 \@dec@text@cmd\newcommand}
\TextSymbolUnavailable 5 \def\ProvideTextCommand{%
\@inmathwarn 6 \@dec@text@cmd\providecommand}

7 \def\@dec@text@cmd#1#2#3{%
8 \expandafter\def\expandafter#2%
9 \expandafter{%
10 \csname#3-cmd\expandafter\endcsname
11 \expandafter#2%
12 \csname#3\string#2\endcsname
13 }%
14 \let\@ifdefinable\@rc@ifdefinable
15 \expandafter#1\csname#3\string#2\endcsname}
```

This command was introduced to fix a major bug in `\@dec@text@cmd` without changing that command itself. This was thought to be necessary because it is defined in more than one package. (Perhaps the more serious bug is to put complex low-level commands like this in packages?)

The problem it solves is that whereas both `\newcommand` and `\providecommand` (used just above) both handle the resetting of `\@ifdefinable` (following its disabling in `\@dec@text@cmd`), the primitive `\chardef` neither needs the disabling, nor does the resetting.

```
16 \def\chardef@text@cmd{%
```



```

17 \let\@ifdefinable\@ifdefinable
18 \chardef
19 }
20 \def\DeclareTextSymbol#1#2#3{%
21 \@dec@text@cmd\chardef@text@cmd#1{#2}#3\relax
22 }

```

The declarations are only available before `\begin{document}`.

```

23 \@onlypreamble\DeclareTextCommand
24 \@onlypreamble\DeclareTextSymbol

```

The sneaky bit in all this is what `\T1-cmd \foo \T1\foo` does. There are five possibilities, depending on the current values of `\protect`, `\cf@encoding` and `\ifmmode`:

- If `\protect` is `\@typeset@protect` and `\cf@encoding` is `T1`, then we execute `\T1\foo`. This should be the normal behaviour, and is optimized for speed.
- If `\protect` is `\@typeset@protect`, `\cf@encoding` is (say) `OT1`, and `\OT1\foo` is defined, then we execute `\OT1\foo`.
- If `\protect` is `\@typeset@protect`, `\cf@encoding` is (say) `OT1`, we're in text mode, and `\OT1\foo` is undefined, then we define `\OT1\foo` to be the default value of `\foo`, and execute `\OT1\foo`.
- If `\protect` is `\@typeset@protect`, `\cf@encoding` is (say) `OT1`, we're in math mode, and `\OT1\foo` is undefined, then we execute the default value of `\foo`. (This is necessary so that things like `X_\copyright` work properly.)
- If `\protect` is not `\@typeset@protect` then we execute `\noexpand\foo`. For example, if we are writing to a file, then this results in `\foo` being written. If we are in a `\mark`, then `\foo` will be put in the mark—since `\foo` is robust, it will then survive all the things which may happen to it whilst it's a `\mark`.

So after all that, we will either execute the appropriate definition of `\foo` for the current encoding, or we will execute `\noexpand\foo`.

The default value of `\foo` is `\?\foo` if it is defined, and an error message otherwise.

When the encoding is changed from `T1` to `OT1`, `\T1-cmd` is defined to be `\@changed@cmd` and `\OT1-cmd` is defined to be `\@current@cmd`. This means that the test for what the current encoding is can be performed quickly.

```

25 \def\@current@cmd#1{%
26 \ifx\protect\@typeset@protect
27 \inmathwarn#1%
28 \else
29 \noexpand#1\expandafter\@gobble
30 \fi}

31 \def\@changed@cmd#1#2{%
32 \ifx\protect\@typeset@protect
33 \inmathwarn#1%
34 \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
35 \expandafter\ifx\csname ?\string#1\endcsname\relax
36 \expandafter\def\csname ?\string#1\endcsname{%
37 \TextSymbolUnavailable#1%
38 }%
39 \fi
40 \global\expandafter\let
41 \csname\cf@encoding\string#1\expandafter\endcsname
42 \csname ?\string#1\endcsname
43 \fi
44 \csname\cf@encoding\string#1%

```

```

45         \expandafter\endcsname
46     \else
47         \noexpand#1%
48     \fi}

49 \</2ekernel | autoloading>
50 \<*2ekernel | autoerr>
51 \gdef\TextSymbolUnavailable#1{%
52     \@latex@error{%
53         Command \protect#1 unavailable in encoding \cf@encoding%
54     }\@eha}
55 \</2ekernel | autoerr>
56 \<autoloading>\gdef\TextSymbolUnavailable{\@autoerr\TextSymbolUnavailable}
57 \<*2ekernel | autoloading>

```

The command `\@inmathwarn` produces a warning message if we are currently in math mode. Note that since this command is used inside text commands, it can't call `\relax` before the `\ifmmode`. This means that it is possible for the warning to fail to be issued at the beginning of a row of an `halign` whose template enters math mode. This is probably a bad feature, but there's not much that can be done about it, since adding a `\relax` would break ligatures and kerning between text symbols.

A more efficient solution would be to make `\@inmathwarn` and `\@inmatherr` equal to `\@empty` and `\relax` by default, and to have `\everymath` reset them to their usual definitions. This is left for future investigation (for example it may break some third party code).

```

58 \def\@inmathwarn#1{%
59     \ifmmode
60         \@latex@warning{Command \protect#1 invalid in math mode}%
61     \fi}

```

`\DeclareTextCommandDefault` These define commands with encoding ?.

`\ProvideTextCommandDefault` Note that `\DeclareTextCommandDefault` can only be used in the preamble, but that the `\Provide` version is allowed in inputenc .def files, so is allowed anywhere.

```

62 \def\DeclareTextCommandDefault#1{%
63     \DeclareTextCommand#1?}

64 \def\ProvideTextCommandDefault#1{%
65     \ProvideTextCommand#1?}

66 \@onlypreamble\DeclareTextCommandDefault
67 %\@onlypreamble\ProvideTextCommandDefault

```

They require `\? -cmd` to be initialized as `\@changed@cmd`.

```

68 \expandafter\let\csname?-cmd\endcsname\@changed@cmd

```

`\DeclareTextAccent` This is just a disguise for defining a T_EX `\accent` command.

```

69 \def\DeclareTextAccent#1#2#3{%
70     \DeclareTextCommand#1{#2}{\add@accent{#3}}
71 \@onlypreamble\DeclareTextAccent

```

`\add@accent` To save space this code is shared between all text accents that are set using the `\accent` primitive. The argument is pre-set in a box so that any font loading that is needed is already done within the box. This is needed because font-loading involves grouping and that would prevent the accent mechanism from working so that the accent would not be positioned over the argument. Declarations that change the font should be allowed (only low-level ones are at present) inside the argument of an accent command, but not size changes, as they involve `\setbox` operations which also inhibit the mechanism of the `\accent` primitive.

Note that the whole process is within a group. For a detailed discussion of this reimplementaion and its deficiencies, see pr/3160.

```
72 \def\add@accent#1#2{\hmode\bgroup
```

Turn off the group in `\UseTextSymbol` in case this is used inside the argument of `\add@accent`.

```
73 \let\hmode@start@before@group\@firstofone
```

```
74 \setbox\@tempboxa\hbox{#2%
```

When presetting the argument in a box we record its `\spacefactor` for later use after the accent got typeset. This way something like `\‘A` gets the spacefactor of A (i.e., 999) rather than the default value of 1000.

```
75 \global\mathchardef\accent@spacefactor\spacefactor}%
```

```
76 \accent#1 #2\egroup\spacefactor\accent@spacefactor}
```

Default definition for `\accent@spacefactor` prevents a horrible death of the above macro inside an unprotected `\edef`.

```
77 \let\accent@spacefactor\relax
```

```
\hmode\bgroup
```

```
78 \def\hmode\bgroup{\leavevmode\bgroup}
```

`\DeclareTextCompositeCommand` Another amusing game to play with `\expandafter`, `\csname`, and `\string`. When you say `\DeclareTextCompositeCommand{\foo}{T1}{a}{bar}`, we look to see if the expansion of `\T1\foo` begins with `\@text@composite`, and if it doesn't, we redefine `\T1\foo` to be:

```
\DeclareTextComposite
\@text@composite
\@text@composite@x
\@strip@args
#1 -> \@text@composite \T1\foo #1\@empty \@text@composite {...}
```

where ... is the previous definition of `\T1\foo`. Finally, we define `\T1\foo-a` to expand to `bar`.

```
79 \def\DeclareTextCompositeCommand#1#2#3#4{%
80 \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
81 \expandafter\expandafter\expandafter\ifx
82 \expandafter\@car\reserved@a\relax\relax\@nil \@text@composite \else
83 \edef\reserved@b##1{%
84 \def\expandafter\noexpand
85 \csname#2\string#1\endcsname###1{%
86 \noexpand\@text@composite
87 \expandafter\noexpand\csname#2\string#1\endcsname
88 ###1\noexpand\@empty\noexpand\@text@composite
89 {##1}}}%
90 \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
91 \fi
92 \expandafter\def\csname\expandafter\string\csname
93 #2\endcsname\string#1-\string#3\endcsname{#4}}
94 \@onlypreamble\DeclareTextCompositeCommand
```

This all works because:

```
\@text@composite \T1\foo A\@empty \@text@composite {...}
```

expands to `\T1\foo-A` if `\T1\foo-A` has been defined, and `{...}` otherwise.

Note that `\@text@composite` grabs the first token of the argument and puts just that in the csname. This is so that `\‘{\textit{e}}` will work—it checks whether `\T1\’-{\textit{e}}` is defined (which presumably it isn't) and so expands to `{\accent 1 \textit{e}}`.

This trick won't always work, for example `\‘{\itshape e}` will expand to (with spaces added for clarity):

```
\csname \string \T1\’ - \string {\itshape e} \@empty \endcsname
```

which will die pretty horribly. Unfortunately there's not much can be done about this if we're going to use `\csname` lookups as a fast way of accessing composites.

This has an unfortunate 'misfeature' though, which is that in the T1 encoding, `\'aa` produces á. This is not the expected behaviour, and should perhaps be fixed if the fix doesn't affect performance too badly.

Finally, it's worth noting that the `\@empty` is used in `\@text@composite` so that accents will work even when the argument is empty. If you say `\'{}` then this looks up `\\T1\'-\@empty`, which ought to be `\relax`, and so all is well. If we didn't include the `\@empty`, then `\'{}` would expand to:

```
\csname \string \T1\' - \string \endcsname
```

so the `\endcsname` would be `\string`'ed and the whole of the rest of the document would be put inside the `\csname`. This would not be good.

```
95 \def\@text@composite#1#2#3\@text@composite{%
96   \expandafter\@text@composite@x
97   \csname\string#1-\string#2\endcsname}
```

Originally the `\@text@composite@x` macro had two arguments and if #1 was not `\relax` it was executed, otherwise #2 was executed. All this happened within the `\ifx` code so that neither #1 nor #2 could have picked up any additional arguments from the input stream. This has now been changed using the typical `\@firstoftwo / \@secondoftwo` coding. This way the final expansion will happen without any `\else` or `\fi` intervening in the case that we need to get a further token from the input stream.

```
98 \def\@text@composite@x#1{%
99   \ifx#1\relax
100     \expandafter\@secondoftwo
101   \else
102     \expandafter\@firstoftwo
103   \fi
104   #1}
```

The command `\DeclareTextComposite` uses `\DeclareTextCompositeCommand` to declare a command which expands out to a single glyph.

```
105 \catcode\z@=11\relax
106 \def\DeclareTextComposite#1#2#3#4{%
107   \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
108   \bgroup
109     \lccode\z@#4%
110     \lowercase{%
111       \egroup
112       \reserved@a ^^@}}
113 \catcode\z@=15\relax
114 \@onlypreamble\DeclareTextComposite
```

<code>\UseTextAccent</code> <code>\UseTextSymbol</code> <code>\@use@text@encoding</code>	<p>These fragile commands access glyphs from different encodings. They use grotty low-level calls to the font selection scheme for speed, and in order to make sure that <code>\UseTextSymbol</code> doesn't do anything which you're not allowed to do between an <code>\accent</code> and its glyph.</p>
--	--

For a detailed discussion of this reimplementation and its deficiencies, see [pr/3160](#).

```
115 \def\UseTextAccent#1#2#3{%
116   \hmode@start@before@group
117   {%
```

Turn off the group in `\UseTextSymbol` in case this is used inside the arguments of `\UseTextAccent`.

```
118   \let\hmode@start@before@group\@firstofone
119   \let\@curr@enc\cf@encoding
120   \@use@text@encoding{#1}%
```

```

121     #2{\@use@text@encoding\@curr@enc#3}%
122   }}

123 \def\UseTextSymbol#1#2{%
124     \hmode@start@before@group
125     {%
126         \def\@wrong@font@char{\MessageBreak
127             for \noexpand\symbol'\string#2'}%
128         \@use@text@encoding{#1}%
129         #2%
130     }%
131 }

132 \def\@use@text@encoding#1{%
133     \edef\f@encoding{#1}%
134     \xdef\font@name{%
135         \csname\curr@fontshape/\f@size\endcsname}%
136     \pickup@font
137     \font@name
138     \@enc@update}

```

`\hmode@start@before@group` The `\hmode@start@before@group` starts hmode and should be immediately followed by an explicit `{...}`. Its purpose is to ensure that hmode is started before this group is opened. Inside `\add@accent` and `\UseTextAccent` it is redefined to remove this group so that it doesn't conflict with the `\accent` primitive.

For a detailed discussion see pr/3160.

```

139 \let\hmode@start@before@group\leavevmode

```

`\DeclareTextSymbolDefault` Some syntactic sugar. Again, these should probably be optimized for speed.

```

\DeclareTextAccentDefault 140 \def\DeclareTextSymbolDefault#1#2{%
141     \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}}

142 \def\DeclareTextAccentDefault#1#2{%
143     \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}}

144 \@onlypreamble\DeclareTextSymbolDefault
145 \@onlypreamble\DeclareTextAccentDefault

```

`\UndeclareTextCommand` This command safely removes an encoding specific declaration for a given encoding. It is helpful if one intends to use the default definition always and therefore wants to get rid of a declaration for some specific encoding.

```

146 \def\UndeclareTextCommand#1#2{%

If there is no declaration for the current encoding do nothing. (This makes a hash
table entry but without eTeX we can't do anything about that).

147     \expandafter\ifx\csname#2\string#1\endcsname\relax
148     \else

Else: throw away that declaration.

149         \global\expandafter\let\csname#2\string#1\endcsname
150             \@undefined

```

But this is unfortunately not enough, we have to take a look at the top-level definition of the encoding specific command which for a command `\foo` would look similar to `\T1-cmd \foo \T1\foo` (three tokens).

Of course, instead of T1 one could see a different encoding name; which one depends the encoding for which `\foo` was declared last.

Now assume we have just removed the declaration for `\foo` in T1 and the top-level of `\foo` expands to the above. Then we better change that pretty fast otherwise we do get an “undefined csname error” when we try to typeset `\foo` within T1 instead of getting the default definition for `\foo`. And what is the best way to change that top-level definition? Well, the only “encoding” we know for sure will still be around is the default encoding denoted by `?`.

Thus in case the last token of the top-level expansion is now undefined we change the declaration to look like `\?-cmd \foo \?\foo` which is done by the following (readable?) code:

```

151 \expandafter\expandafter\expandafter
152 \ifx\expandafter\@thirdofthree#1\@undefined
153 \expandafter\gdef\expandafter#1\expandafter
154 {\csname ?-cmd\expandafter\endcsname\expandafter
155 #1\csname?\string#1\endcsname}%
156 \fi
157 \fi
158 }
159 \@onlypreamble\UndeclareTextCommand

```

19.4.2 Hyphenation

`\patterns` We redefine `\patterns` and `\hyphenation` to allow the use of commands declared with `\DeclareText*` to be used inside them.

`\@patterns`

`\hyphenation` 160 `%\let\@patterns\patterns`

`\@hyphenation` 161 `%\let\@hyphenation\hyphenation`

```

162 %\def\patterns{%
163 % \bgroup
164 % \let\protect\@empty
165 % \let\@typeset@protect\@empty
166 % \let\@changed@x\@changed@x@mouth
167 % \afterassignment\egroup
168 % \@patterns
169 %}
170 %\def\hyphenation{%
171 % \bgroup
172 % \let\protect\@empty
173 % \let\@typeset@protect\@empty
174 % \let\@changed@x\@changed@x@mouth
175 % \afterassignment\egroup
176 % \@hyphenation
177 %}

```

19.4.3 Miscellanea

`\a` The `\a` command is used to access the accent commands even when they have been redefined (for example by the `\tabbing` environment). Its internal name is `\@tabacckludge`.

The `\string` within the `\csname` guards against something like `'` being active at the point of use.

```

178 \def\@tabacckludge#1{\expandafter\@changed@cmd
179 \csname\string#1\endcsname\relax}
180 \let\a=\@tabacckludge

```

19.4.4 Default encodings

We define the default encodings for most commands to be either OT1, OML or OMS. These defaults are in the kernel and therefore fonts with these encodings must be available unless these defaults are redefined elsewhere. Recall that the standard kernel loads the encoding files for these encodings, and also that for the T1 encoding.

The naming conventions in the kernel are not what we would use if we were starting from scratch... Those defined by DEK (like `\ae` and `\ss`) or by the T_EX Users Group Technical Working Group on multi-lingual typesetting (like `\th` and `\ng`) have short names. Those which were added to the kernel in 1993 and early 1994 are named after their Adobe glyph names (like `\guillemotleft` and

\quotedblbase). Unfortunately, this naming scheme won't work for all glyphs, since some names (like \space) are already used, and some (like \endash) are very likely to be defined by users. So we're now using the naming scheme of \text followed by the Adobe name, (like \textendash and \textsterling). Except that some glyphs don't have Adobe names, so we're using the names used by fontinst for those (like \textcompwordmark). Sigh.

Some accents from OT1:

```
181 \DeclareTextAccentDefault{"}{OT1}
182 \DeclareTextAccentDefault{'}{OT1}
183 \DeclareTextAccentDefault{.}{OT1}
184 \DeclareTextAccentDefault{=}{OT1}
185 \DeclareTextAccentDefault{H}{OT1}
186 \DeclareTextAccentDefault{^}{OT1}
187 \DeclareTextAccentDefault{'}{OT1}
188 \DeclareTextAccentDefault{b}{OT1}
189 \DeclareTextAccentDefault{c}{OT1}
190 \DeclareTextAccentDefault{d}{OT1}
191 \DeclareTextAccentDefault{r}{OT1}
192 \DeclareTextAccentDefault{u}{OT1}
193 \DeclareTextAccentDefault{v}{OT1}
194 \DeclareTextAccentDefault{~}{OT1}
```

Some symbols from OT1:

```
195 %\DeclareTextSymbolDefault{\AA}{OT1}
196 \DeclareTextSymbolDefault{\AE}{OT1}
197 \DeclareTextSymbolDefault{\L}{OT1}
198 \DeclareTextSymbolDefault{\OE}{OT1}
199 \DeclareTextSymbolDefault{\O}{OT1}
200 %\DeclareTextSymbolDefault{\aa}{OT1}
201 \DeclareTextSymbolDefault{\ae}{OT1}
202 \DeclareTextSymbolDefault{\i}{OT1}
203 \DeclareTextSymbolDefault{\j}{OT1}

204 \DeclareTextSymbolDefault{\ij}{OT1}
205 \DeclareTextSymbolDefault{\IJ}{OT1}

206 \DeclareTextSymbolDefault{\l}{OT1}
207 \DeclareTextSymbolDefault{\oe}{OT1}
208 \DeclareTextSymbolDefault{\o}{OT1}
209 \DeclareTextSymbolDefault{\ss}{OT1}
210 \DeclareTextSymbolDefault{\textdollar}{OT1}
211 \DeclareTextSymbolDefault{\textendash}{OT1}
212 \DeclareTextSymbolDefault{\textendash}{OT1}
213 \DeclareTextSymbolDefault{\textexclamdown}{OT1}
214 %\DeclareTextSymbolDefault{\texthyphenchar}{OT1}
215 %\DeclareTextSymbolDefault{\texthyphen}{OT1}
216 \DeclareTextSymbolDefault{\textquestiondown}{OT1}
217 \DeclareTextSymbolDefault{\textquotedblleft}{OT1}
218 \DeclareTextSymbolDefault{\textquotedblright}{OT1}
219 \DeclareTextSymbolDefault{\textquoteleft}{OT1}
220 \DeclareTextSymbolDefault{\textquoteright}{OT1}
221 \DeclareTextSymbolDefault{\textsterling}{OT1}
```

Some symbols from OMS:

```
222 \DeclareTextSymbolDefault{\textasteriskcentered}{OMS}
223 \DeclareTextSymbolDefault{\textbackslash}{OMS}
224 \DeclareTextSymbolDefault{\textbar}{OMS}
225 \DeclareTextSymbolDefault{\textbardbl}{OMS}
226 \DeclareTextSymbolDefault{\textbraceleft}{OMS}
227 \DeclareTextSymbolDefault{\textbraceright}{OMS}
228 \DeclareTextSymbolDefault{\textbullet}{OMS}
229 \DeclareTextSymbolDefault{\textdaggerdbl}{OMS}
230 \DeclareTextSymbolDefault{\textdagger}{OMS}
```

```

231 \DeclareTextSymbolDefault{\textparagraph}{OMS}
232 \DeclareTextSymbolDefault{\textperiodcentered}{OMS}
233 \DeclareTextSymbolDefault{\textsection}{OMS}
234 \DeclareTextAccentDefault{\textcircled}{OMS}

    Some symbols from OML:
235 \DeclareTextSymbolDefault{\textless}{OML}
236 \DeclareTextSymbolDefault{\textgreater}{OML}
237 \DeclareTextAccentDefault{\t}{OML}

    Some defaults we can fake.
    The interface for defining \copyright changed, it used to use \expandafter
    to add braces at the appropriate points.
238 \DeclareTextCommandDefault{\textcopyright}{\textcircled{c}}
239 % \expandafter\def\expandafter
240 % \copyright\expandafter{\expandafter{\copyright}}

241 \DeclareTextCommandDefault{\textasciicircum}{\~{}}
242 \DeclareTextCommandDefault{\textasciitilde}{\~{}}
243 \DeclareTextCommandDefault{\textcompwordmark}{\leavevmode\kern\z@}
244 \DeclareTextCommandDefault{\textunderscore}{%
245   \leavevmode \kern.06em\vbox{\hrule\@width.3em}}
246 \DeclareTextCommandDefault{\textvisiblespace}{%
247   \mbox{\kern.06em\vrule \@height.3ex}%
248   \vbox{\hrule \@width.3em}%
249   \hbox{\vrule \@height.3ex}}

    Using \fontdimen3 in the next definition is some sort of a kludge (since it
    is the interword stretch) but it makes the ellipsis come out right in mono-spaced
    fonts too (since there it is zero).
250 \DeclareTextCommandDefault{\textellipsis}{%
251   .\kern\fontdimen3\font
252   .\kern\fontdimen3\font
253   .\kern\fontdimen3\font}

254 %\DeclareTextCommandDefault{\textregistered}{\textcircled{\scshape r}}
255 \DeclareTextCommandDefault{\textregistered}{\textcircled{%
256   \check@mathfonts\fontsize\sf@size\z@math@fontsfalse\selectfont R}}
257 \DeclareTextCommandDefault{\texttrademark}{\textsuperscript{TM}}
258 \DeclareTextCommandDefault{\SS}{SS}

259 \DeclareTextCommandDefault{\textordfeminine}{\textsuperscript{a}}
260 \DeclareTextCommandDefault{\textordmasculine}{\textsuperscript{o}}

```

19.4.5 Math material

Some commands can be used in both text and math mode:

```

261 \DeclareRobustCommand{\$}{\ifmmode\mathdollar\else\textdollar\fi}
262 \DeclareRobustCommand{\{}{\ifmmode\lbrace\else\textbraceleft\fi}
263 \DeclareRobustCommand{\}}{\ifmmode\rbrace\else\textbraceright\fi}
264 \DeclareRobustCommand{\P}{\ifmmode\mathparagraph\else\textparagraph\fi}
265 \DeclareRobustCommand{\S}{\ifmmode\mathsection\else\textsection\fi}
266 \DeclareRobustCommand{\dag}{\ifmmode\dagger\else\textdagger\fi}
267 \DeclareRobustCommand{\ddag}{\ifmmode\ddagger\else\textdaggerdbl\fi}

    For historical reasons \copyright needs {} around the definition in maths.
268 \DeclareRobustCommand{\_}{%
269   \ifmmode\nfss@text{\textunderscore}\else\textunderscore\fi}
270 \DeclareRobustCommand{\copyright}{%
271   \ifmmode{\nfss@text{\textcopyright}}\else\textcopyright\fi}
272 \DeclareRobustCommand{\pounds}{%
273   \ifmmode\mathsterling\else\textsterling\fi}
274 \DeclareRobustCommand{\dots}{%
275   \ifmmode\mathellipsis\else\textellipsis\fi}

```



```

276 \let\ldots\dots
277 </2ekernel | autoload>

```

19.5 Definitions for the OT1 encoding

The definitions for the ‘T_EX text’ (OT1) encoding.

Declare the encoding.

```

278 <*OT1>
279 \DeclareFontEncoding{OT1}{-}{-}

Declare the accents.

280 \DeclareTextAccent{"}{OT1}{127}
281 \DeclareTextAccent{'}{OT1}{19}
282 \DeclareTextAccent{.}{OT1}{95}
283 \DeclareTextAccent{=}{OT1}{22}
284 \DeclareTextAccent{^}{OT1}{94}
285 \DeclareTextAccent{'}{OT1}{18}
286 \DeclareTextAccent{~}{OT1}{126}
287 \DeclareTextAccent{H}{OT1}{125}
288 \DeclareTextAccent{u}{OT1}{21}
289 \DeclareTextAccent{v}{OT1}{20}
290 \DeclareTextAccent{r}{OT1}{23}

```

Some accents have to be built by hand: Note that `\oalign` and `\o@lign` must be inside a group. In these definitions we no longer use the helper function `\sh@ft` from `plain.tex` since that now has two incompatible definitions.

```

291 \DeclareTextCommand{\b}{OT1}[1]
292   {\hmode\bgroup\o@lign{\relax#1\crrc\hidewidth\ltx@sh@ft{-3ex}%
293     \vbox to.2ex{\hbox{\char22}\vss}\hidewidth}\egroup}
294 \DeclareTextCommand{\c}{OT1}[1]
295   {\leavevmode\setbox\z@\hbox{#1}\ifdim\ht\z@=1ex\accent24 #1%
296     \else{\oalign{\unhbox\z@\crrc\hidewidth\char24\hidewidth}}\fi}
297 \DeclareTextCommand{\d}{OT1}[1]
298   {\hmode\bgroup
299     \o@lign{\relax#1\crrc\hidewidth\ltx@sh@ft{-1ex}.\hidewidth}\egroup}

```

Declare the text symbols.

```

300 \DeclareTextSymbol{\AE}{OT1}{29}
301 \DeclareTextSymbol{\OE}{OT1}{30}
302 \DeclareTextSymbol{\O}{OT1}{31}
303 \DeclareTextSymbol{\ae}{OT1}{26}
304 \DeclareTextSymbol{\i}{OT1}{16}
305 \DeclareTextSymbol{\j}{OT1}{17}
306 \DeclareTextSymbol{\oe}{OT1}{27}
307 \DeclareTextSymbol{\o}{OT1}{28}
308 \DeclareTextSymbol{\ss}{OT1}{25}
309 \DeclareTextSymbol{\textemdash}{OT1}{124}
310 \DeclareTextSymbol{\textendash}{OT1}{123}

```

Using the ligatures helps with OT1 fonts that have `\textexclamdown` and `\textquestiondown` in unusual positions.

```

311 %\DeclareTextSymbol{\textexclamdown}{OT1}{60}
312 %\DeclareTextSymbol{\textquestiondown}{OT1}{62}
313 \DeclareTextCommand{\textexclamdown}{OT1}{!'}
314 \DeclareTextCommand{\textquestiondown}{OT1}{?''}
315 %\DeclareTextSymbol{\texthyphenchar}{OT1}{'\-}
316 %\DeclareTextSymbol{\texthyphen}{OT1}{'\-}
317 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
318 \DeclareTextSymbol{\textquotedblright}{OT1}{'\'}
319 \DeclareTextSymbol{\textquoteleft}{OT1}{'\'}
320 \DeclareTextSymbol{\textquoteright}{OT1}{'\'}

```

Some symbols which are faked from others:

```

321 % \DeclareTextCommand{\aa}{OT1}
322 %   {\accent23a}}
323 \DeclareTextCommand{\L}{OT1}
324   {\leavevmode\setbox\z@\hbox{L}\hb@xt@\wd\z@{\hss\@xxxii L}}
325 \DeclareTextCommand{\l}{OT1}
326   {\hmode\bgroup\@xxxii l\egroup}
327 % \DeclareTextCommand{\AA}{OT1}
328 %   {\leavevmode\setbox\z@\hbox{h}\dimen@ht\z@\advance\dimen@-1ex%
329 %     \rlap{\raise.67\dimen@\hbox{\char23}}A}

```

In the OT1 encoding Å has a hand-crafted definition, so we have here the first recorded explicit use of `\DeclareTextCompositeCommand`.

```

330 \DeclareTextCompositeCommand{\r}{OT1}{A}
331   {\leavevmode\setbox\z@\hbox{!}\dimen@ht\z@\advance\dimen@-1ex%
332     \rlap{\raise.67\dimen@\hbox{\char23}}A}

```

The dutch language uses the letter ‘ij’. It is available in T1 encoded fonts, but not in the OT1 encoded fonts. Therefor we fake it for the OT1 encoding.

```

333 \DeclareTextCommand{\ij}{OT1}{%
334   \nobreak\hskip\z@skip i\kern-0.02em j\nobreak\hskip\z@skip}
335 \DeclareTextCommand{\IJ}{OT1}{%
336   \nobreak\hskip\z@skip I\kern-0.02em J\nobreak\hskip\z@skip}

```

In the OT1 encoding, £ and \$ share a slot.

```

337 \DeclareTextCommand{\textdollar}{OT1}{\hmode\bgroup
338   \ifdim \fontdimen\@ne\font >\z@
339     \slshape
340   \else
341     \upshape
342   \fi
343   \char'\$ \egroup}
344 \DeclareTextCommand{\textsterling}{OT1}{\hmode\bgroup
345   \ifdim \fontdimen\@ne\font >\z@
346     \itshape
347   \else
348     \fontshape{ui}\selectfont
349   \fi
350   \char'\$ \egroup}

```

Here we are adding some more composite commands to the OT1 encoding. This makes the use of certain accents with i compatible with their use with the T1 encoding; this enables them to become true L^AT_EX internal representations. However, it will make these accents work a little less fast since a check will always be made for the existence of a composite.

```

351 \DeclareTextComposite{\.}{OT1}{i}{'\i}
352 \DeclareTextComposite{\.}{OT1}{\i}{'\i}
353 \DeclareTextCompositeCommand{\'}{OT1}{i}{\@tabacckludge'\i}
354 \DeclareTextCompositeCommand{\'}{OT1}{\i}{\@tabacckludge'\i}
355 \DeclareTextCompositeCommand{\^}{OT1}{i}{\^i}
356 \DeclareTextCompositeCommand{\^}{OT1}{\i}{\^i}
357 </OT1>

```

19.6 Definitions for the T1 encoding

The definitions for the ‘Extended T_EX text’ (T1) encoding.

Declare the encoding.

```

358 <*T1>
359 \DeclareFontEncoding{T1}{}{}

```

Declare the accents.

```

360 \DeclareTextAccent{\'}{T1}{0}

```

```

361 \DeclareTextAccent{\'}{T1}{1}
362 \DeclareTextAccent{\^}{T1}{2}
363 \DeclareTextAccent{\~}{T1}{3}
364 \DeclareTextAccent{\"}{T1}{4}
365 \DeclareTextAccent{\H}{T1}{5}
366 \DeclareTextAccent{\r}{T1}{6}
367 \DeclareTextAccent{\v}{T1}{7}
368 \DeclareTextAccent{\u}{T1}{8}
369 \DeclareTextAccent{\=} {T1}{9}
370 \DeclareTextAccent{\.}{T1}{10}

```

Some accents have to be built by hand. Note that `\oalign` and `\o@lign` must be inside a group. In these definitions we no longer use the helper function `\sh@ft` from `plain.tex` since that now has two incompatible definitions.

```

371 \DeclareTextCommand{\b}{T1}[1]
372   {\hmode\bgroup\o@lign{\relax#1\crrc\hidewidth\ltx@sh@ft{-3ex}%
373     \vbox to.2ex{\hbox{\char9}\vss}\hidewidth}\egroup}
374 \DeclareTextCommand{\c}{T1}[1]
375   {\leavevmode\setbox\z@\hbox{#1}\ifdim\ht\z@=1ex\accent11 #1%
376     \else{\oalign{\unhbox\z@\crrc
377       \hidewidth\char11\hidewidth}}\fi}
378 \DeclareTextCommand{\d}{T1}[1]
379   {\hmode\bgroup
380     \o@lign{\relax#1\crrc\hidewidth\ltx@sh@ft{-1ex}.\hidewidth}\egroup}
381 \DeclareTextCommand{\k}{T1}[1]
382   {\hmode\bgroup\oalign{\null#1\crrc\hidewidth\char12}\egroup}
383 \DeclareTextCommand{\textogonekcentered}{T1}[1]
384   {\hmode\bgroup\oalign{\null#1\crrc\hidewidth\char12\hidewidth}\egroup}

```

Some symbols are constructed.

Slot 24 contains a small circle intended for construction of these two glyphs.

```

385 \DeclareTextCommand{\textperthousand}{T1}
386   {\%\char 24 } % space or 'relax as delimiter?
387 \DeclareTextCommand{\textpertenthousand}{T1}
388   {\%\char 24\char 24 } % space or 'relax as delimiter?

```

Declare the text symbols.

```

389 %\DeclareTextSymbol{\AA}{T1}{197}
390 \DeclareTextSymbol{\AE}{T1}{198}
391 \DeclareTextSymbol{\DH}{T1}{208}
392 \DeclareTextSymbol{\DJ}{T1}{208}
393 \DeclareTextSymbol{\L}{T1}{138}
394 \DeclareTextSymbol{\NG}{T1}{141}
395 \DeclareTextSymbol{\OE}{T1}{215}
396 \DeclareTextSymbol{\O}{T1}{216}
397 \DeclareTextSymbol{\SS}{T1}{223}
398 \DeclareTextSymbol{\TH}{T1}{222}
399 %\DeclareTextSymbol{\aa}{T1}{229}
400 \DeclareTextSymbol{\ae}{T1}{230}
401 \DeclareTextSymbol{\dh}{T1}{240}
402 \DeclareTextSymbol{\dj}{T1}{158}
403 \DeclareTextSymbol{\guillemotleft}{T1}{19}
404 \DeclareTextSymbol{\guillemotright}{T1}{20}
405 \DeclareTextSymbol{\guilsinglleft}{T1}{14}
406 \DeclareTextSymbol{\guilsinglright}{T1}{15}
407 \DeclareTextSymbol{\i}{T1}{25}
408 \DeclareTextSymbol{\j}{T1}{26}
409 \DeclareTextSymbol{\ij}{T1}{188}
410 \DeclareTextSymbol{\IJ}{T1}{156}
411 \DeclareTextSymbol{\l}{T1}{170}
412 \DeclareTextSymbol{\ng}{T1}{173}
413 \DeclareTextSymbol{\oe}{T1}{247}
414 \DeclareTextSymbol{\o}{T1}{248}

```

```

415 \DeclareTextSymbol{\quotedblbase}{T1}{18}
416 \DeclareTextSymbol{\quotesinglbase}{T1}{13}
417 \DeclareTextSymbol{\ss}{T1}{255}
418 \DeclareTextSymbol{\textasciicircum}{T1}{'\^}
419 \DeclareTextSymbol{\textasciitilde}{T1}{'\~}
420 \DeclareTextSymbol{\textbackslash}{T1}{'\}
421 \DeclareTextSymbol{\textbar}{T1}{'|}
422 \DeclareTextSymbol{\textbraceleft}{T1}{'\{ }
423 \DeclareTextSymbol{\textbraceright}{T1}{'\} }
424 \DeclareTextSymbol{\textcompwordmark}{T1}{23}
425 \DeclareTextSymbol{\textdollar}{T1}{'\$}
426 \DeclareTextSymbol{\textemdash}{T1}{22}
427 \DeclareTextSymbol{\textendash}{T1}{21}
428 \DeclareTextSymbol{\textexclamdown}{T1}{189}
429 \DeclareTextSymbol{\textgreater}{T1}{'\>}
430 %\DeclareTextSymbol{\textthyphenchar}{T1}{127}
431 %\DeclareTextSymbol{\textthyphen}{T1}{'\-}
432 \DeclareTextSymbol{\textless}{T1}{'\<}
433 \DeclareTextSymbol{\textquestiondown}{T1}{190}
434 \DeclareTextSymbol{\textquotedblleft}{T1}{16}
435 \DeclareTextSymbol{\textquotedblright}{T1}{17}
436 \DeclareTextSymbol{\textquotedbl}{T1}{'\"}
437 \DeclareTextSymbol{\textquoteleft}{T1}{'\'}
438 \DeclareTextSymbol{\textquoteright}{T1}{'\'}
439 \DeclareTextSymbol{\textsection}{T1}{159}
440 \DeclareTextSymbol{\textsterling}{T1}{191}
441 \DeclareTextSymbol{\textunderscore}{T1}{95}
442 \DeclareTextSymbol{\textvisiblespace}{T1}{32}
443 \DeclareTextSymbol{\th}{T1}{254}

```

Declare the composites.

```

444 \DeclareTextComposite{\.}{T1}{i}{'\i}
445 \DeclareTextComposite{\.}{T1}{i}{'\i}
"80 = 128
446 \DeclareTextComposite{\u}{T1}{A}{128}
447 \DeclareTextComposite{\k}{T1}{A}{129}
448 \DeclareTextComposite{\'}{T1}{C}{130}
449 \DeclareTextComposite{\v}{T1}{C}{131}
450 \DeclareTextComposite{\v}{T1}{D}{132}
451 \DeclareTextComposite{\v}{T1}{E}{133}
452 \DeclareTextComposite{\k}{T1}{E}{134}
453 \DeclareTextComposite{\u}{T1}{G}{135}
"88 = 136
454 \DeclareTextComposite{\'}{T1}{L}{136}
455 \DeclareTextComposite{\v}{T1}{L}{137}
456 \DeclareTextComposite{\'}{T1}{N}{139}
457 \DeclareTextComposite{\v}{T1}{N}{140}
458 \DeclareTextComposite{\H}{T1}{O}{142}
459 \DeclareTextComposite{\'}{T1}{R}{143}
"90 = 144
460 \DeclareTextComposite{\v}{T1}{R}{144}
461 \DeclareTextComposite{\'}{T1}{S}{145}
462 \DeclareTextComposite{\v}{T1}{S}{146}
463 \DeclareTextComposite{\c}{T1}{S}{147}
464 \DeclareTextComposite{\v}{T1}{T}{148}
465 \DeclareTextComposite{\c}{T1}{T}{149}
466 \DeclareTextComposite{\H}{T1}{U}{150}
467 \DeclareTextComposite{\r}{T1}{U}{151}
"98 = 152
468 \DeclareTextComposite{\"}{T1}{Y}{152}

```

```

469 \DeclareTextComposite{\'}{T1}{Z}{153}
470 \DeclareTextComposite{\v}{T1}{Z}{154}
471 \DeclareTextComposite{\.}{T1}{Z}{155}
472 \DeclareTextComposite{\.}{T1}{I}{157}
    "A0 = 160
473 \DeclareTextComposite{\u}{T1}{a}{160}
474 \DeclareTextComposite{\k}{T1}{a}{161}
475 \DeclareTextComposite{\'}{T1}{c}{162}
476 \DeclareTextComposite{\v}{T1}{c}{163}
477 \DeclareTextComposite{\v}{T1}{d}{164}
478 \DeclareTextComposite{\v}{T1}{e}{165}
479 \DeclareTextComposite{\k}{T1}{e}{166}
480 \DeclareTextComposite{\u}{T1}{g}{167}
    "A8 = 168
481 \DeclareTextComposite{\'}{T1}{l}{168}
482 \DeclareTextComposite{\v}{T1}{l}{169}
483 \DeclareTextComposite{\'}{T1}{n}{171}
484 \DeclareTextComposite{\v}{T1}{n}{172}
485 \DeclareTextComposite{\H}{T1}{o}{174}
486 \DeclareTextComposite{\'}{T1}{r}{175}
    "B0 = 176
487 \DeclareTextComposite{\v}{T1}{r}{176}
488 \DeclareTextComposite{\'}{T1}{s}{177}
489 \DeclareTextComposite{\v}{T1}{s}{178}
490 \DeclareTextComposite{\c}{T1}{s}{179}
491 \DeclareTextComposite{\v}{T1}{t}{180}
492 \DeclareTextComposite{\c}{T1}{t}{181}
493 \DeclareTextComposite{\H}{T1}{u}{182}
494 \DeclareTextComposite{\r}{T1}{u}{183}
    "B8 = 184
495 \DeclareTextComposite{\"}{T1}{y}{184}
496 \DeclareTextComposite{\'}{T1}{z}{185}
497 \DeclareTextComposite{\v}{T1}{z}{186}
498 \DeclareTextComposite{\.}{T1}{z}{187}
    "C0 = 192
499 \DeclareTextComposite{\'}{T1}{A}{192}
500 \DeclareTextComposite{\'}{T1}{A}{193}
501 \DeclareTextComposite{\^}{T1}{A}{194}
502 \DeclareTextComposite{\~}{T1}{A}{195}
503 \DeclareTextComposite{\"}{T1}{A}{196}
504 \DeclareTextComposite{\r}{T1}{A}{197}
505 \DeclareTextComposite{\c}{T1}{C}{199}
    "C8 = 200
506 \DeclareTextComposite{\'}{T1}{E}{200}
507 \DeclareTextComposite{\'}{T1}{E}{201}
508 \DeclareTextComposite{\^}{T1}{E}{202}
509 \DeclareTextComposite{\"}{T1}{E}{203}
510 \DeclareTextComposite{\'}{T1}{I}{204}
511 \DeclareTextComposite{\'}{T1}{I}{205}
512 \DeclareTextComposite{\^}{T1}{I}{206}
513 \DeclareTextComposite{\"}{T1}{I}{207}
    "D0 = 208
514 \DeclareTextComposite{\~}{T1}{N}{209}
515 \DeclareTextComposite{\'}{T1}{O}{210}
516 \DeclareTextComposite{\'}{T1}{O}{211}
517 \DeclareTextComposite{\^}{T1}{O}{212}
518 \DeclareTextComposite{\~}{T1}{O}{213}
519 \DeclareTextComposite{\"}{T1}{O}{214}

```

```

"D8 = 216
520 \DeclareTextComposite{'}{T1}{U}{217}
521 \DeclareTextComposite{'}{T1}{U}{218}
522 \DeclareTextComposite{'}{T1}{U}{219}
523 \DeclareTextComposite{'}{T1}{U}{220}
524 \DeclareTextComposite{'}{T1}{Y}{221}
"E0 = 224
525 \DeclareTextComposite{'}{T1}{a}{224}
526 \DeclareTextComposite{'}{T1}{a}{225}
527 \DeclareTextComposite{'}{T1}{a}{226}
528 \DeclareTextComposite{'}{T1}{a}{227}
529 \DeclareTextComposite{'}{T1}{a}{228}
530 \DeclareTextComposite{'}{T1}{a}{229}
531 \DeclareTextComposite{'}{T1}{c}{231}
"E8 = 232
532 \DeclareTextComposite{'}{T1}{e}{232}
533 \DeclareTextComposite{'}{T1}{e}{233}
534 \DeclareTextComposite{'}{T1}{e}{234}
535 \DeclareTextComposite{'}{T1}{e}{235}
536 \DeclareTextComposite{'}{T1}{i}{236}
537 \DeclareTextComposite{'}{T1}{i}{236}
538 \DeclareTextComposite{'}{T1}{i}{237}
539 \DeclareTextComposite{'}{T1}{i}{237}
540 \DeclareTextComposite{'}{T1}{i}{238}
541 \DeclareTextComposite{'}{T1}{i}{238}
542 \DeclareTextComposite{'}{T1}{i}{239}
543 \DeclareTextComposite{'}{T1}{i}{239}
"F0 = 240
544 \DeclareTextComposite{'}{T1}{n}{241}
545 \DeclareTextComposite{'}{T1}{o}{242}
546 \DeclareTextComposite{'}{T1}{o}{243}
547 \DeclareTextComposite{'}{T1}{o}{244}
548 \DeclareTextComposite{'}{T1}{o}{245}
549 \DeclareTextComposite{'}{T1}{o}{246}
"F8 = 248
550 \DeclareTextComposite{'}{T1}{u}{249}
551 \DeclareTextComposite{'}{T1}{u}{250}
552 \DeclareTextComposite{'}{T1}{u}{251}
553 \DeclareTextComposite{'}{T1}{u}{252}
554 \DeclareTextComposite{'}{T1}{y}{253}

555 \DeclareTextCompositeCommand{k}{T1}{o}{\textogonekcentered{o}}
556 \DeclareTextCompositeCommand{k}{T1}{0}{\textogonekcentered{0}}
557 \end{font}

```

19.7 Definitions for the OMS encoding

The definitions for the ‘ \TeX math symbol’ (OMS) encoding. Even though this is meant to be a math font, it includes some of the standard \LaTeX text symbols.

Declare the encoding.

```

558 \newfontfamily\OMSfont{OMS}
559 \DeclareFontEncoding{OMS}{-}{-}

Declare the symbols.
560 % \changes{v1.99}{2004/02/02}{Added \cs{textbigcircle}}
561 % Note that slot 13 has in places been named |\Orb|: please root
562 % out and destroy this impolity wherever you find it!
563 % \begin{macrocode}
564 \DeclareTextSymbol{\textasteriskcentered}{OMS}{3} % "03

```

```

565 \DeclareTextSymbol{\textbackslash}{OMS}{110}      % "6E
566 \DeclareTextSymbol{\textbar}{OMS}{106}           % "6A
567 \DeclareTextSymbol{\textbardbl}{OMS}{107}        % "6B
568 \DeclareTextSymbol{\textbraceleft}{OMS}{102}     % "66
569 \DeclareTextSymbol{\textbraceright}{OMS}{103}    % "67
570 \DeclareTextSymbol{\textbullet}{OMS}{15}         % "0F
571 \DeclareTextSymbol{\textdaggerdbl}{OMS}{122}     % "7A
572 \DeclareTextSymbol{\textdagger}{OMS}{121}        % "79
573 \DeclareTextSymbol{\textparagraph}{OMS}{123}     % "7B
574 \DeclareTextSymbol{\textperiodcentered}{OMS}{1}  % "01
575 \DeclareTextSymbol{\textsection}{OMS}{120}       % "78
576 \DeclareTextSymbol{\textbigcircle}{OMS}{13}     % "0D
577 \DeclareTextCommand{\textcircled}{OMS}[1]{\hmode@bgroup
578   \ooalign{%
579     \hfil \raise .07ex\hbox {\upshape#1}\hfil \crrc
580     \char 13 % "0D
581   }%
582 \egroup}
583 \</OMS>

```

19.8 Definitions for the OML encoding

The definitions for the ‘ \TeX math italic’ (OML) encoding. Even though this is meant to be a math font, it includes some of the standard \LaTeX text symbols.

Declare the encoding.

```

584 \<*OML>
585 \DeclareFontEncoding{OML}{}{}
586 \DeclareTextSymbol{\textless}{OML}{'\<}
587 \DeclareTextSymbol{\textgreater}{OML}{'\>}
588 \DeclareTextAccent{\t}{OML}{127} % "7F
589 \</OML>

```

19.9 Definitions for the OT4 encoding

These definitions are for the Polish extension to the ‘ \TeX text’ (OT1) encoding. This encoding was created by B. Jackowski and M. Ryćko for use with the Polish version of Computer Modern and Computer Concrete. In positions 0–127 it is identical to OT1 but it contains some additional characters in the upper half. The \LaTeX support was developed by Mariusz Olko.

The PL fonts that use it are available as follows:

Metafont sources <ftp://ftp.gust.org.pl/TeX/language/polish/pl-mf.zip>;

Font files <ftp://ftp.gust.org.pl/TeX/language/polish/pl-tfm.zip>.

Declare the encoding.

```

590 \<*OT4>
591 \DeclareFontEncoding{OT4}{}{}
592 \DeclareFontSubstitution{OT4}{cmr}{m}{n}
593 \DeclareTextAccent{"}{OT4}{127}
594 \DeclareTextAccent{\'}{OT4}{19}
595 \DeclareTextAccent{\.}{OT4}{95}
596 \DeclareTextAccent{\=}{OT4}{22}
597 \DeclareTextAccent{\~}{OT4}{94}
598 \DeclareTextAccent{\'}{OT4}{18}
599 \DeclareTextAccent{\~}{OT4}{126}
600 \DeclareTextAccent{\H}{OT4}{125}
601 \DeclareTextAccent{\u}{OT4}{21}
602 \DeclareTextAccent{\v}{OT4}{20}
603 \DeclareTextAccent{\r}{OT4}{23}

```

The ogonek accent is available only under a e A & E. But we have to provide some definition for \k. Some other accents have to be built by hand as in OT1:

```
604 \DeclareTextCommand{\k}{OT4}[1]{%
605   \TextSymbolUnavailable{\k{#1}}{#1}}
```

In these definitions we no longer use the helper function \sh@ft from plain.tex since that now has two incompatible definitions.

```
606 \DeclareTextCommand{\b}{OT4}[1]
607   {\hmode\bgroup\o@lign{\relax#1\cr\hidewidth\ltx@sh@ft{-3ex}%
608    \vbox to.2ex{\hbox{\char22}\vss}\hidewidth}\egroup}
609 \DeclareTextCommand{\c}{OT4}[1]
610   {\leavevmode\setbox\z@\hbox{#1}\ifdim\ht\z@=1ex\accent24 #1%
611    \else{\oalign{\unhbox\z@\cr\hidewidth\char24\hidewidth}}\fi}
612 \DeclareTextCommand{\d}{OT4}[1]
613   {\hmode\bgroup
614    \o@lign{\relax#1\cr\hidewidth\ltx@sh@ft{-1ex}.\hidewidth}\egroup}
```

Declare the text symbols.

```
615 \DeclareTextSymbol{\AE}{OT4}{29}
616 \DeclareTextSymbol{\OE}{OT4}{30}
617 \DeclareTextSymbol{\O}{OT4}{31}
618 \DeclareTextSymbol{\L}{OT4}{138}
619 \DeclareTextSymbol{\ae}{OT4}{26}
620 \DeclareTextSymbol{\guillemotleft}{OT4}{174}
621 \DeclareTextSymbol{\guillemotright}{OT4}{175}
622 \DeclareTextSymbol{\i}{OT4}{16}
623 \DeclareTextSymbol{\j}{OT4}{17}
624 \DeclareTextSymbol{\l}{OT4}{170}
625 \DeclareTextSymbol{\o}{OT4}{28}
626 \DeclareTextSymbol{\oe}{OT4}{27}
627 \DeclareTextSymbol{\quotedblbase}{OT4}{255}
628 \DeclareTextSymbol{\ss}{OT4}{25}
629 \DeclareTextSymbol{\textendash}{OT4}{124}
630 \DeclareTextSymbol{\textendash}{OT4}{123}
631 \DeclareTextSymbol{\textexclamdown}{OT4}{60}
632 %\DeclareTextSymbol{\textthyphenchar}{OT4}{'\-}
633 %\DeclareTextSymbol{\textthyphen}{OT4}{'\-}
634 \DeclareTextSymbol{\textquestiondown}{OT4}{62}
635 \DeclareTextSymbol{\textquotedblleft}{OT4}{92}
636 \DeclareTextSymbol{\textquotedblright}{OT4}{'\'}
637 \DeclareTextSymbol{\textquoteleft}{OT4}{'\'}
638 \DeclareTextSymbol{\textquoteright}{OT4}{'\'}
```

Definition for Å as in OT1:

```
639 \DeclareTextCompositeCommand{\r}{OT4}{A}
640   {\leavevmode\setbox\z@\hbox{!}\dimen@ht\z@\advance\dimen@-1ex%
641    \rlap{\raise.67\dimen@\hbox{\char23}}A}
```

In the OT4 encoding, £ and \$ share a slot.

```
642 \DeclareTextCommand{\textdollar}{OT4}{\hmode\bgroup
643   \ifdim \fontdimen\@ne\font >\z@
644     \slshape
645   \else
646     \upshape
647   \fi
648   \char'\$ \egroup}
649 \DeclareTextCommand{\textsterling}{OT4}{\hmode\bgroup
650   \ifdim \fontdimen\@ne\font >\z@
651     \itshape
652   \else
653     \fontshape{ui}\selectfont
654   \fi
655   \char'\$ \egroup}
```


Declare the composites.

```

656 \DeclareTextComposite{\k}{OT4}{A}{129}
657 \DeclareTextComposite{\'}{OT4}{C}{130}
658 \DeclareTextComposite{\k}{OT4}{E}{134}
659 \DeclareTextComposite{\'}{OT4}{N}{139}
660 \DeclareTextComposite{\'}{OT4}{S}{145}
661 \DeclareTextComposite{\'}{OT4}{Z}{153}
662 \DeclareTextComposite{\.}{OT4}{Z}{155}
663 \DeclareTextComposite{\k}{OT4}{a}{161}
664 \DeclareTextComposite{\'}{OT4}{c}{162}
665 \DeclareTextComposite{\k}{OT4}{e}{166}
666 \DeclareTextComposite{\'}{OT4}{n}{171}
667 \DeclareTextComposite{\'}{OT4}{s}{177}
668 \DeclareTextComposite{\'}{OT4}{z}{185}
669 \DeclareTextComposite{\.}{OT4}{z}{187}
670 \DeclareTextComposite{\'}{OT4}{O}{211}
671 \DeclareTextComposite{\'}{OT4}{o}{243}
672 \</OT4>

```

19.10 Definitions for the TS1 encoding

```

673 \<*TS1>
674 \DeclareFontEncoding{TS1}{-}{-}
675 \DeclareFontSubstitution{TS1}{cmr}{m}{n}

```

Some accents have to be built by hand. Note that `\ooalign` and `\o@lign` must be inside a group.

```

676 \DeclareTextCommand{\capitalcedilla}{TS1}[1]
677   {\hmode\bgroup
678     \ooalign{\null#1\crcr\hidewidth\char11\hidewidth}\egroup}
679 \DeclareTextCommand{\capitalogonek}{TS1}[1]
680   {\hmode\bgroup
681     \ooalign{\null#1\crcr\hidewidth\char12\hidewidth}\egroup}

```

Accents for capital letters.

These commands can be used by the end user either directly or through definitions of the type

```
\DeclareTextCompositeCommand{\'}{T1}{X}{\capitalacute X}
```

None of the latter definitions are provided by default, since they are probably rarely used.

"00 = 0

```

682 \DeclareTextAccent{\capitalgrave}{TS1}{0}
683 \DeclareTextAccent{\capitalacute}{TS1}{1}
684 \DeclareTextAccent{\capitalcircumflex}{TS1}{2}
685 \DeclareTextAccent{\capitaltilde}{TS1}{3}
686 \DeclareTextAccent{\capitaldieresis}{TS1}{4}
687 \DeclareTextAccent{\capitalhungarumlaut}{TS1}{5}
688 \DeclareTextAccent{\capitalring}{TS1}{6}
689 \DeclareTextAccent{\capitalcaron}{TS1}{7}
"08 = 8
690 \DeclareTextAccent{\capitalbreve}{TS1}{8}
691 \DeclareTextAccent{\capitalmacron}{TS1}{9}
692 \DeclareTextAccent{\capitaldotaccent}{TS1}{10}

```

Tie accents.

The tie accent was borrowed from the `cmmi` font. The `tc` fonts now provide four tie accents, the first two are done in the classical way with assymetric glyphs hanging out of their boxes; the new ties are centered in their boxes like all other accents. They need a name: please tell us if you know what to call them.

" =

```

693 \DeclareTextAccent{\t}{TS1}{26}
694 \DeclareTextAccent{\capitaltie}{TS1}{27}
695 \DeclareTextAccent{\newtie}{TS1}{28}
696 \DeclareTextAccent{\capitalnewtie}{TS1}{29}
    Compound word marks.
    The text companion fonts contain two compound word marks of different
    heights, one has cap_height, the other asc_height.
697 \DeclareTextSymbol{\textcapitalcompwordmark}{TS1}{23}
698 \DeclareTextSymbol{\textascendercompwordmark}{TS1}{31}
    The text companion symbols.
699 \DeclareTextSymbol{\textquotestraightbase}{TS1}{13}
    "10 = 16
700 \DeclareTextSymbol{\textquotestraightdblbase}{TS1}{18}
701 \DeclareTextSymbol{\texttwelveudash}{TS1}{21}
702 \DeclareTextSymbol{\textthreequartersemdash}{TS1}{22}
    "18 = 24
703 \DeclareTextSymbol{\textleftarrow}{TS1}{24}
704 \DeclareTextSymbol{\textrightarrow}{TS1}{25}
    "20 = 32
705 \DeclareTextSymbol{\textblank}{TS1}{32}
706 \DeclareTextSymbol{\textdollar}{TS1}{36}
707 \DeclareTextSymbol{\textquotesingle}{TS1}{39}
    "28 = 40
708 \DeclareTextSymbol{\textasteriskcentered}{TS1}{42}
    Note that '054 is a comma and '056 is a full stop: these make numbers using
    oldstyle digits easier to input.
709 \DeclareTextSymbol{\textdblhyphen}{TS1}{45}
710 \DeclareTextSymbol{\textfractionsolidus}{TS1}{47}
    Oldstyle digits.
    "30 = 48
711 \DeclareTextSymbol{\textzerooldstyle}{TS1}{48}
712 \DeclareTextSymbol{\textoneoldstyle}{TS1}{49}
713 \DeclareTextSymbol{\texttwooldstyle}{TS1}{50}
714 \DeclareTextSymbol{\textthreeoldstyle}{TS1}{51}
715 \DeclareTextSymbol{\textfouroldstyle}{TS1}{52}
716 \DeclareTextSymbol{\textfiveoldstyle}{TS1}{53}
717 \DeclareTextSymbol{\textsixoldstyle}{TS1}{54}
718 \DeclareTextSymbol{\textsevenoldstyle}{TS1}{55}
    "38 = 56
719 \DeclareTextSymbol{\texteightoldstyle}{TS1}{56}
720 \DeclareTextSymbol{\textnineoldstyle}{TS1}{57}
    More text companion symbols.
721 \DeclareTextSymbol{\textlangle}{TS1}{60}
722 \DeclareTextSymbol{\textminus}{TS1}{61}
723 \DeclareTextSymbol{\textrangle}{TS1}{62}
    "48 = 72
724 \DeclareTextSymbol{\textmho}{TS1}{77}
    The big circle is here to define the command \textcircled. Formerly it was
    taken from the cmsy font.
725 \DeclareTextSymbol{\textbigcircle}{TS1}{79}
726 \DeclareTextCommand{\textcircled}{TS1}[1]{\hmode@bgroup
727   \ooalign{%
728     \hfil \raise .07ex\hbox {\upshape#1}\hfil \cr
729     \char 79   % '117 = "4F
730   }%
731 \egroup}

```

More text companion symbols.

"50 = 80

```

732 \DeclareTextSymbol{\textohm}{TS1}{87}
"58 = 88
733 \DeclareTextSymbol{\textlbrackdbl}{TS1}{91}
734 \DeclareTextSymbol{\textrbrackdbl}{TS1}{93}
735 \DeclareTextSymbol{\textuparrow}{TS1}{94}
736 \DeclareTextSymbol{\textdownarrow}{TS1}{95}
"60 = 96
737 \DeclareTextSymbol{\textasciigrave}{TS1}{96}
738 \DeclareTextSymbol{\textborn}{TS1}{98}
739 \DeclareTextSymbol{\textdivorced}{TS1}{99}
740 \DeclareTextSymbol{\textdied}{TS1}{100}
"68 = 104
741 \DeclareTextSymbol{\textleaf}{TS1}{108}
742 \DeclareTextSymbol{\textmarried}{TS1}{109}
743 \DeclareTextSymbol{\textmusicalnote}{TS1}{110}
"78 = 120
744 \DeclareTextSymbol{\texttildelow}{TS1}{126}
    This glyph, \textdblhyphenchar is hanging, like the hyphenchar of the ec
    fonts.
745 \DeclareTextSymbol{\textdblhyphenchar}{TS1}{127}
"80 = 128
746 \DeclareTextSymbol{\textasciibreve}{TS1}{128}
747 \DeclareTextSymbol{\textasciicaron}{TS1}{129}
    This next glyph is not the same as \textquotedbl.
748 \DeclareTextSymbol{\textacutedbl}{TS1}{130}
749 \DeclareTextSymbol{\textgravedbl}{TS1}{131}
750 \DeclareTextSymbol{\textdagger}{TS1}{132}
751 \DeclareTextSymbol{\textdaggerdbl}{TS1}{133}
752 \DeclareTextSymbol{\textbardbl}{TS1}{134}
753 \DeclareTextSymbol{\textperthousand}{TS1}{135}
"88 = 136
754 \DeclareTextSymbol{\textbullet}{TS1}{136}
755 \DeclareTextSymbol{\textcelsius}{TS1}{137}
756 \DeclareTextSymbol{\textdollaroldstyle}{TS1}{138}
757 \DeclareTextSymbol{\textcentoldstyle}{TS1}{139}
758 \DeclareTextSymbol{\textflorin}{TS1}{140}
759 \DeclareTextSymbol{\textcolonmonetary}{TS1}{141}
760 \DeclareTextSymbol{\textwon}{TS1}{142}
761 \DeclareTextSymbol{\textnaira}{TS1}{143}
"90 = 144
762 \DeclareTextSymbol{\textguarani}{TS1}{144}
763 \DeclareTextSymbol{\textpeso}{TS1}{145}
764 \DeclareTextSymbol{\textlira}{TS1}{146}
765 \DeclareTextSymbol{\textrecipe}{TS1}{147}
766 \DeclareTextSymbol{\textinterrobang}{TS1}{148}
767 \DeclareTextSymbol{\textinterrobangdown}{TS1}{149}
768 \DeclareTextSymbol{\textdong}{TS1}{150}
769 \DeclareTextSymbol{\texttrademark}{TS1}{151}
"98 = 152
770 \DeclareTextSymbol{\textpertenthousand}{TS1}{152}
771 \DeclareTextSymbol{\textpilcrow}{TS1}{153}
772 \DeclareTextSymbol{\textbaht}{TS1}{154}
773 \DeclareTextSymbol{\textnumero}{TS1}{155}

```

This next name may change. For the following sign we know only a german name, which is abzüglich. The meaning is something like “commercial minus”. An ASCII ersatz is ./.. (dot slash dot). The temporary English name is `\textdiscount`.

```

774 \DeclareTextSymbol{\textdiscount}{TS1}{156}
775 \DeclareTextSymbol{\textestimated}{TS1}{157}
776 \DeclareTextSymbol{\textopenbullet}{TS1}{158}
777 \DeclareTextSymbol{\textservicemark}{TS1}{159}

" A0 = 160

778 \DeclareTextSymbol{\textlquill}{TS1}{160}
779 \DeclareTextSymbol{\textrquill}{TS1}{161}
780 \DeclareTextSymbol{\textcent}{TS1}{162}
781 \DeclareTextSymbol{\textsterling}{TS1}{163}
782 \DeclareTextSymbol{\textcurrency}{TS1}{164}
783 \DeclareTextSymbol{\textyen}{TS1}{165}
784 \DeclareTextSymbol{\textbrokenbar}{TS1}{166}
785 \DeclareTextSymbol{\textsection}{TS1}{167}

" A8 = 168

786 \DeclareTextSymbol{\textasciidieresis}{TS1}{168}
787 \DeclareTextSymbol{\textcopyright}{TS1}{169}
788 \DeclareTextSymbol{\textordfeminine}{TS1}{170}
789 \DeclareTextSymbol{\textcopyleft}{TS1}{171}
790 \DeclareTextSymbol{\textlnot}{TS1}{172}

    The meaning of the circled-P is “sound recording copyright”.

791 \DeclareTextSymbol{\textcircledP}{TS1}{173}
792 \DeclareTextSymbol{\textregistered}{TS1}{174}
793 \DeclareTextSymbol{\textasciimacron}{TS1}{175}

" B0 = 176

794 \DeclareTextSymbol{\textdegree}{TS1}{176}
795 \DeclareTextSymbol{\textpm}{TS1}{177}
796 \DeclareTextSymbol{\texttwosuperior}{TS1}{178}
797 \DeclareTextSymbol{\textthreesuperior}{TS1}{179}
798 \DeclareTextSymbol{\textasciacute}{TS1}{180}
799 \DeclareTextSymbol{\textmu}{TS1}{181} % micro sign
800 \DeclareTextSymbol{\textparagraph}{TS1}{182}
801 \DeclareTextSymbol{\textperiodcentered}{TS1}{183}

" B8 = 184

802 \DeclareTextSymbol{\textreferencemark}{TS1}{184}
803 \DeclareTextSymbol{\textonesuperior}{TS1}{185}
804 \DeclareTextSymbol{\textordmasculine}{TS1}{186}
805 \DeclareTextSymbol{\textsurd}{TS1}{187}
806 \DeclareTextSymbol{\textonequarter}{TS1}{188}
807 \DeclareTextSymbol{\textonehalf}{TS1}{189}
808 \DeclareTextSymbol{\textthreequarters}{TS1}{190}
809 \DeclareTextSymbol{\texteuro}{TS1}{191}

" E0 = 208

810 \DeclareTextSymbol{\texttimes}{TS1}{214}

" F0 = 240

811 \DeclareTextSymbol{\textdiv}{TS1}{246}
812 \</TS1>

```

20 Package files

This file now also contains some packages that provide access to the more specialised encodings.

20.1 The fontenc package

This package allows authors to specify which encodings they will use. For each encoding FOO, the package looks to see if the encoding FOO has already been declared. If it has not, the file fooenc.def is loaded. The default encoding is set to be FOO.

In addition the package at the moment contains extra code to extend the `\@uclclist` (list of upper/lower case pairs) for encodings that involve cyrillic characters. THIS IS A TEMPORARY SOLUTION and will not stay this way forever (or so we hope) but right now we are missing a proper interface for this and didn't wanted to rush it.

```
813 (*package)
```

Here we define a macro that extends the `\@uclclist` if needed and afterwards turns itself in a noop.

```
814 \def\update@uclc@with@cyrillic{%
815   \expandafter\def\expandafter\@uclclist\expandafter
816     {\@uclclist
817       \cyr\CYRA\cyrabhch\CYRABHCH\cyrabhchdsc\CYRABHCHDSC\cyrabhdze
818       \CYRABHDZE\cyrabhha\CYRABHHA\cyrac\CYRAE\cyrb\CYRE\cyrbyus
819       \CYRBYUS\cyrch\CYRC\cyrch\CYRCH\cyrchldsc\CYRCHLDSC\cyrchrdsc
820       \CYRCHRDSC\cyrchvcrs\CYRCHVCRS\cyrd\CYRD\cyrdelta\CYRDELTA
821       \cyrdje\CYRDJE\cyrdze\CYRDZE\cyrdzhe\CYRDZHE\cyre\CYRE\cyreps
822       \CYREPS\cyrerev\CYREREV\cyrry\CYRERY\cyrf\CYRF\cyrfita
823       \CYRFITA\cyrgh\CYRG\cyrghdsc\CYRGDSC\cyrghdscrs\CYRGDSCHCRS
824       \cyrghcrs\CYRGHCRS\cyrghk\CYRGHK\cyrghup\CYRGUP\cyrh\CYRH
825       \cyrhdsc\CYRHDSC\cyrhhcrs\CYRHHCRS\cyrhhk\CYRHHK\cyrhrdsn
826       \CYRHRDSN\cyri\CYRI\cyrie\CYRIE\cyrii\CYRII\cyrishrt\CYRISHRT
827       \cyrishrtdsc\CYRISHRTDSC\cyrizh\CYRIZH\cyrje\CYRJE\cyrk\CYRK
828       \cyrkbeak\CYRKBEAK\cyrkdsc\CYRKDSC\cyrkchcrs\CYRKHCRS\cyrkhhk
829       \CYRKHK\cyrkvcrs\CYRKVCRS\cyrll\CYRL\cyrldsc\CYRLDSC\cyrllhk
830       \CYRLHK\cyrllje\CYRLJE\cyrml\CYRM\cyrmdsc\CYRMDSC\cyrmlhk\CYRMLHK
831       \cyrn\CYRN\cyrndsc\CYRNDSC\cyrng\CYRNG\cyrnhk\CYRNHK\cyrnje
832       \CYRNJE\cyrnlhk\CYRNLHK\cyro\CYRO\cyrotld\CYROTLD\cyrp\CYRP
833       \cyrphk\CYRPHK\cyrq\CYRQ\cyrr\CYRR\cyrddsc\CYRDDSC\cyrddhk
834       \CYRDDHK\cyrtdsc\CYRTDSC\cyrtdsc\CYRSDSC\cyrsemisftsn\CYRSEMISFTSN
835       \cyrshftsn\CYRSFTSN\cyrsh\CYRSH\cyrshch\CYRSHCH\cyrshha\CYRSHHA
836       \cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC
837       \cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC
838       \cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC
839       \cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC
840       \cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC
841       \cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC
842       \cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC\cyrtdsc\CYRTDSC
843     }
```

Here we process each option:

```
844 \DeclareOption*{%
845   \let\encodingdefault\CurrentOption
846   \edef\reserved@f{%
847     \lowercase{\def\noexpand\reserved@f{\CurrentOption enc.def}}}%
848   \reserved@f
849   \InputIfFileExists\reserved@f
850     {\PackageError{fontenc}%
851       {Encoding file '\reserved@f' not found.%
852       \MessageBreak
853       You might have misspelt the name of the encoding}%
854     {Necessary code for this encoding was not
855       loaded.\MessageBreak
856       Thus calling the encoding later on will
857       produce further error messages.}}%
858   \let\reserved@f\relax
```

In case the current encoding is one of a list of known cyrillic ones we extend the `\@uclclist`:

```
859 \expandafter\in@\expandafter{\CurrentOption}%
860                                     {T2A,T2B,T2C,X2,LCY,OT2}%
861 \ifin@
```

But only if it hasn't already been extended. This might happen if there are several calls to fontenc loading one of the above encodings. If we don't do this check the `\@uclclist` gets unnecessarily big, slowing down the processing at runtime.

```
862 \expandafter\in@\expandafter\cyr@\expandafter
863                                     {\@uclclist}%
864 \ifin@
865 \else
866 \update@uclc@with@cyrillic
867 \fi
868 \fi
869 }
```

```
870 \ProcessOptions*
```

```
871 \fontencoding\encodingdefault\selectfont
```

To save some space we get rid of the macro extending the `\@uclclist` (might have happened already).

```
872 \let\update@uclc@with@cyrillic\relax
```

Finally we pretend that the fontenc package wasn't read in. This allows for using it several times, e.g., in a class file and in the preamble (at the cost of not getting any version info). That kind of hackery shows that using a general purpose package just for loading an encoding is not the right kind of interface for setting up encodings — it will get replaced at some point in the future.

```
873 \global\expandafter\let\csname ver@fontenc.sty\endcsname\relax
874 \global\expandafter\let\csname opt@fontenc.sty\endcsname\relax
875 \global\let\@ifl@ter@@\@ifl@ter
876 \def\@ifl@ter#1#2#3#4#5{\global\let\@ifl@ter\@ifl@ter@@}
877 </package>
```

20.2 The textcomp package

This one is for the **TS1** encoding which contains text symbols for use with the **T1**-encoded text fonts. It therefore first inputs the file **TS1enc.def** and then sets (or resets) the defaults for the symbols it contains. The result of this is that when one of these symbols is accessed and the current encoding does not provide it, the symbol will be supplied by a silent, local change to this encoding.

```
878 (*TS1sty)
```

Since many PostScript fonts only implement a subset of **TS1** many commands only produce black blobs of ink. To resolve the resulting problems a number of options have been introduced and some code has been developed to distinguish sub-encodings.

The sub-encodings have a numerical id and are defined as follows for **TS1**:

#5 those **TS1** symbols that are also in the ISO-Adobe character set; without `\textcurrency`, which is often misused for the Euro. Older Type1 fonts from the non- \TeX world provide only this subset.

#4 = **#5** + `\texteuro`. Most newer fonts provide this.

#3 = **#4** + `\textomega`. Can also be described as $\text{TS1} \cap (\text{ISO-Adobe} \cup \text{MacRoman})$. (Except for the missing "currency".)

#2 = **#3** + `\textestimated` + `\textcurrency`. Can also be described as $\text{TS1} \cap \text{Adobe-Western-2}$. This may be relevant for OpenType fonts, which usually show the Adobe-Western-2 character set.

#1 = TS1 without `\textcircled` and `\t`. These two glyphs are often not implemented and if their kernel defaults are changed commands like `\copyright` unnecessarily fail.

#0 = full TS1

And here a summary to go in the transcript file:

```
879 \PackageInfo{textcomp}{Sub-encoding information:\MessageBreak
880   \space\space 5 = only ISO-Adobe without \string\textcurrency\MessageBreak
881   \space\space 4 = 5 + \string\texteuro\MessageBreak
882   \space\space 3 = 4 + \string\textohm\MessageBreak
883   \space\space 2 = 3 + \noexpand\textestimated+ \string\textcurrency\MessageBreak
884   \space\space 1 = TS1 - \noexpand\textcircled- \string\t\MessageBreak
885   \space\space 0 = TS1 (full)\MessageBreak
886   Font families with sub-encoding setting implement\MessageBreak
887   only a restricted character set as indicated.\MessageBreak
888   Family '?' is the default used for unknown fonts.\MessageBreak
889   See the documentation for details\@gobble}
```

\DeclareEncodingSubset An encoding subset to which a font family belongs is declared by `\DeclareEncodingSubset` that take the major encoding as the first argument (e.g., TS1), the family name as the second argument (e.g., cmr), and the subset encoding id as a third, (e.g., 0 for cmr).

The default encoding subset to use when nothing is known about the current font family is named ?.

```
890 \def\DeclareEncodingSubset#1#2#3{%
891   \@ifundefined{#1:#2}%
892     {\PackageInfo{textcomp}{Setting #2 sub-encoding to #1/#3}}%
893     {\PackageInfo{textcomp}{Changing #2 sub-encoding to #1/#3}}%
894   \@namedef{#1:#2}{#3}}
895 \onlypreamble\DeclareEncodingSubset
```

The options for the package are the following:

safe for unknown font families enables only symbols that are also in the ISO-Adobe character set; without "currency", which is often misused for the Euro. Older Type1 fonts from the non-TeX world provide only this subset.

euro enables the "safe" symbols plus the `\texteuro` command. Most newer fonts provide this.

full enables all TS1 commands; useful only with fonts like EC or CM bright.

almostfull same as "full", except that `\textcircled` and `\t` are *not* redefined from their defaults to avoid that commands like `\copyright` suddenly no longer work.

force ignore all subset encoding definitions stored in the package itself or in the configuration file and always use the default subset as specified by one of the other options (seldom useful, only dangerous).

\iftc@forced Switch used to implement the force option

```
896 \newif\iftc@forced   \tc@forcedfalse
```

This is implemented by defining the default subset:

```
897 \DeclareOption{full}{\DeclareEncodingSubset{TS1}{?}{0}}
898 \DeclareOption{almostfull}{\DeclareEncodingSubset{TS1}{?}{1}}
899 \DeclareOption{euro}{\DeclareEncodingSubset{TS1}{?}{4}}
900 \DeclareOption{safe}{\DeclareEncodingSubset{TS1}{?}{5}}
```

The default is “almostfull” which means that old documents will work except that `\textcircled` and `\t` will use the kernel defaults (with the advantage that this also works if the current font (as often the case) doesn’t implement these glyphs.

The “force” option simply sets the switch to true.

```
901 \DeclareOption{force}{\tc@forcedtrue}
```

The suggestions to user is to use the “safe” option always unless that balks in which case they could switch to “almostfull” but then better check their output manually.

```
902 \def\tc@errorwarn{\PackageError}
```

```
903 \DeclareOption{warn}{\gdef\tc@errorwarn#1#2#3{\PackageWarning{#1}{#2}}}
```

```
904 \ExecuteOptions{almostfull}
```

```
905 \ProcessOptions\relax
```

`\CheckEncodingSubset` The command `\CheckEncodingSubset` will check if the current font family has the right encoding subset to typeset a certain command. It takes five arguments as follows: first argument is either `\UseTextSymbol`, `\UseTextAccent` depending on whether or not the symbol is a text symbol or a text accent.

The second argument is the encoding from which this symbol should be fetched.

The third argument is either a fake accessor command or an error message. the code in that argument (if ever executed) receives two arguments: `#2` and `#5` of `\CheckEncodingSubset`.

Argument four is the subset encoding id to test against: if this value is higher than the subset id of the current font family then we typeset the symbol, i.e., execute `#1{#2}#5` otherwise it runs `#3#5`, e.g., to produce an error message or fake the glyph somehow.

Argument five is the symbol or accent command that is being checked.

For usage examples see definitions below.

```
906 \iftc@forced
```

If the “force” option was given we always use the default for testing against.

```
907 \def\CheckEncodingSubset#1#2#3#4#5{%
```

```
908   \ifnum #4>%
```

```
909     0\csname #2:\endcsname
```

```
910     \relax
```

```
911   \expandafter\@firstoftwo
```

```
912   \else
```

```
913   \expandafter\@secondoftwo
```

```
914   \fi
```

```
915   {#1{#2}}{#3}%
```

```
916   #5%
```

```
917 }
```

In normal circumstances the test is a bit more complicated: first check if there exists a macro `\langle arg2\rangle:\langle current-family\rangle` and if so use that value to test against, otherwise use the default to test against.

```
918 \else
```

```
919 \def\CheckEncodingSubset#1#2#3#4#5{%
```

```
920   \ifnum #4>%
```

```
921     \expandafter\ifx\csname #2:\f@family\endcsname\relax
```

```
922       0\csname #2:\endcsname
```

```
923     \else
```

```
924       \csname #2:\f@family\endcsname
```

```
925     \fi
```

```
926     \relax
```

```
927   \expandafter\@firstoftwo
```

```
928   \else
```

```
929   \expandafter\@secondoftwo
```

```
930   \fi
```

```
931   {#1{#2}}{#3}%
```

```
932   #5%
```



```

933 }
934 \fi

tc@subst
935 \def\tc@subst#1{%
936   \tc@errorwarn{textcomp}% % should be latex error if general
937   {Symbol \string#1 not provided by\MessageBreak
938     font family \f@family\space
939     in TS1 encoding.\MessageBreak Default family used instead}\@eha
940   \bgroup\fontfamily\tc@compstdefault\selectfont#1\egroup
941 }

\textcompstdefault
942 \def\textcompstdefault{cmr}

\tc@error \tc@error is going to be used in arg #3 of \CheckEncodingSubset when a symbol
is not available in a certain font family. It gets pass the encoding it normally lives
in (arg one) and the name of the symbol or accent that has a problem.

943 % error commands take argument:
944 % #1 symbol to be used
945 \def\tc@error#1{%
946   \PackageError{textcomp}% % should be latex error if general
947   {Accent \string#1 not provided by\MessageBreak
948     font family \f@family\space
949     in TS1 encoding}\@eha
950 }

\tc@fake@euro \tc@fake@euro is an example of a “fake” definition to use in arg #3 of
\CheckEncodingSubset when a symbol is not available in a certain font family.
Here we produce an Euro symbol by combining a “C” with a “=”.

951 \def\tc@fake@euro#1{%
952   \leavevmode
953   \PackageInfo{textcomp}{Faking \noexpand#1for font family
954     \f@family\MessageBreak in TS1 encoding}%
955   \valign{##}\cr
956   \vfil\hbox to 0.07em{\dimen@f@size\p@
957     \math@fontsfalse
958     \fontsize{.7\dimen@}\z@\selectfont=\hss}\vfil\cr%
959   \hbox{C}\cr
960   }%
961 }

\tc@check@symbol These are two abbreviations that we use below to check symbols and accents in
\tc@check@accent TS1. Only there to save some space, e.g., we can then write

\DeclareTextCommandDefault{\textcurrency}{\tc@check@symbol3\textcurrency}

to ensure that \textcurrency is only typeset if the current font has a TS1 subset
id of less than 3. Otherwise \tc@error is called telling the user that for this font
family \textcurrency is not available.

962 \def\tc@check@symbol{\CheckEncodingSubset\UseTextSymbol{TS1}\tc@subst}
963 \def\tc@check@accent{\CheckEncodingSubset\UseTextAccent{TS1}\tc@error}

We start with the commands that are “safe” and which can be unconditionally
set up, first the accents...

964 \DeclareTextAccentDefault{\capitalcedilla}{TS1}
965 \DeclareTextAccentDefault{\capitalogonek}{TS1}
966 \DeclareTextAccentDefault{\capitalgrave}{TS1}
967 \DeclareTextAccentDefault{\capitalacute}{TS1}
968 \DeclareTextAccentDefault{\capitalcircumflex}{TS1}
969 \DeclareTextAccentDefault{\capitaltilde}{TS1}

```

```

970 \DeclareTextAccentDefault{\capitaldieresis}{TS1}
971 \DeclareTextAccentDefault{\capitalhungarumlaut}{TS1}
972 \DeclareTextAccentDefault{\capitalring}{TS1}
973 \DeclareTextAccentDefault{\capitalcaron}{TS1}
974 \DeclareTextAccentDefault{\capitalbreve}{TS1}
975 \DeclareTextAccentDefault{\capitalmacron}{TS1}
976 \DeclareTextAccentDefault{\capitaldotaccent}{TS1}
...and then the other glyphs.
977 \DeclareTextSymbolDefault{\textcapitalcompwordmark}{TS1}
978 \DeclareTextSymbolDefault{\textascendercompwordmark}{TS1}
979 \DeclareTextSymbolDefault{\textquotestraightbase}{TS1}
980 \DeclareTextSymbolDefault{\textquotestraightdblbase}{TS1}
981 \DeclareTextSymbolDefault{\texttwelveudash}{TS1}
982 \DeclareTextSymbolDefault{\textthreequartersemdash}{TS1}
983 \DeclareTextSymbolDefault{\textdollar}{TS1}
984 \DeclareTextSymbolDefault{\textquotesingle}{TS1}
985 \DeclareTextSymbolDefault{\textasteriskcentered}{TS1}
986 \DeclareTextSymbolDefault{\textfractionsolidus}{TS1}
987 \DeclareTextSymbolDefault{\textminus}{TS1}
988 \DeclareTextSymbolDefault{\textlbrackdbl}{TS1}
989 \DeclareTextSymbolDefault{\textrbrackdbl}{TS1}
990 \DeclareTextSymbolDefault{\textasciigrave}{TS1}
991 \DeclareTextSymbolDefault{\texttildelow}{TS1}
992 \DeclareTextSymbolDefault{\textasciibreve}{TS1}
993 \DeclareTextSymbolDefault{\textasciicaron}{TS1}
994 \DeclareTextSymbolDefault{\textgravedbl}{TS1}
995 \DeclareTextSymbolDefault{\textacutedbl}{TS1}
996 \DeclareTextSymbolDefault{\textdagger}{TS1}
997 \DeclareTextSymbolDefault{\textdaggerdbl}{TS1}
998 \DeclareTextSymbolDefault{\textbardbl}{TS1}
999 \DeclareTextSymbolDefault{\textperthousand}{TS1}
1000 \DeclareTextSymbolDefault{\textbullet}{TS1}
1001 \DeclareTextSymbolDefault{\textcelsius}{TS1}
1002 \DeclareTextSymbolDefault{\textflorin}{TS1}
1003 \DeclareTextSymbolDefault{\texttrademark}{TS1}
1004 \DeclareTextSymbolDefault{\textcent}{TS1}
1005 \DeclareTextSymbolDefault{\textsterling}{TS1}
1006 \DeclareTextSymbolDefault{\textyen}{TS1}
1007 \DeclareTextSymbolDefault{\textbrokenbar}{TS1}
1008 \DeclareTextSymbolDefault{\textsection}{TS1}
1009 \DeclareTextSymbolDefault{\textasciidieresis}{TS1}
1010 \DeclareTextSymbolDefault{\textcopyright}{TS1}
1011 \DeclareTextSymbolDefault{\textordfeminine}{TS1}
1012 \DeclareTextSymbolDefault{\textlnot}{TS1}
1013 \DeclareTextSymbolDefault{\textregistered}{TS1}
1014 \DeclareTextSymbolDefault{\textasciimacron}{TS1}
1015 \DeclareTextSymbolDefault{\textdegree}{TS1}
1016 \DeclareTextSymbolDefault{\textpm}{TS1}
1017 \DeclareTextSymbolDefault{\texttwosuperior}{TS1}
1018 \DeclareTextSymbolDefault{\textthreesuperior}{TS1}
1019 \DeclareTextSymbolDefault{\textasciiacute}{TS1}
1020 \DeclareTextSymbolDefault{\textmu}{TS1}
1021 \DeclareTextSymbolDefault{\textparagraph}{TS1}
1022 \DeclareTextSymbolDefault{\textperiodcentered}{TS1}
1023 \DeclareTextSymbolDefault{\textonesuperior}{TS1}
1024 \DeclareTextSymbolDefault{\textordmasculine}{TS1}
1025 \DeclareTextSymbolDefault{\textonequarter}{TS1}
1026 \DeclareTextSymbolDefault{\textonehalf}{TS1}
1027 \DeclareTextSymbolDefault{\textthreequarters}{TS1}
1028 \DeclareTextSymbolDefault{\texttimes}{TS1}
1029 \DeclareTextSymbolDefault{\textdiv}{TS1}

```

The `\texteuro` is only available for subsets with id 4 or less. Otherwise we fake the glyph using `\tc@fake@euro`

```
1030 \DeclareTextCommandDefault{\texteuro}
1031   {\CheckEncodingSubset\UseTextSymbol{TS1}\tc@fake@euro5\texteuro}
```

The `\textohm` is only available for subsets with id 3 or less. Otherwise we produce an error.

```
1032 \DeclareTextCommandDefault{\textohm}{\tc@check@symbol4\textohm}
```

The `\textestimated` and `\textcurrency` are only provided for fonts with subset encoding with id 2 or less.

```
1033 \DeclareTextCommandDefault{\textestimated}{\tc@check@symbol3\textestimated}
1034 \DeclareTextCommandDefault{\textcurrency}{\tc@check@symbol3\textcurrency}
```

Nearly all of the remaining glyphs are provided only with fonts with id 1 or 0, i.e., are essentially complete.

```
1035 \DeclareTextCommandDefault{\capitaltie}{\tc@check@accent2\capitaltie}
1036 \DeclareTextCommandDefault{\newtie}{\tc@check@accent2\newtie}
1037 \DeclareTextCommandDefault{\capitalnewtie}{\tc@check@accent2\capitalnewtie}
1038 \DeclareTextCommandDefault{\textleftarrow}{\tc@check@symbol2\textleftarrow}
1039 \DeclareTextCommandDefault{\textrightarrow}{\tc@check@symbol2\textrightarrow}
1040 \DeclareTextCommandDefault{\textblank}{\tc@check@symbol2\textblank}
1041 \DeclareTextCommandDefault{\textdblhyphen}{\tc@check@symbol2\textdblhyphen}
1042 \DeclareTextCommandDefault{\textzerooldstyle}{\tc@check@symbol2\textzerooldstyle}
1043 \DeclareTextCommandDefault{\textoneoldstyle}{\tc@check@symbol2\textoneoldstyle}
1044 \DeclareTextCommandDefault{\texttwooldstyle}{\tc@check@symbol2\texttwooldstyle}
1045 \DeclareTextCommandDefault{\textthreeoldstyle}{\tc@check@symbol2\textthreeoldstyle}
1046 \DeclareTextCommandDefault{\textfouroldstyle}{\tc@check@symbol2\textfouroldstyle}
1047 \DeclareTextCommandDefault{\textfiveoldstyle}{\tc@check@symbol2\textfiveoldstyle}
1048 \DeclareTextCommandDefault{\textsixoldstyle}{\tc@check@symbol2\textsixoldstyle}
1049 \DeclareTextCommandDefault{\textsevenoldstyle}{\tc@check@symbol2\textsevenoldstyle}
1050 \DeclareTextCommandDefault{\teightoldstyle}{\tc@check@symbol2\teightoldstyle}
1051 \DeclareTextCommandDefault{\textnineoldstyle}{\tc@check@symbol2\textnineoldstyle}
1052 \DeclareTextCommandDefault{\textlangle}{\tc@check@symbol2\textlangle}
1053 \DeclareTextCommandDefault{\textrangle}{\tc@check@symbol2\textrangle}
1054 \DeclareTextCommandDefault{\textmho}{\tc@check@symbol2\textmho}
1055 \DeclareTextCommandDefault{\textbigcircle}{\tc@check@symbol2\textbigcircle}
1056 \DeclareTextCommandDefault{\textuparrow}{\tc@check@symbol2\textuparrow}
1057 \DeclareTextCommandDefault{\textdownarrow}{\tc@check@symbol2\textdownarrow}
1058 \DeclareTextCommandDefault{\textborn}{\tc@check@symbol2\textborn}
1059 \DeclareTextCommandDefault{\textdivorced}{\tc@check@symbol2\textdivorced}
1060 \DeclareTextCommandDefault{\textdied}{\tc@check@symbol2\textdied}
1061 \DeclareTextCommandDefault{\textleaf}{\tc@check@symbol2\textleaf}
1062 \DeclareTextCommandDefault{\textmarried}{\tc@check@symbol2\textmarried}
1063 \DeclareTextCommandDefault{\textmusicalnote}{\tc@check@symbol2\textmusicalnote}
1064 \DeclareTextCommandDefault{\textdblhyphenchar}{\tc@check@symbol2\textdblhyphenchar}
1065 \DeclareTextCommandDefault{\textdollaroldstyle}{\tc@check@symbol2\textdollaroldstyle}
1066 \DeclareTextCommandDefault{\textcentoldstyle}{\tc@check@symbol2\textcentoldstyle}
1067 \DeclareTextCommandDefault{\textcolonmonetary}{\tc@check@symbol2\textcolonmonetary}
1068 \DeclareTextCommandDefault{\textwon}{\tc@check@symbol2\textwon}
1069 \DeclareTextCommandDefault{\textnaira}{\tc@check@symbol2\textnaira}
1070 \DeclareTextCommandDefault{\textguarani}{\tc@check@symbol2\textguarani}
1071 \DeclareTextCommandDefault{\textpeso}{\tc@check@symbol2\textpeso}
1072 \DeclareTextCommandDefault{\textlira}{\tc@check@symbol2\textlira}
1073 \DeclareTextCommandDefault{\textrecipe}{\tc@check@symbol2\textrecipe}
1074 \DeclareTextCommandDefault{\textinterrobang}{\tc@check@symbol2\textinterrobang}
1075 \DeclareTextCommandDefault{\textinterrobangdown}{\tc@check@symbol2\textinterrobangdown}
1076 \DeclareTextCommandDefault{\textdong}{\tc@check@symbol2\textdong}
1077 \DeclareTextCommandDefault{\textpertenthousand}{\tc@check@symbol2\textpertenthousand}
1078 \DeclareTextCommandDefault{\textpilcrow}{\tc@check@symbol2\textpilcrow}
1079 \DeclareTextCommandDefault{\textbaht}{\tc@check@symbol2\textbaht}
1080 \DeclareTextCommandDefault{\textnumero}{\tc@check@symbol2\textnumero}
1081 \DeclareTextCommandDefault{\textdiscount}{\tc@check@symbol2\textdiscount}
```

```

1082 \DeclareTextCommandDefault{\textopenbullet}{\tc@check@symbol2\textopenbullet}
1083 \DeclareTextCommandDefault{\textservicemark}{\tc@check@symbol2\textservicemark}
1084 \DeclareTextCommandDefault{\textlquill}{\tc@check@symbol2\textlquill}
1085 \DeclareTextCommandDefault{\textrquill}{\tc@check@symbol2\textrquill}
1086 \DeclareTextCommandDefault{\textcopyleft}{\tc@check@symbol2\textcopyleft}
1087 \DeclareTextCommandDefault{\textcircledP}{\tc@check@symbol2\textcircledP}
1088 \DeclareTextCommandDefault{\textreferencemark}{\tc@check@symbol2\textreferencemark}
1089 \DeclareTextCommandDefault{\textsurd}{\tc@check@symbol2\textsurd}

```

The `\textcircled` and `\t` are handled specially, unless the current font has a subset id of 0 (i.e. full TS1) we pick the symbols up from the the math font encodings, i.e., the third argument to `\CheckEncodingSubset` uses `\UseTextAccent` to get them from there.

```

1090 \DeclareTextCommandDefault{\textcircled}
1091 {\CheckEncodingSubset\UseTextAccent{TS1}{\UseTextAccent{OMS}}1\textcircled}
1092 \DeclareTextCommandDefault{\t}
1093 {\CheckEncodingSubset\UseTextAccent{TS1}{\UseTextAccent{OML}}1\t}

```

Finally input the encoding-specific definitions for TS1 thus making the top-level definitions optimised for this encoding (and not for the default encoding, see section 19.2).

```

1094 \input{ts1enc.def}

```

Now having the new glyphs available we also want to make sure that they are used. For most cases this will automatically happen but for some glyphs there are inferior definitions already known to \LaTeX which will prevent the usage of the TS1 versions (see section 19.1 above). So we better get rid of them:

```

1095 \UndeclareTextCommand{\textsterling}{OT1}
1096 \UndeclareTextCommand{\textdollar}{OT1}

```

Similar declarations should probably be made for other encodings like OT4 if they are in use.

```

1097 %\UndeclareTextCommand{\textsterling}{OT4}
1098 %\UndeclareTextCommand{\textdollar}{OT4}

```

From the T1 encoding there are two candidates for removal: `%0` and `%00` since these are both constructed from `%` followed by a tiny ‘o’ rather than being a single glyph. The problem with this approach is that in PostScript fonts this small zero is usually not available resulting in `%■` rather than `%0` while the real glyph (at least for `\textperthousand`) is available in the PostScript version of TS1. So for the moment we compromise by removing the T1 declaration for `\textperthousand` but keeping the one for `\textpertenthousand`. This will have the effect that with Computer Modern fonts everything will come out (although `%0` and `%00` are not taken from the same physical font) and with PostScript fonts `%0` will come out correctly while `%00` will most likely look like `%■` — which is probably an improvement over just getting a single ‘■’ to indicate a completely missing glyph, which would happen if we also ‘undeclared’ `\textpertenthousand`.

```

1099 \UndeclareTextCommand{\textperthousand}{T1}
1100 %\UndeclareTextCommand{\textpertenthousand}{T1}

```

20.2.1 Supporting oldstyle digits

```

1101 \DeclareRobustCommand\oldstylenums[1]{%
1102 \begingroup
1103 \ifmmode
1104 \mathgroup\symletters #1%
1105 \else
1106 \CheckEncodingSubset\@use@text@encoding{TS1}%
1107 {\PackageWarning{textcomp}%
1108 {Oldstyle digits unavailable for
1109 family \f@family.\MessageBreak
1110 Lining digits used instead}}%
1111 \tw@{#1}%

```

```

1112 \fi
1113 \endgroup
1114 }

```

20.2.2 Subset encoding defaults

For many font families commonly used in the T_EX world we provide the subset encoding data here. Users can add additional font families in the file `textcomp.cfg` if they own other fonts.

However, if the option “forced” was given then all subset encoding specifications are ignored, so there is no point in setting any of them up:

```
1115 \iftc@forced \else
```

Computer modern based fonts (e.g., CM, CM-Bright, Concrete):

```

1116 \DeclareEncodingSubset{TS1}{cmr}      {0}
1117 \DeclareEncodingSubset{TS1}{cmss}     {0}
1118 \DeclareEncodingSubset{TS1}{cmtt}     {0}
1119 \DeclareEncodingSubset{TS1}{cmvtt}    {0}
1120 \DeclareEncodingSubset{TS1}{cmbr}     {0}
1121 \DeclareEncodingSubset{TS1}{cmtl}     {0}
1122 \DeclareEncodingSubset{TS1}{ccr}      {0}

```

PSNFSS fonts:

```

1123 \DeclareEncodingSubset{TS1}{ptm}      {4}
1124 \DeclareEncodingSubset{TS1}{pcr}      {4}
1125 \DeclareEncodingSubset{TS1}{phv}      {4}
1126 \DeclareEncodingSubset{TS1}{ppl}      {3}
1127 \DeclareEncodingSubset{TS1}{pag}      {4}
1128 \DeclareEncodingSubset{TS1}{pbk}      {4}
1129 \DeclareEncodingSubset{TS1}{pnc}      {4}
1130 \DeclareEncodingSubset{TS1}{pzc}      {4}
1131 \DeclareEncodingSubset{TS1}{bch}      {4}
1132 \DeclareEncodingSubset{TS1}{put}      {5}

```

Other CTAN fonts (probably not complete):

```

1133 \DeclareEncodingSubset{TS1}{uag}      {5}
1134 \DeclareEncodingSubset{TS1}{ugq}      {5}
1135 \DeclareEncodingSubset{TS1}{ul8}      {4}
1136 \DeclareEncodingSubset{TS1}{ul9}      {4} % (LuxiSans, one day)
1137 \DeclareEncodingSubset{TS1}{augie}    {5}
1138 \DeclareEncodingSubset{TS1}{dayrom}    {3}
1139 \DeclareEncodingSubset{TS1}{dayroms}  {3}
1140 \DeclareEncodingSubset{TS1}{pxr}      {0}
1141 \DeclareEncodingSubset{TS1}{pxss}     {0}
1142 \DeclareEncodingSubset{TS1}{pxtt}     {0}
1143 \DeclareEncodingSubset{TS1}{txr}      {0}
1144 \DeclareEncodingSubset{TS1}{txss}     {0}
1145 \DeclareEncodingSubset{TS1}{txtt}     {0}

```

Fourier-GUTenberg:

```

1146 \DeclareEncodingSubset{TS1}{futs}     {4}
1147 \DeclareEncodingSubset{TS1}{futx}     {4}
1148 \DeclareEncodingSubset{TS1}{futj}     {4}

```

Y&Y’s Lucida Bright

```

1149 \DeclareEncodingSubset{TS1}{hlh}      {3}
1150 \DeclareEncodingSubset{TS1}{hls}      {3}
1151 \DeclareEncodingSubset{TS1}{hlst}     {3}

```

The remaining settings for Lucida are conservative: the following fonts contain the `\textohm` character but not the `\texteuro`, i.e., belong to neither subset 4 nor subset 3. If you want to use the `\textohm` with these fonts copy these definition to `textcomp.cfg` and change the subset to 3. However in that case make sure that you do not use the `\texteuro`.

```
1152 \DeclareEncodingSubset{TS1}{hlct}     {5}
```

```

1153 \DeclareEncodingSubset{TS1}{hlx}      {5}
1154 \DeclareEncodingSubset{TS1}{hlce}     {5}
1155 \DeclareEncodingSubset{TS1}{hlcn}     {5}
1156 \DeclareEncodingSubset{TS1}{hlcw}     {5}
1157 \DeclareEncodingSubset{TS1}{hlcf}     {5}

```

Other commercial families...

```

1158 \DeclareEncodingSubset{TS1}{pplx}     {3}
1159 \DeclareEncodingSubset{TS1}{pplj}     {3}
1160 \DeclareEncodingSubset{TS1}{ptmx}     {4}
1161 \DeclareEncodingSubset{TS1}{ptmj}     {4}

```

If the file `textcomp.cfg` exists it will be loaded at this point. This allows to define further subset encodings for font families not covered by default.

```

1162 \InputIfFileExists{textcomp.cfg}
1163   {\PackageInfo{textcomp}{Local configuration file used}}{}
1164 \fi
1165 \</TS1sty>

```

File m

ltcounts.dtx

21 Counters and Lengths

Commands for defining and using counters. This file defines:

<code>\newcounter</code>	To define a new counter.
<code>\setcounter</code>	To set the value of counters.
<code>\addtocounter</code>	Increase the counter #1 by the number #2.
<code>\stepcounter</code>	Increase a counter by one.
<code>\refstepcounter</code>	Increase a counter by one, also setting the value used by <code>\label</code> .
<code>\value</code>	For accessing the value of the counter as a T _E X number (as opposed to <code>\the<counter></code> which expands to the <i>printed</i> representation of <code><counter></code>)
<code>\arabic</code>	<code>\arabic{<counter>}</code> : 1, 2, 3, ...
<code>\roman</code>	<code>\roman{<counter>}</code> : i, ii, iii, ...
<code>\Roman</code>	<code>\Roman{<counter>}</code> : I, II, III, ...
<code>\alph</code>	<code>\alph{<counter>}</code> : a, b, c, ...
<code>\Alph</code>	<code>\Alph{<counter>}</code> : A, B, C, ...
<code>\fnsymbol</code>	<code>\fnsymbol{<counter>}</code> : *, †, ‡, ...

1 (*2ekernel)

21.1 Environment Counter Macros

An environment foo has an associated counter defined by the following control sequences:

<code>\c@foo</code>	Contains the counter's numerical value. It is defined by <code>\newcount\foocounter</code> .
<code>\thefoo</code>	Macro that expands to the printed value of <code>\foocounter</code> . For example, if sections are numbered within chapters, and section headings look like Section II-3. The Nature of Counters then <code>\thesection</code> might be defined by: <code>\def\thesection</code> <code>{\@Roman{\c@chapter}-\@arabic{\c@section}}</code>
<code>\p@foo</code>	Macro that expands to a printed 'reference prefix' of counter foo. Any <code>\ref</code> to a value created by counter foo will produce the expansion of <code>\p@foo\thefoo</code> when the <code>\label</code> command is executed. See file <code>ltxref.dtx</code> for an extension of this mechanism.
<code>\cl@foo</code>	List of counters to be reset when foo stepped. Has format <code>\@elt{countera}\@elt{counterb}\@elt{counterc}</code> .

NOTE:

`\thefoo` and `\p@foo` *must* be defined in such a way that `\edef\bar{\thefoo}` or `\edef\bar{\p@foo}` defines `\bar` so that it will evaluate to the counter value at the time of the `\edef`, even after `\foocounter` and any other counters have been changed. This will happen if you use the standard commands `\@arabic`, `\@Roman`, etc.

The following commands are used to define and modify counters.

`\refstepcounter{<foo>}`

Same as `\stepcounter`, but it also defines `\@currentreference` so that a subsequent `\label{<bar>}` command causes `\ref{<bar>}` to generate the current value of counter `<foo>`.

`\@definecounter{<foo>}`

Initializes counter `{<foo>}` (with empty reset list), defines `\p@foo` and `\thefoo` to be null. Also adds `<foo>` to `\cl@ckpt` – the reset list of a dummy counter `@ckpt` used for taking checkpoints for the `\include` system.

```

    \@addtoreset{<foo>}{<bar>} : Adds counter <foo> to the list of counters
    \cl@bar to be reset when counter <bar> is stepped.

\setcounter \setcounter{<foo>}{<val>} : Globally sets \foocounter equal to <val>.
2 \def\setcounter#1#2{%
3   \@ifundefined{c@#1}%
4     {\@nocounterr{#1}}%
5     {\global\csname c@#1\endcsname#2\relax}}

\addtocounter \addtocounter{<foo>}{<val>} Globally increments \foocounter by <val>.
6 \def\addtocounter#1#2{%
7   \@ifundefined{c@#1}%
8     {\@nocounterr{#1}}%
9     {\global\advance\csname c@#1\endcsname #2\relax}}

\newcounter \newcounter{<newctr>}[<oldctr>] Defines <newctr> to be a counter, which is
reset when counter <oldctr> is stepped. If <newctr> already defined produces
'c@newctr already defined' error.
10 \def\newcounter#1{%
11   \expandafter\@ifdefinable \csname c@#1\endcsname
12     {\@definecounter{#1}}%
13     \@ifnextchar[{\@newctr{#1}}{}]}

\value \value{<ctr>} produces the value of counter <ctr>, for use with a \setcounter or
\addtocounter command.
14 \def\value#1{\csname c@#1\endcsname}

\@newctr
15 \def\@newctr#1[#2]{%
16   \@ifundefined{c@#2}{\@nocounterr{#2}}{\@addtoreset{#1}{#2}}}}

\stepcounter \stepcounterfoo Globally increments counter \c@FOO and resets all subsidiary
counters.
17 \def\stepcounter#1{%
18   \addtocounter{#1}\@ne
19   \begingroup
20     \let\@elt\@stpelt
21     \csname cl@#1\endcsname
22   \endgroup}

\@stpelt
23 \def\@stpelt#1{\global\csname c@#1\endcsname \z@}

\cl@ckpt
24 \def\cl@ckpt{\@elt{page}}

\@definecounter
25 \def\@definecounter#1{\expandafter\newcount\csname c@#1\endcsname
26   \setcounter{#1}\z@
27   \global\expandafter\let\csname cl@#1\endcsname\@empty
28   \@addtoreset{#1}{ckpt}%
29   \global\expandafter\let\csname p@#1\endcsname\@empty
30   \expandafter
31   \gdef\csname the#1\endcsname\expandafter\endcsname\expandafter
32     {\expandafter\@arabic\csname c@#1\endcsname}}

\@addtoreset
33 \def\@addtoreset#1#2{\expandafter\@cons\csname cl@#2\endcsname {{#1}}}
```


Numbering commands for definitions of `\theCOUNTER` and `\list` arguments.
All commands can now be used in text and math mode.

```

\arabic Representation of  $\langle counter \rangle$  as arabic numerals. Changed 29 Apr 86 to make it
print the obvious thing it COUNTER not positive.
34 \def\arabic#1{\expandafter\@arabic\csname c@#1\endcsname}

\roman Representation of  $\langle counter \rangle$  as lower-case Roman numerals.
35 \def\roman#1{\expandafter\@roman\csname c@#1\endcsname}

\Roman Representation of  $\langle counter \rangle$  as upper-case Roman numerals.
36 \def\Roman#1{\expandafter\@Roman\csname c@#1\endcsname}

\alph Representation of  $\langle counter \rangle$  as a lower-case letter: 1 = a, 2 = b, etc.
37 \def\alph#1{\expandafter\@alph\csname c@#1\endcsname}

\Alph Representation of  $\langle counter \rangle$  as an upper-case letter: 1 = A, 2 = B, etc.
38 \def\Alph#1{\expandafter\@Alph\csname c@#1\endcsname}

\fnsymbol Representation of  $\langle COUNTER \rangle$  as a footnote symbol: 1 = *, 2 = †, etc.
39 \def\fnsymbol#1{\expandafter\@fnsymbol\csname c@#1\endcsname}

\@arabic \@arabic\F00counter Representation of \F00counter as arabic numerals.
40 \def\@arabic#1{\number #1} %% changed 29 Apr 86

\@roman \@roman\F00counter Representation of \F00counter as lower-case Roman nu-
merals.
41 \def\@roman#1{\romannumeral #1}

\@Roman \@Roman\F00counter Representation of \F00counter as upper-case Roman nu-
merals.
42 \def\@Roman#1{\expandafter\@slowromancap\romannumeral #1@}

\@slowromancap Fully expandable macro to change a roman number to uppercase.
43 \def\@slowromancap#1{\ifx @#1% then terminate
44   \else
45     \if i#1I\else\if v#1V\else\if x#1X\else\if l#1L\else\if
46       c#1C\else\if d#1D\else \if m#1M\else#1\fi\fi\fi\fi\fi\fi\fi
47       \expandafter\@slowromancap
48       \fi
49   }

\@alph \@alph\F00counter Representation of \F00counter as a lower-case letter: 1 =
a, 2 = b, etc.
50 \def\@alph#1{%
51   \ifcase#1\or a\or b\or c\or d\or e\or f\or g\or h\or i\or j\or
52   k\or l\or m\or n\or o\or p\or q\or r\or s\or t\or u\or v\or w\or x\or
53   y\or z\else\@ctrerr\fi}

\@Alph \@Alph\F00counter Representation of \F00counter as an upper-case letter: 1 =
A, 2 = B, etc.
54 \def\@Alph#1{%
55   \ifcase#1\or A\or B\or C\or D\or E\or F\or G\or H\or I\or J\or
56   K\or L\or M\or N\or O\or P\or Q\or R\or S\or T\or U\or V\or W\or X\or
57   Y\or Z\else\@ctrerr\fi}

\@fnsymbol Typesetting old fashioned footnote symbols. This can be done both in text or
math mode now.
58 \def\@fnsymbol#1{\ensuremath{\ifcase#1\or *\or \dagger\or \ddagger\or
59   \mathsection\or \mathparagraph\or \|\or **\or \dagger\dagger
60   \or \ddagger\ddagger \else\@ctrerr\fi}}
61 \</2kernel>

```

File n ltlength.dtx

22 Lengths

<code>\newlength</code>	Declare #1 to be a new length command.
<code>\setlength</code>	Set the length command, #1, to the value #2.
<code>\addtolength</code>	Increase the value of the length command, #1, by the value #2.
<code>\settowidth</code>	Set the length, #1 to the width of a box containing #2.
<code>\settoheight</code>	Set the length, #1 to the height of a box containing #2.
<code>\settodepth</code>	Set the length, #1 to the depth of a box containing #2.

```

1 <*/2ekernel>
2 \message{lengths,}

\newlength
3 \def\newlength#1{\@ifdefinable#1{\newskip#1}}

\setlength
4 \def\setlength#1#2{#1#2\relax}

\addtolength \relax added 24 Mar 86
5 \def\addtolength#1#2{\advance#1 #2\relax}

\settoheight The obvious analogs of \settowidth.
\settodepth 6 \def\@settodim#1#2#3{\setbox\@tempboxa\hbox{{#3}}#2#1\@tempboxa
\settowidth Clear the memory afterwards (which might be a lot).
\@settodim 7 \setbox\@tempboxa\box\voidb@x}
8 \def\settoheight{\@settodim\ht}
9 \def\settodepth {\@settodim\dp}
10 \def\settowidth {\@settodim\wd}

\@settopoint This macro takes the contents of the skip register that is supplied as its argument
and removes the fractional part to make it a whole number of points. This can be
used in class files to avoid values like 345.4666666pt when calulating a dimension.

11 \def\@settopoint#1{\divide#1\p@\multiply#1\p@}
12 </2ekernel>
```

File o

ltfssbas.dtx

This file contains the main implementation of the ‘low level’ font selection commands. See other parts of the L^AT_EX distribution, or *The L^AT_EX Companion* for higher level documentation of the L^AT_EX ‘New’ Font Selection Scheme.

Warning: The macro documentation is still basically the documentation from the first NFSS release and therefore in some cases probably not completely accurate.

23 Autoloading parts of NFSS

This code is set up in a way that some parts of it can be kept separate and will only be loaded if needed.

If we are producing an autoload version of L^AT_EX 2_ε then all those parts with `def1` or `def2` docstrip guards will be placed into the autoloadable files `autofss1.sty` and `autofss2.sty`.

The ‘2ekernel’ code ensures that a `\usepackage{autofss1}` is essentially ignored if a ‘full’ format is being used that has picture mode already in the format.

Note the `autofss2` loading is currently disabled.

```
1 <2ekernel>\expandafter\let\csname ver@autofss1.sty\endcsname\fmtversion
```

The autoload file `autofss2` is a specialty because it contains code which will be completely local, ie loaded every time again.

24 Preliminary macros

We define a number of macros that will be used later.

`\@nomath` `\@nomath` is used by most macros that will have no effect in math mode. It issues a warning message.

```
2 <*2ekernel | autoload>
3 \def\@nomath#1{\relax\ifmmode
4   \font@warning{Command \noexpand#1invalid in math mode}\fi}
5 </2ekernel | autoload>
```

`\no@alphabet@error` The macro `\no@alphabet@error` is called whenever the user requests a math *alphabet* that is not available in the current *version*. In math mode an error message is produced otherwise the command keeps silent. The argument is the name of the control sequence that identifies the math *alphabet*. The `\relax` at the beginning is necessary to prevent T_EX from scanning too far in certain situations.

```
6 <*2ekernel | def1>
7 \gdef\no@alphabet@error#1{\relax \ifmmode
8   \@latex@error{Math\space alphabet\space identifier\space
9     \noexpand#1is\space undefined\space in\space math\space
10     version\space ‘\math@version’}%
11   {Your\space requested\space math\space alphabet\space
12     is\space undefined\space in\space the\space current\space
13     math\space version.^^JCheck\space the\space spelling\space
14     or\space use\space the\space \noexpand\SetMathAlphabet\space
15     command.}
16   \fi}
17 </2ekernel | def1>
18 <*autoload>
19 \gdef\no@alphabet@error{\relax \ifmmode
```

```

20 \expandafter\try@sizes\expandafter\no@alphabet@error \fi}
21 \</autoload>

```

`\new@mathgroup` We also give a new name to `\newfam` and `\fam` to avoid verbal confusion (see the introduction).²

`\mathgroup`

```

22 \<*2ekernel | autoload>
23 \def\new@mathgroup{\alloc@8\mathgroup\chardef\sixt@@n}
24 \let\mathgroup\fam
25 \let\newfam\new@mathgroup
26 \@onlypreamble\new@mathgroup

```

25 Macros for setting up the tables

`\DeclareFontShape` The macro `\DeclareFontShape` takes 6 arguments:

```
27 \def\DeclareFontShape{\begingroup
```

First we restore the catcodes of all characters used in the syntax.

```
28 \nfss@catcodes
```

We use `\expandafter \endgroup` to restore catcode in case something goes wrong with the argument parsing (suggested by Tim Van Zandt)

`\DeclareFontShape`

```

29 \expandafter\endgroup
30 \DeclareFontShape@{}
31 \def\DeclareFontShape@#1#2#3#4#5#6{%
32 \expandafter\ifx\csname #1+#2\endcsname\relax
33 \@latex@error{Font family ‘#1+#2’ unknown}\@eha
34 \else
35 \expandafter
36 \xdef\csname#1/#2/#3/#4\endcsname{\expandafter\noexpand
37 \csname #5\endcsname}%
38 \def\reserved@a{#6}%
39 \global
40 \expandafter\let\csname#5\endcsname\expandafter\endcsname
41 \ifx\reserved@a\@empty
42 \@empty
43 \else
44 \reserved@a
45 \fi
46 \fi
47 }

```

`\DeclareFixedFont` Define a direct font switch that avoids all overhead.

```

48 \def\DeclareFixedFont#1#2#3#4#5#6{%
49 \begingroup
50 \math@fontsfalse
51 \every@math@size{}%
52 \fontsize{#6}\z@
53 \usefont{#2}{#3}{#4}{#5}%
54 \global\expandafter\let\expandafter#1\the\font
55 \endgroup
56 }
57 \</2ekernel | autoload>

```

`\do@subst@correction`

```

58 \<*2ekernel | autoload>
59 \def\do@subst@correction{%
60 \xdef\subst@correction{%

```

²For the same reason it seems advisable to `\let\fam` and `\newfam` equal to `\relax`, but this is commented out to retain compatibility to existing style files.

```

61      \font@name
62      \global\expandafter\font
63      \csname \curr@fontshape/\f@size\endcsname
64      \noexpand\fontname\font
65      \relax}%

```

Calling `\subst@correction` after the current group means calling it after we have loaded the substitution font which is done inside a group.

```

66      \aftergroup\subst@correction
67 }

```

`\DeclareFontFamily`

```

68 \def\DeclareFontFamily#1#2#3{%

```

If we want fast checking for the encoding scheme we can just check for `\T@.` being defined.

```

69 % \@tempwafalse
70 % \def\reserved@b{#1}%
71 % \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%
72 %     \ifx\reserved@b\reserved@c \@tempwattrue\fi}%
73 % \cdp@list
74 % \if@tempswa
75 % \ifundefined{T@#1}%
76 % {
77 %   \@latex@error{Encoding scheme ‘#1’ unknown}\@eha
78 % }%
79 % {

```

Now we have to define the macro `\(<#1>+<#2>)` to contain `#3`. But since most of the time `#3` will be empty we use `\let` in a tricky way rather than a simple `\def` since this will save internal memory. We store the argument `#3` in a temporary macro `\reserved@a`.

```

80     \def\reserved@a{#3}%

```

We compare `\reserved@a` with `\@empty`. If these two are the same we `\let` the ‘extra’ macro equal to `\@empty` which is not the same as doing a `\let` to `\reserved@a` — the latter would blow one extra memory location rather than reusing the one from `\@empty`.

```

81     \global
82     \expandafter\let\csname #1+#2\expandafter\endcsname
83     \ifx \reserved@a\@empty
84         \@empty
85     \else \reserved@a
86     \fi
87 }%
88 }

```

`\cdp@list` We initialize the code page list to be empty.

```

89 \let\cdp@list\@empty
90 \@onlypreamble\cdp@list

```

`\cdp@elt`

```

91 \let\cdp@elt\relax
92 \@onlypreamble\cdp@elt

```

`\DeclareFontEncoding`

```

93 \def\DeclareFontEncoding{%

```

First we start with ignoring all blanks and newlines since every surplus space in the second or third argument will come out in a weird place in the document.

```

94     \begingroup
95     \nfss@catcodes
96     \expandafter\endgroup

```

```

97 \DeclareFontEncoding@}
98 \@onlypreamble\DeclareFontEncoding

99 \def\DeclareFontEncoding#1#2#3{%
100 \expandafter
101 \ifx\csname T@#1\endcsname\relax
102 \def\cdp@elt{\noexpand\cdp@elt}%
103 \xdef\cdp@list{\cdp@list\cdp@elt{#1}%
104 {\default@family}{\default@series}%
105 {\default@shape}}%

```

To support encoding dependent commands (like accents) we initialise the command `\langle encoding \rangle-cmd` to be `\@changed@cmd`. (See `ltoutenc.dtx` for details.)

```

106 \expandafter\let\csname#1-cmd\endcsname\@changed@cmd
107 \else
108 \@font@info{Redefining font encoding #1}%
109 \fi

110 \global\@namedef{T@#1}{#2}%
111 \global\@namedef{M@#1}{\default@M#3}%

```

Keep a record of the last encoding being declared:

```

112 \xdef\LastDeclaredEncoding{#1}%
113 }
114 \@onlypreamble\DeclareFontEncoding@

```

`\LastDeclaredEncoding` The last encoding being declared by `\DeclareFontEncoding`.

```

115 \def\LastDeclaredEncoding{}

```

`\DeclareFontSubstitution`

```

116 \def\DeclareFontSubstitution#1#2#3#4{%
117 \expandafter
118 \ifx\csname T@#1\endcsname\relax
119 \@latex@error{Encoding scheme ‘#1’ unknown}\@eha
120 \else
121 \begingroup

```

We loop through the `\cdp@list` and rebuild it anew in `\toks@` thereby replacing the defaults for the encoding in question with the new defaults. It is important to store the encoding to test against expanded in `\reserved@a` since it might just be `\LastDeclaredEncoding` that is passed as `#1`.

```

122 \edef\reserved@a{#1}%
123 \toks@{}%
124 \def\cdp@elt##1##2##3##4{%
125 \def\reserved@b{##1}%
126 \ifx\reserved@a\reserved@b

```

Here we use the new defaults but we use `##1` (i.e., the encoding name already stored previously) since we know that it is expanded.

```

127 \addto@hook\toks@{\cdp@elt{##1}{##2}{##3}{##4}}%
128 \else

```

If `\reserved@a` and `\reserved@b` differ then we simply copy from the old list to the new.

```

129 \addto@hook\toks@{\cdp@elt{##1}{##2}{##3}{##4}}%
130 \fi}%
131 \cdp@list
132 \xdef\cdp@list{\the\toks@}%
133 \endgroup
134 \global
135 \@namedef{D@#1}{%
136 \def\default@family{#2}%
137 \def\default@series{#3}%

```

```

138         \def\default@shape{#4}%
139     }%
140     \fi
141 }
142 \@onlypreamble\DeclareFontSubstitution

```

\DeclareFontEncodingDefaults

```

143 \def\DeclareFontEncodingDefaults#1#2{%
144     \ifx\relax#1\else
145         \ifx\default@T\@empty\else
146             \@font@info{Overwriting encoding scheme text defaults}%
147             \fi
148             \gdef\default@T{#1}%
149             \fi
150         \ifx\relax#2\else
151             \ifx\default@M\@empty\else
152                 \@font@info{Overwriting encoding scheme math defaults}%
153                 \fi
154                 \gdef\default@M{#2}%
155                 \fi
156     }
157 \@onlypreamble\DeclareFontEncodingDefaults

```

\default@T

```

\default@M 158 \let\default@T\@empty
159 \let\default@M\@empty

```

\DeclarePreloadSizes

```

160 \def\DeclarePreloadSizes#1#2#3#4#5{%
161     \@ifundefined{TC#1}%
162     {\@latexerror{Encoding scheme ‘#1’ unknown}\@eha}%
163     {%

```

Don't know at the moment what this group here does!

```

164     \begingroup

```

We define a macro `\reserved@f`³ that grabs the next *size* and loads the corresponding font. This is done by delimiting `\reserved@f`'s only argument by the token `,` (comma).

```

165     \def\reserved@f##1,{%

```

The end of the list will be detected when there are no more elements, i.e. when `\reserved@f`'s argument is empty. The trick used here is explained in Appendix D of the *T_EXbook*: if the argument is empty the `\if` will select the first clause and `\let \reserved@f` equal to `\relax`. (We use the `>` character here since it cannot appear in font file names.)

```

166         \if>##1>%
167         \let\reserved@f\relax
168     \else

```

Otherwise, we define `\font@name` appropriately and call `\pickup@font` to do the work. Note that the requested `\curr@fontshape` combination must have been defined, or you will get an error. The definition of `\font@name` is carried out globally to be consistent with the rest of the code in this file.

```

169         \xdef\font@name{\csname#1/#2/#3/#4/##1\endcsname}%
170         \pickup@font

```

Now we forget the name of the font just loaded. More precisely, we set the corresponding control sequence to `\relax`. This means that later on, when the font is first used, the macro `\define@newfont` is called again to execute the 'extra' macro for this font.

³We cannot use `\@tempa` since it is needed in `\pickup@font`.

```

171      \global\expandafter\let\font@name\relax
172      \fi

```

Finally we call `\reserved@f` again to process the next *size*. If `\reserved@f` was `\let` equal to `\relax` this will end the macro.

```

173      \reserved@f}%

```

We finish with reinserting the list of sizes after the `\reserved@f` macro and appending an empty element so that the end of the list is recognized properly.

```

174      \reserved@f#5,,%
175      \endgroup
176      }%
177  }
178  \@onlypreamble\DeclarePreloadSizes

```

`\ifmath@fonts` We need a switch to decide if we have to switch math fonts. For this purpose we provide `\ifmath@fonts` that can be set to true or false by the `\S@...` macros depending on if math fonts are provided for this size or not. The default is of course to switch all fonts.

```

179  \newif\ifmath@fonts \math@fontstrue

```

`\DeclareMathSizes` `\DeclareMathSizes` takes the text size, math text size, math script size, and math scriptscript size as arguments and defines the right `\S@...` macro.

```

\DeclareMathSizes*
180  \def\DeclareMathSizes{%
181    \@ifstar{\@DeclareMathSizes\math@fontsfalse}%
182    {\@DeclareMathSizes{}}}%
183  \@onlypreamble\DeclareMathSizes

```

`\@DeclareMathSizes`

```

184  \def\@DeclareMathSizes#1#2#3#4#5{%
185    \@defaultunits\dimen@#2pt\relax\@nnil
186    \if$#3$%
187      \expandafter \let
188      \csname S@\strip@pt\dimen@\endcsname
189      \math@fontsfalse
190    \else
191      \expandafter \gdef
192      \csname S@\strip@pt\dimen@\endcsname
193      {\gdef\tf@size{#3}\gdef\sfont@size{#4}%
194       \gdef\ssf@size{#5}%
195       #1%
196       }%
197    \fi}
198  \@onlypreamble\@DeclareMathSizes

```

26 Selecting a new font

26.1 Macros for the user

`\fontencoding` As we said in the introduction a font is described by four parameters. We first define macros to specify the wanted *family*, *series*, or *shape*. These are simply recorded in internal macros `\f@family`, `\f@series`, and `\f@shape`, resp. We use `\edef`'s so that the arguments can also be macros.

`\f@encoding`

```

199  \DeclareRobustCommand\fontencoding[1]{%
200    \expandafter\ifx\csname T@#1\endcsname\relax
201    \latexerror{Encoding scheme ‘#1’ unknown}\@eha
202    \else
203    \edef\f@encoding{#1}%
204    \ifx\cf@encoding\f@encoding

```


If the new encoding is the same as the old encoding we have nothing to do. However, in case we had a sequence of several encoding changes without a `\selectfont` inbetween we can save processing by making sure that `\enc@update` is `\relax`.

```
205     \let\enc@update\relax
206     \else
```

If current and new encoding differ we define the macro `\enc@update` to contain all updates necessary at `\selectfont` time.

```
207     \let\enc@update\@enc@update
208     \fi
209     \fi
210 }
```

`\@enc@update`

```
211 \def\@enc@update{%
```

When `\@enc@update` is executed `\f@encoding` holds the encoding name for the new encoding and `\cf@encoding` the name of the last active encoding.

We start by setting the init command for encoding dependent macros to `\@changed@cmd`.

```
212     \expandafter
213     \let
214     \csname\cf@encoding-cmd\endcsname
215     \@changed@cmd
```

Then we turn the one for the new encoding to `\@current@cmd` (see `ltoutenc.dtx` for further explanations).

```
216     \expandafter
217     \let
218     \csname\f@encoding-cmd\endcsname
219     \@current@cmd
```

We execute the default settings `\default@T`, followed by the one for the new encoding.

```
220     \default@T
221     \csname T@\f@encoding\endcsname
```

Finally we change the default substitution values, disable `\enc@update` and make `\f@encoding` officially the current encoding.

```
222     \csname D@\f@encoding\endcsname
223     \let\enc@update\relax
224     \let\cf@encoding\f@encoding
225 }
```

`\enc@update` The default action in `\selectfont` is to do nothing.

```
226 \let\enc@update\relax
```

`\fontfamily`

```
\f@family 227 \DeclareRobustCommand\fontfamily[1]{\edef\f@family{#1}}
\fontseries 228 \DeclareRobustCommand\fontseries[1]{\edef\f@series{#1}}
\f@series 229 \DeclareRobustCommand\fontshape [1]{\edef\f@shape{#1}}
```

`\fontshape` Some handy abbreviation if you want to get some particular font in the current size. If also the size should change one has to issue a `\fontsize` comand first.

`\f@shape`

```
230 \def\usefont#1#2#3#4{\fontencoding{#1}\fontfamily{#2}%
231     \fontseries{#3}\fontshape{#4}\selectfont
232     \ignorespaces}
```

`\linespread` The comand `\linespread` changes the current `\baselinestretch` by calling `\set@fontsize`. The values for `\f@size` and `\f@baselineskip` will be left unchanged.

```
233 \DeclareRobustCommand\linespread[1]
234     {\set@fontsize{#1}\f@size\f@baselineskip}
```

`\fontsize` We also define a macro that allows to specify a size. In this case, however, we also need the value of `\baselineskip`. As the first argument to `\set@fontsize` we pass the current value of `\baselinestretch`. This will either match the internal value (in which case nothing changes, or it will be an updated value due to a user change of that macro using `\renewcommand`. If we would pass the internal `\f@linespread` such a change would be effectively overwritten by a size change.

```

235 \DeclareRobustCommand\fontsize[2]
236   {\set@fontsize\baselinestretch{#1}{#2}}

```

`\f@linespread` This macro holds the current internal value for `\baselinestretch`.

```

237 \let\f@family\@empty
238 \let\f@series\@empty
239 \let\f@shape\@empty
240 \let\f@size\@empty
241 \let\f@baselineskip\@empty
242 \let\f@linespread\@empty

```

`\cf@encoding`

```

243 \let\f@encoding\@empty
244 \let\cf@encoding\@empty

```

`\@defaultunits` The function `\@defaultunits` when wrapped around a `dimen` or `skip` assignment supplies default units. Usage:

```

\@defaultunits\dimen@=#1pt\relax\@nnil

```

Note: the `\relax` is *important*. Other units can be substituted for the ‘pt’ if desired.

We use `\remove@to@nnil` as an auxiliary macros for `\@defaultunits`. It just has to gobble the supplied default unit ‘pt’ or whatever, if it wasn’t used in the assignment.

```

245 \def\@defaultunits{\afterassignment\remove@to@nnil}

```

`\strip@pt` This macro strips the characters `pt` produced by using `\the` on a `dimen` register.

```

\rem@pt 246 \begingroup
247   \catcode‘P=12
248   \catcode‘T=12
249   \lowercase{
250     \def\x{\def\rem@pt##1.##2PT{##1\ifnum##2>\z@.##2\fi}}
251   \expandafter\endgroup\x
252 \def\strip@pt{\expandafter\rem@pt\the}

```

`\mathversion` `\mathversion` takes the math *version* name as argument, defines `\math@version` appropriately and switches to the font selected forcing a call to `\glb@settings` if the *version* is known to the system.

```

253 \DeclareRobustCommand\mathversion[1]
254   {\@nomath\mathversion
255    \expandafter\ifx\csname mv@#1\endcsname\relax
256    \@latex@error{Math version ‘#1’ is not defined}\@eha\else
257    \edef\math@version{#1}%

```

We need to force a math font setup both now and at the point where we return to the previous math version. Forcing a math font setup can simply be done by setting `\glb@currsz` to an invalid value since this will trigger the setup when the formula starts.

```

258   \gdef\glb@currsz{}%

```

When the scope of the current `\mathversion` ends we need to restore the old setup. However this time we need to force it directly at least if we are inside `math`, otherwise we could wait. Another way to enhance this code here is to do the setting only if the version really has changed after all. This might be interesting in case of `amstext` and `boldsymbol`.

```

259      \aftergroup\glb@settings
260      \fi}

```

If T_EX would support a hook just before the end of a formula (opposite of `\everymath` so to speak) the implementation of the algorithm would be much simpler because in that case we would set up the correct math fonts at this point without having to worry about incorrect settings due to nesting. The same would be true if in L^AT_EX the use of `$` (as the primitive T_EX command) would be impossible and instead only a higher-level interface would be available. Note that this does not mean that a `$` couldn't be the short-hand for starting and stopping that higher-level interface, it only means that the direct T_EX function must be hidden.

Anyway, since we don't have this and won't have it in L^AT_EX 2_ε we need to implement it in a somewhat slower way.

We test for the current math font setup on entry of a formula, i.e., on the hooks `\everymath` and `\everydisplay`. But since these hooks may contain user data we provide ourselves with an internal version of these hooks which stays frozen.

```

\frozen@everymath  New internal names for \everymath and \everydisplay.
\frozen@everydisplay 261 \let\frozen@everymath\everymath
                    262 \let\frozen@everydisplay\everydisplay

\everymath         Now we provide now user hooks that will be called in the frozen internals.
\everydisplay      263 \newtoks\everymath
                    264 \newtoks\everydisplay

\frozen@everymath  Now we define the behaviour of the frozen hooks: first check the math setup then
                    call the user hook.
                    265 \frozen@everymath = {\check@mathfonts
                    266                      \the\everymath}

\frozen@everydisplay  Ditto for the display hook.
                    267 \frozen@everydisplay = {\check@mathfonts
                    268                      \the\everydisplay}

\curr@math@size    This holds locally the current math size.
                    269 \let\curr@math@size\@empty

```

26.2 Macros for loading fonts

```

\pickup@font  The macro \pickup@font which is used in \selectfont is very simple: if the font
              name is undefined (i.e. not known yet) it calls \define@newfont to load it.
              270 \def\pickup@font{%
              271     \expandafter \ifx \font@name \relax
              272         \define@newfont
              273     \fi}

\split@name    \pickup@font assumes that \font@name is set but it is sometimes called when
               \f@family, \f@series, \f@shape, or \f@size may have the wrong settings (see,
               e.g., the definition of \getanddefine@fonts). Therefore we need a macro to ex-
               tract font family, series, shape, and size from the font name. To this end we
               define \split@name which takes the font name as a list of characters of \catcode
               12 (without the backslash at the beginning) delimited by the special control se-
               quence \@nil. This is not very complicated: we first ensure that / has the right
               \catcode
              274 {\catcode'\/=12

```

and define `\split@name` so that it will define our private `\f@encoding`, `\f@family`, `\f@series`, `\f@shape`, and `\f@size` macros.

```
275 \gdef\split@name#1/#2/#3/#4/#5\@nil{\def\f@encoding{#1}%
276                                     \def\f@family{#2}%
277                                     \def\f@series{#3}%
278                                     \def\f@shape{#4}%
279                                     \def\f@size{#5}}}
```

`\curr@fontshape` Abbreviation which may get removed again for speed.

```
280 \def\curr@fontshape{\f@encoding/\f@family/\f@series/\f@shape}
281 \</2ekernel | autoload>
```

`\define@newfont` Now we can tackle the problem of defining a new font.

```
282 (*2ekernel | def2 | autoload)
283 \def\define@newfont{%
```

We have already mentioned that the token list that `\split@name` will get as argument must not start with a backslash. To reach this goal we will set the `\escapechar` to `-1` so that the `\string` primitive will not generate an escape character. To keep this change local we open a group. We use `\begingroup` for this purpose since `\define@newfont` might be called in math mode, and an empty `\bgroup... \egroup` would add an empty Ord atom to the math list and thus affect the spacing.

Also locally redefine `\typeout` so that ‘No file ...fd’ Warnings become Font Info message just sent to the log file.

```
284 \begingroup
285 \let\typeout\@font@info
286 \escapechar\m@ne
```

Then we extract *encoding scheme*, *family*, *series*, *shape*, and *size* from the font name. Note the four `\expandafter`’s so that `\font@name` is expanded first, then `\string`, and finally `\split@name`.

```
287 \expandafter\expandafter\expandafter
288 \split@name\expandafter\string\font@name\@nil
```

If the `\curr@fontshape` combination is not available, (i.e. undefined) we call the macro `\wrong@fontshape` to take care of this case. Otherwise `\extract@font` will load the external font for us.

```
289 % \expandafter\ifx
290 % \csname\curr@fontshape\endcsname \relax
291 \try@load@fontshape % try always
292 % \fi
293 \expandafter\ifx
294 \csname\curr@fontshape\endcsname \relax
295 \wrong@fontshape\else
```

To allow substitution we call the `\curr@fontshape` macro which usually will expand to `\relax` but may hold code for substitution (see `\subst@fontshape` definition).

```
296 % \csname\curr@fontshape\endcsname
297 \extract@font\fi
```

We are nearly finished and must only restore the `\escapechar` by closing the group.

```
298 \endgroup}
299 \</2ekernel | def2 | autoload>
```

As `autofss2.sty` only makes local definitions it is re-loaded for each font, to save some string memory in the kernel, and to speed up the loading of some packages which may load fonts. The code is actually pre-loaded into the kernel and removed at `\begin{document}`. The `\ifx` test below ensures that if `\usepackage{autofss2}` appears in the preamble, then the code is not removed at this time. Can not use `\AtBeginDocument` here as it is not defined yet! Listing all the commands like this is not ideal as any changes to the `autofss2.sty` need

to be reflected here, but this seems the most memory efficient mechanism as it avoids the use of an extra csname to store the list.

This is currently disabled, so the ‘autofss2’ code remains in the kernel, and autofss2.sty is not generated in the current public release.

```

300 (*autoloadxxx)
301 \expandafter\def\expandafter\@begindocumenthook\expandafter{%
302   \expandafter\ifx\csname ver@autofss2.sty\endcsname\relax
303     \gdef\define@newfont{%
304       \begingroup
305         \makeatletter\nfss@catcodes
306         \catcode'\#6\relax
307         \@input autofss2.sty\relax\define@newfont
308       \endgroup}%
309   \begingroup
310     \def\do##1{\global\let##1\@undefined}%
311     \do\extract@sizefn
312     \do\try@simple@size
313     \do\set@simple@size@args
314     \do\extract@rangefontinfo
315     \do\is@range
316     \do\check@range
317     \do\check@single
318     \do\set@size@funct@args
319     \do\set@size@funct@args@
320     \do\try@size@range
321     \do\empty@sfcnt
322     \do\gen@sfcnt
323     \do\genb@sfcnt
324     \do\sub@sfcnt
325     \do\subf@sfcnt
326     \do\fixed@sfcnt
327   \endgroup
328   \fi}
329 \autoloadxxx)

330 (*2ekernel | autoload)
331 \def\try@load@fontshape{%
332   \expandafter
333   \ifx\csname \f@encoding+\f@family\endcsname\relax
334     \@font@info{Try loading font information for
335       \f@encoding+\f@family}%

```

We predefine this combination to be \@empty which means that next time we don't try again unnecessary in case we don't find a .fd file. If the file contains a \DeclareFontFamily command than this setting will be overwritten.

```

336   \global\expandafter\let
337   \csname \f@encoding+\f@family\endcsname\@empty

```

Set the catcodes used in the syntax, but do it only once (this will be restored at the end of the font loading group).

```

338   \nfss@catcodes
339   \let\nfss@catcodes\relax

```

For increased portability make the external filename monospace, but look for the (old style) mixed case filename if the first attempt fails.

On any monospace system this means that the file is looked for twice which takes up time and string space, but at least for this release Check for both names to give people time to re-install their private fd files with lowercase names.

```

340   \edef\reserved@a{%
341     \lowercase{%
342       \noexpand\InputIfFileExists{\f@encoding\f@family.fd}}}%
343   \reserved@a\relax
344   {\@input@{\f@encoding\f@family.fd}}%

```

345 \fi}

\nfss@catcodes This macro should contain the standard `\catcode` assignments to all characters which are used in the commands found in an `.fd` file and which might have special `\catcodes` in the middle of a document. If necessary, this list can be extended in a package file using a suitable number of `\expandafter`, i.e.,

```
\expandafter\def\expandafter\nfss@catcodes
\expandafter{\nfss@catcodes <additional settings>}
```

Note, that this macro might get executed several times since it is also called by `\DeclareFontShape`, thus it probably should not be misused as a general purpose hook.

346 \def\nfss@catcodes{%

We start by making `@` a letter and ignoring all blanks and newlines.

```
347     \makeatletter
348     \catcode'\ 9%
349     \catcode'\^~I9%
350     \catcode'\^~M9%
```

Then we set up `\`, `{`, `}`, `#` and `%` in case an `.fd` file is loaded during a verbatim environment.

```
351     \catcode'\z@
352     \catcode'\{@ne
353     \catcode'\}\tw@
354     \catcode'\#6%
355     \catcode'\^7%
356     \catcode'\%14%
```

The we make sure that the important syntax parts have the right `\catcode`.

```
357     \@makeother\<%
358     \@makeother\>%
359     \@makeother\*%
360     \@makeother\.%
361     \@makeother\-%
362     \@makeother\/%
363     \@makeother\[%
364     \@makeother\]%
365     \@makeother\'%
366     \@makeother\'%
367     \@makeother\"%
368 }
```

\DeclareErrorFont Declare the last resort shape! We assume that in this fontshape there is a 10pt font but it doesn't really matter. We only loose one macro name if the assumption is false. But at least the font should be there!

```
369 \def\DeclareErrorFont#1#2#3#4#5{%
370     \xdef\error@fontshape{%
371         \noexpand\expandafter\noexpand\split@name\noexpand\string
372         \expandafter\noexpand\csname#1/#2/#3/#4/#5\endcsname
373         \noexpand\@nil}%
```

Initialize all those internal variables which may or may not have values in the first seconds of NFSS' bootstrapping process. Later on such values will be updated when an encoding is selected, etc.

We definitely don't want to set `\f@encoding`; we can set all the others since if they are left "blank" any selection would grap "error default values" as well. However, this probably should go also.

```
374 %     \gdef\f@encoding{#1}%
375     \gdef\default@family{#2}%
376     \gdef\default@series{#3}%
377     \gdef\default@shape{#4}%
```

```

378     \global\let\f@family\default@family
379     \global\let\f@series\default@series
380     \global\let\f@shape\default@shape
381     \gdef\f@size{#5}%
382     \gdef\f@baselineskip{#5pt}%
383 }
384 \@onlypreamble\DeclareErrorFont

```

`\wrong@fontshape` Before we come to the macro `\extract@font` we have to take care of unknown `\curr@fontshape` combinations. The general strategy is to issue a warning and to try a default *shape*, then a default *series*, and finally a default *family*. If this last one also fails T_EX will go into an infinite loop. But if the defaults are set incorrectly one deserves nothing else!

```

385 \def\wrong@fontshape{%
386     \csname D@f@encoding\endcsname      % install defaults if in math
    We remember the wanted \curr@fontshape combination which we will need in a
    moment.
387     \edef\reserved@a{\csname\curr@fontshape\endcsname}%
388     \ifx\last@fontshape\reserved@a
389         \errmessage{Corrupted NFSS tables}%
390         \error@fontshape
391     \else
    Then we warn the user about the mess and set the shape to its default.
392     \let\f@shape\default@shape
    If the combination is not known, try the default series.
393     \expandafter\ifx\csname\curr@fontshape\endcsname\relax
394         \let\f@series\default@series
    If this is still undefined, try the default family. Otherwise give up. We never try
    to change the encoding scheme!
395         \expandafter
396             \ifx\csname\curr@fontshape\endcsname\relax
397                 \let\f@family\default@family
398             \fi \fi
399     \fi

```

At this point a valid `\curr@fontshape` combination must have been found. We inform the user about this fact.

The `\expandafter\string` here stops T_EX adding the space that it usually puts after command names in messages. The similar construction with `\@undefined` just produces ‘undefined’, but saves a few tokens.

`\@wrong@font@char` is locally redefined in `\UseTextSymbol` from its normal (empty) definition, to report the symbol generating the font switch.

```

400     \@font@warning{Font shape ‘\expandafter\string\reserved@a’
401                     \expandafter\@gobble\string\@undefined\MessageBreak
402                     using ‘\curr@fontshape’ instead\@wrong@font@char}%
403     \global\let\last@fontshape\reserved@a

```

We change `\@defaultsubs` to produce a warning at the end of the document.

The macro `\@defaultsubs` is initially `\relax` but gets changed here if some default font substitution happens. It is then executed in `\enddocument`.

```

404     \gdef\@defaultsubs{%
405         \@font@warning{Some font shapes were not available, defaults
406                         substituted.\@gobbletwo}}%

```

If we substitute a `\curr@fontshape` combination by the default one we don’t want the warning to be printed out whenever this (unknown) combination is used. Therefore we globally `\let` the macro corresponding to the wanted combination equal to its substitution. This requires the use of four `\expandafter`’s since `\csname... \endcsname` has to be expanded before `\reserved@a` (i.e. the requested combination), and this must happen before the `\let` is executed.

```

407 \global\expandafter\expandafter\expandafter\let
408 \expandafter\reserved@a
409 \csname\curr@fontshape\endcsname

```

Now we can redefine `\font@name` accordingly. This *must* be done globally since it might occur in the group opened by `\define@newfont`. If we would this definition were local the closing `\endgroup` there would restore the old meaning of `\font@name` and then switch to the wrong font at the end of `\selectfont` although the correct font was loaded.

```

410 \xdef\font@name{%
411 \csname\curr@fontshape/\f@size\endcsname}%

```

The last thing this macro does is to call `\pickup@font` again to load the font if it is not defined yet. At this point this code will loop endlessly if the defaults are not well defined.

```

412 \pickup@font}

```

`\@wrong@font@char` Normally empty but redefined in `\UseTextSymbol` so that the Font shape undefined message can refer to the symbol causing the problem.

```

413 \let\@wrong@font@char\@empty

```

`\@defaultsubs` See above.

```

\@defaultsubs 414 \let\@defaultsubs\relax

```

`\strip@prefix` In `\extract@font` we will need a way to recover the replacement text of a macro. This is done by the primitive `\meaning` together with the macro `\strip@prefix` (for the details see appendix D of the *T_EXbook*, p. 382).

```

415 \def\strip@prefix#1>{}

```

27 Assigning math fonts to *versions*

`\install@mathalphabet` This is just another name for `\gdef` but we can redefine it if necessary later on.

```

416 \let\install@mathalphabet\gdef

```

`\math@fonts`

```

417 \let\math@fonts\@empty

```

`\select@group` `\select@group` has four arguments: the new *math alphabet identifier* (a control sequence), the *math group number*, the extra macro for math mode and the `\curr@fontshape` definition macro name. We first check if we are in math mode.

```

418 %\def\select@group#1#2#3{\relax\ifmmode

```

We do these things locally using `\begingroup` instead of `\bgroup` to avoid the appearance of an empty Ord atom on the math list.

```

419 % \begingroup

```

We set the math fonts for the *family* in question by calling `\getanddefine@fonts` in the correct environment.

```

420 % \escapechar\m@ne
421 % \getanddefine@fonts{\csname c@mv@\math@version\endcsname}#3%

```

We globally select the math fonts...

```

422 % \globaldefs\@ne \math@fonts

```

... and close the group to restore `\globaldefs` and `\escapechar`.

```

423 % \endgroup

```


As long as no *size* or *version* change occurs the $\langle\textit{math alphabet identifier}\rangle$ should simply switch to the installed *math group* instead of calling `\select@group` unnecessarily. So we globally redefine the first argument (the new $\langle\textit{math alphabet identifier}\rangle$) to expand into a `\mathgroup` switch and then select this *alphabet*. Note that this redefinition will be overwritten by the next call to a *version* macro.

The original code for the end of `\select@group` was

```
\gdef#1{#3\mathgroup #2}#1\fi}
```

i.e. first redefining the $\langle\textit{math alphabet identifier}\rangle$ and then calling the new definition to switch to the wanted $\langle\textit{math group}\rangle$. Now we define the $\langle\textit{math alphabet identifier}\rangle$ as a call to the `\use@mathgroup` command.

```
424 % \xdef#1{\noexpand\use@mathgroup\noexpand#2%
425 %      {\number\csname c@mv@\math@version\endcsname}}%
```

But this is not sufficient, as we learned the hard way. The problem here is that the loading of the fonts that comprise the alphabet identifier `#1`, as well as the necessary math font assignments is deferred until it is used. This is OK so far, but if the fonts are switched within the current formula (which may happen if a sub-formula is a box that contains a math version switch) the font assignments for `#1` are not restored unless `#1` is used again. This is disastrous since TeX sees the wrong fonts at the end of the math formula, when it converts the math list into a horizontal list.

This is taken into account as follows: When a math alphabet identifier is used for the first time in a certain version it modifies the corresponding macro `\mv@<version>` so that it calls `\getanddefine@fonts` directly in future as well. We use the macro `\extract@alph@from@version` to do this. It takes the math alphabet identifier `#1` and the math version macro as arguments.

```
426 % \expandafter\extract@alph@from@version
427 %      \csname mv@\math@version\expandafter\endcsname
428 % \expandafter{\number\csname c@mv@\math@version\endcsname}%
429 %      #1%
430 % \stepcounter{mv@\math@version}%
```

Finally, it is not possible to simply call the new definition since we have an argument (the third argument of `\use@mathgroup` or more exactly the argument of `\math@egroup` if the `margid` option is in force) which would swallow our closing `\fi`. So we use the `\expandafter` technique to remove the `\fi` before the `\use@mathgroup` is expanded.

```
431 %\expandafter #1\fi}
```

`\extract@alph@from@version` We proceed to the definition of the macro `\extract@alph@from@version`. As stated above, it takes a math alphabet identifier and a math version macro (e.g. `\mv@normal`) as its arguments.

```
432 \def\extract@alph@from@version#1#2#3{%
```

To extract and replace the definition of math alphabet identifier `#3` in macro `#1` we have to recall how this definition looks like: Somewhere in the replacement text of `#1` there is the sequence

```
\install@mathalphabet<math alphabet identifier> #3{%
  <Definitions for >#3}
```

Hence, the first thing we do is to extract the tokens preceding this definitions, the definition itself, and the tokens following it. To this end we define one auxiliary macro `\reserved@a`.

```
433 \def\reserved@a##1\install@mathalphabet#3##2##3\@nil{%
```

When `\reserved@a` is expanded, it will have the tokens preceding the definition in question in its first argument (`##1`), the following tokens in its third argument (`##3`), and the replacement text for the math alphabet identifier `#3` in its second argument. (`##2`). This is then recorded for later use in a temporary macro `\reserved@b`.

```
434 \def\reserved@b{##2}%
```

Additionally, we define a macro `\reserved@c` to reconstruct the definitions for the math version in question from the tokens that will remain unchanged (`##1` and `##3`) and the yet to build new definitions for the math alphabet identifier `#3`.

```
435 \def\reserved@c####1{\gdef#1{##1####1##3}}%
```

Then we execute our auxiliary macro.

```
436 \expandafter\reserved@a#1\@nil
```

OK, so now we have to build the new definition for `#3`. To do so, we first extract the interesting parts out of the old one. The old definition looks like:

```
\select@group<math alphabet identifier>
  <math group number><math extra part>
<curr@fontshape definition>
```

So we define a new temporary macro `\reserved@a` that extracts these parts.

```
437 \def\reserved@a\select@group#3##1##2\@nil{%
```

This macro can now directly rebuild the math version definition by calling `\reserved@c`:

```
438 \reserved@c{%
439 \getanddefine@fonts{#2}##2%
440 \install@mathalphabet#3{%
441 \relax\ifmmode \else \non@alpherr#3\fi
442 \use@mathgroup##1{#2}}%
```

In addition it defines the alphabet the way it should be used from now on.

```
443 \gdef#3{\relax\ifmmode \else \non@alpherr#3\fi
444 \use@mathgroup##1{#2}}%
```

Finally, we only have to call this macro `\reserved@a` on the old definitions recorded in `\reserved@b`:

```
445 \expandafter\reserved@a\reserved@b\@nil
446 }
```

`\math@bgroup` Here are the default definitions for `\math@bgroup` and `\math@egroup`. We use `\math@egroup` `\bgroup` instead of `\begingroup` to avoid ‘leaking out’ of style changes. This has the side effect of always producing mathord atoms.

```
447 \let\math@bgroup\bgroup
448 \def\math@egroup#1{#1\egroup}
449 </2ekernel | autoload>
```

`\calculate@math@sizes` Here is the default definition for `\calculate@math@sizes` a more elaborate interface is under testing in `mthscale.sty`.

```
450 <*2ekernel | def1>
451 \gdef\calculate@math@sizes{%
452 \font@info{Calculating\space math\space sizes\space for\space
453 size\space <\f@size>}%
454 \dimen@\f@size \p@
455 \tempdimb \defaultscriptratio \dimen@
456 \dimen@ \defaultscriptscriptratio \dimen@
457 \expandafter\xdef\csname S@\f@size\endcsname{%
458 \gdef\noexpand\tf@size{\f@size}%
459 \gdef\noexpand\sfs@size{\strip@pt\@tempdimb}%
460 \gdef\noexpand\ssf@size{\strip@pt\dimen@}%
461 \noexpand\math@fontstrue}}
462 </2ekernel | def1>
463 <*autoload>
464 \def\calculate@math@sizes{\try@sizes\calculate@math@sizes}
465 </autoload>
```

`\defaultscriptratio` The default ratio for math sizes is:
`\defaultscriptscriptratio` 1 to `\defaultscriptratio` to `\defaultscriptscriptratio`.
 By default this is 1 to .7 to .5.

```

466 \<*2kernel | autoloading>
467 \def\defaultscriptratio{.7}
468 \def\defaultscriptscriptratio{.5}

\noaccents@ If we don't have a definition for \noaccents@ we provide a dummy.
469 \ifx\noaccents@\@undefined
470   \let\noaccents@\@empty
471 \fi

\showhyphens The \showhyphens command must be redefined since the version in plain.tex
              uses \tenrm. We have also made some further adjustments for its use in LATEX.
472 \</2kernel | autoloading>
473 \<*2kernel | autoerr>
474 \gdef\showhyphens#1{%
475   \setbox0\vbox{%
476     \color@begingroup
477     \everypar{}%
478     \parfillskip\z@skip\hsize\maxdimen
479     \normalfont
480     \pretolerance\m@ne\tolerance\m@ne\hbadness\z@\showboxdepth\z@\ #1%
481     \color@endgroup}}
482 \</2kernel | autoerr>
483 \<autoloading>\def\showhyphens{\@autoerr\showhyphens}
484 \<*2kernel | autoloading>

\addto@hook We need a macro to add tokens to a hook.
485 \long\def\addto@hook#1#2{#1\expandafter{\the#1#2}}

\@vpt
486 \def\@vpt{5}

\@vipt
487 \def\@vipt{6}

\@viipt
488 \def\@viipt{7}

\@viiipt
489 \def\@viiipt{8}

\@ixpt
490 \def\@ixpt{9}

\@xpt
491 \def\@xpt{10}

\@xipt
492 \def\@xipt{10.95}

\@xiipt
493 \def\@xiipt{12}

\@xivpt
494 \def\@xivpt{14.4}

\@xviipt
495 \def\@xviipt{17.28}

\@xxpt
496 \def\@xxpt{20.74}

```

\@xxvpt

497 \def\@xxvpt{24.88}

498 \</2ekernel | autoloading>

File p

ltfsstrc.dtx

28 Introduction

This package contains the code for tracing font loading and font changes. It basically overlays some of the low-level functions of NFSS with additional code used for tracing.

The package accepts the following options:

errorshow Write all information about font changes etc. only to the transcript file unless an error happens. This means that information about font substitution will not be shown on the terminal.

warningshow Show all NFSS warnings on the terminal. This setting corresponds to the default behaviour of NFSS if the `tracefmt` package is *not* loaded!

infoshow Show all NFSS warning and all NFSS info messages (that are normally only written to the transcript file) also on the terminal. This is the default if the `tracefmt` package is loaded.

debugshow In addition to **infoshow** show also changing of math fonts as far as possible (this option can produce a large amount of output).

loading Show the name of external fonts when they are loaded. This option shows only “newly” loaded fonts not those already preloaded in the format or the class file before the `tracefmt` package became active.

pausing Turn all font warnings into errors so that L^AT_EX will stop.

29 A driver for this document

The next bit of code contains the documentation driver file for T_EX, i.e., the file that will produce the documentation you are currently reading. It will be extracted from this file by the DOCSTRIP program.

When this file is processed directly by L^AT_EX this will produce the documentation as well.

```
1 \(*driver)
2 \documentclass{ltxdoc}
3
4
5 %\OnlyDescription % comment out for implementation details
6
7 \begin{document}
8   \DocInput{ltfsstrc.dtx}
9 \end{document}
10 \(/driver)
```

30 The Implementation

Warning: Read the macro documentation with a grain of salt. It is still basically the documentation from the first NFSS release and therefore in some cases probably not completely accurate.

If we are making a package file it is a good idea to test whether we are running under 2e. This code is actually placed at the very beginning of this file for easier maintenance, thus commented out here.

```

11 <*package>
12 %\NeedsTeXFormat{LaTeX2e}
13 %\ProvidesPackage{tracefnt}[??/??/?? v?.??
14 %                               Standard LaTeX package (font tracing)]
15 </package>

```

The `debug` module makes use of commands contained in a special package file named `trace.sty`.⁴

```

16 <+debug> \input trace.sty

```

31 Handling Options

`\tracingfonts` Here is the definition of the integer register for the font trace. As a default in a package file we use 1 to give error messages if fonts are substituted. If this code is used for debugging or tracing reasons in the format file (i.e. in `fam.dtx`) we use 0 as the default. But if no font trace is used we build a definition that will produce a warning message.

```

17 <*2ekernel | autoload>
18 \def\tracingfonts{%
19   \@font@warning{Command \noexpand\tracingfonts
20     not provided.\MessageBreak
21     Use the ‘tracefnt’ package.\MessageBreak Command found:}%
22   \count@}
23 </2ekernel | autoload>

```

The `\count@` in the line above will remove the number after `\tracingfonts`. Note that this definition will be overwritten by the next line if one of these modules are included.

```

24 <*package, trace, debug>
25 \newcount\tracingfonts
26 \tracingfonts=0
27 </package, trace, debug>

```

The option `errorshow` turns off all warnings so that only real errors are shown. `warningshow` corresponds to the NFSS default (when `tracefnt` is not loaded). `infoshow` is the default for this package here; and `debugshow`, `loading`, and `pausing` extend the amount of information even further.

```

28 <*package>
29 \DeclareOption{errorshow}{%
30   \def\@font@info#1{%
31     \GenericInfo{(Font)\@spaces\@spaces\@spaces\space\space}%
32     {LaTeX Font Info: \space\space\space#1}}%
33   \def\@font@warning#1{%
34     \GenericInfo{(Font)\@spaces\@spaces\@spaces\space\space}%
35     {LaTeX Font Warning: #1}}%
36   }
37 \DeclareOption{warningshow}{%
38   \def\@font@info#1{%
39     \GenericInfo{(Font)\@spaces\@spaces\@spaces\space\space}%
40     {LaTeX Font Info: \space\space\space#1}}%
41   \def\@font@warning#1{%
42     \GenericWarning{(Font)\@spaces\@spaces\@spaces\space\space}%
43     {LaTeX Font Warning: #1}}%
44   }
45 \DeclareOption{infoshow}{%
46   \def\@font@info#1{%
47     \GenericWarning{(Font)\@spaces\@spaces\@spaces\space\space}%
48     {LaTeX Font Info: \space\space\space#1}}%

```

⁴This package is not in distribution at the moment (and probably doesn't any longer work). Think of this part of the code as being historical artefacts.

```

49 \def\@font@warning#1{%
50     \GenericWarning{(Font)\@spaces\@spaces\@spaces\space\space}%
51         {LaTeX Font Warning: #1}}%
52 }

53 \DeclareOption{loading}{%
54     \tracingfonts\tw@
55 }

56 \DeclareOption{debugshow}{%
57     \ExecuteOptions{infoshow}%
58     \tracingfonts\thr@@
59 }

60 \DeclareOption{pausing}{%
61     \def\@font@warning#1{%
62         \GenericError
63             {(Font)\@spaces\@spaces\@spaces\space\space}%
64             {LaTeX Font Warning: #1}%
65             {See the LaTeX Companion for details.}%
66             {I'll stop for every LaTeX Font Warning because
67              you requested\MessageBreak the 'pausing' option
68              to the tracefnt package.}}%
69 }

```

We make `infoshow` the default, which in turn defines `\font@warning` and `\font@info`.

```

70 \ExecuteOptions{infoshow}
71 \ProcessOptions
72 \endpackage

```

We also need a default definition inside the kernel:

```

73 \if*2ekernel | autoload
74 \def\@font@info#1{%
75     \GenericInfo{(Font)\@spaces\@spaces\@spaces\space\space}%
76         {LaTeX Font Info: \space\space\space#1}}%
77 \def\@font@warning#1{%
78     \GenericWarning{(Font)\@spaces\@spaces\@spaces\space\space}%
79         {LaTeX Font Warning: #1}}%
80 \if*2ekernel | autoload

```

32 Macros common to `fam.tex` and `tracefnt.sty`

In the first versions of `tracefnt.dtx` some macros of `fam.dtx`⁵ were redefined to include the extra tracing information. Now these macros are all defined in this file (i.e. removed from `fam.dtx`) and different production versions can be obtained simply by specifying a different set of modules to include when generating `ltfss.dtx`.

32.1 General font loading

`\extract@font` This macro organizes the font loading. It first calls `\get@external@font` which will return in `\external@font` the name of the external font file (the `.tfm`) as it was determined by the NFSS tables.

```

81 \if*2ekernel | package | autoload
82 \def\extract@font{%
83     \get@external@font

```

Then the external font is loaded and assigned to the font identifier stored inside `\font@name` (for this reason we need `\expandafter`).

```

84     \global\expandafter\font\font@name\external@font\relax

```

⁵This file is currently not distributed in documented form. Its code is part of `ltfss.dtx`.

When tracing we typeout the internal and external font name.

```

85 \<*trace>
86   \ifnum \tracingfonts >\@ne
87     \@font@info{External font '\external@font'
88               loaded as\MessageBreak \font@name}\fi
89 \</trace>

```

Finally we call the corresponding “loading action” macros to finish things. First the font is locally selected to allow the use of `\font` inside the loading action macros.

```
90   \font@name \relax
```

The next two lines execute the “loading actions” for the family and then for the individual font shape.

```

91   \csname \f@encoding+\f@family\endcsname
92   \csname\curr@fontshape\endcsname
93   \relax
94   }
95 \</2ekernel | package | autoload>

```

The `\relax` at the end needs to be explained. This is inserted to prevent \TeX from scanning too far when it is executing the replacement text of the loading code macros.

`\get@external@font` This function tries to find an external font name. It will place the name into the macro `\external@font`. If no font is found it will return the one that was defined via `\DeclareErrorFont`.

```

96 \<*2ekernel | autoload>
97 \def\get@external@font{%
    We don't know the external font name at the beginning.
98   \let\external@font\@empty
99   \edef\font@info{\expandafter\expandafter\expandafter\string
100                 \csname \curr@fontshape \endcsname}%
101   \try@size@range

```

If this failed, we'll try to substitute another size of the same font. This is done by the `\try@size@substitution` macro. It “knows about” `\do@extract@font`, `\font@name`, `\f@size`, and so on.

```

102   \ifx\external@font\@empty
103     \try@size@substitution
104     \ifx\external@font\@empty
105       \@latex@error{Font \expandafter \string\font@name\space
106                   not found}\@eha
107       \error@fontshape
108       \get@external@font
109   \fi\fi
110 }
111 \</2ekernel | autoload>

```

`\selectfont` The macro `\selectfont` is called whenever a font change must take place.

```

112 \<*2ekernel | package | autoload>
113 \DeclareRobustCommand\selectfont
114   {%

```

When `debug` is specified we actually want something like ‘`undebug`’. The font selection is now stable so that using `\tracingall` on some other macros will show us a lot of unwanted information about font loading. Therefore we disable tracing during font loading as long as `\tracingfonts` is less than 4.

```

115 \<+debug> \pushtracing
116 \<+debug> \ifnum\tracingfonts<4 \tracingoff
117 \<+debug> \else \tracingon\p@selectfont \fi

```


If `\baselinestretch` was redefined by the user it will not longer match its internal counterpart `\f@linespread`. If so we call `\set@fontsize` to prepare `\size@update`.

```
118 \ifx\f@linespread\baselinestretch \else
119 \set@fontsize\baselinestretch\f@size\f@baselineskip \fi
```

Then we generate the internal name of the font by concatenating *family*, *series*, *shape*, and current *size*, with slashes as delimiters between them. This is much more readable than standard L^AT_EX's `\twfbf`, etc. We define `\font@name` globally, as always. The reason for this is explained later on.

```
120 \xdef\font@name{%
121 \csname\curr@fontshape/\f@size\endcsname}%
```

We call the macro `\pickup@font` which will load the font if necessary.

```
122 \pickup@font
```

Then we select the font.

```
123 \font@name
```

If `\tracingfonts` is greater than 2 we also show the font switch. We do this before `\glb@settings` is called since this macro might redefine `\font@name`.

```
124 (*trace)
125 \ifnum \tracingfonts>\tw@
126 \font@info{Switching to \font@name}\fi
127 (/trace)
```

Finally we call `\size@update`. This macro is normally empty but will contain actions (like setting the `\baselineskip`) that have to be carried out when the font size, the base `\baselineskip` or the `\baselinestretch` have changed.

```
128 \size@update
```

A similar function is called to handle anything related to encoding updates. This one is changed from `\relax` by `\fontencoding`.

```
129 \enc@update
```

Just before ending this macro we have to pop the tracing stack if it was pushed before.

```
130 (<+debug) \poptracing
131 }
```

`\set@fontsize` The macro `\set@fontsize` does the actual work. First it assigns new values to `\f@size`, `\f@baselineskip` and `\f@linespread`.

```
132 \def\set@fontsize#1#2#3{%
133 \@defaultunits\@tempdimb#2pt\relax\@nnil
134 \edef\f@size{\strip@pt\@tempdimb}%
135 \@defaultunits\@tempskipa#3pt\relax\@nnil
136 \edef\f@baselineskip{\the\@tempskipa}%
137 \edef\f@linespread{#1}%
```

For backward compatibility and for later testing within `\selectfont` the internal value of `\f@linespread` is passed back to `\baselinestretch`.

```
138 \let\baselinestretch\f@linespread
```

Additional processing will happen within `\selectfont`. For this reason the macro `\size@update` (which will be called in `\selectfont`) will be defined to be:

```
139 \def\size@update{%
```

First calculate the new `\baselineskip` and also store it in `normalbaselineskip`

```
140 \baselineskip\f@baselineskip\relax
141 \baselineskip\f@linespread\baselineskip
142 \normalbaselineskip\baselineskip
```

then to set up a new `\strutbox`

```
143 \setbox\strutbox\hbox{%
144 \vrule\@height.7\baselineskip
145 \@depth.3\baselineskip
146 \width\z@}%
```

We end with a bit of tracing information.

```

147 (*trace)
148   \ifnum \tracingfonts>\tw@
149     \ifx\f@linespread\@empty
150       \let\reserved@a\@empty
151     \else
152       \def\reserved@a{\f@linespread x}%
153     \fi
154     \@font@info{Changing size to \f@size/\reserved@a
155               \f@baselineskip}%
156     \aftergroup\type@restoreinfo \fi
157 </trace>

```

When all this is processed `\size@update` redefines itself to `\relax` so that in later calls of `\selectfont` no extra code will be executed.

```

158   \let\size@update\relax}%
159 }

```

Instead of defining this macro internally we might speed things up by placing the code into a separate macro and use `\let`!

`\size@update` Normally this macro does nothing; it will be redefined by `\set@fontsize` to initiate an update.

```

160 \let\size@update\relax

```

`\type@restoreinfo` This macro produces some info when a font size and/or baseline change will get restored.

```

161 (*trace)
162   \def\type@restoreinfo{%
163     \ifx\f@linespread\@empty
164       \let\reserved@a\@empty
165     \else
166       \def\reserved@a{\f@linespread x}%
167     \fi
168     \@font@info{Restoring size to
169               \f@size/\reserved@a\f@baselineskip}}
170 </trace>

```

`\glb@settings` The macro `\glb@settings` globally selects all math fonts for the current size if necessary.

```

171 \def\glb@settings{%

```

When `\glb@settings` gains control a size change was requested and all previous font assignments need to be replaced. Therefore the old values of the fonts are no longer needed. For every *math group* the new assignments are appended to `\math@fonts`. But this happens only if the `math@fonts` switch is set to true. However, we always set up the correct math sizes for script and scriptscript fonts since they may be needed even if we don't set up the whole math machinery.

Here we set the math size, script size and scriptscript size. If the `S@...` macro is not defined we have to first calculate the three sizes.

```

172   \expandafter\ifx\csname S@\f@size\endcsname\relax
173     \calculate@math@sizes
174   \fi

```

The effect of this is that `\calculate@math@sizes` may or may not define the `S@...` macro. In the first case the next time the same size is requested this macro is used, otherwise `\calculate@math@sizes` is called again. This also sets the `math@fonts` switch. If it is true we must switch the math fonts.

```

175   \csname S@\f@size\endcsname
176   \ifmath@fonts
177 (*trace)
178   \ifnum \tracingfonts>\tw@

```

```

179      \@font@info{Setting up math fonts for
180                  \f@size/\f@baselineskip}\fi
181 </trace>

```

Inside a group we execute the macro for the current math *version*. This sets `\math@fonts` to a list of `\textfont...` assignments. `\getanddefine@fonts` (which may be called at this point) needs the `\escapechar` parameter to be set to `-1`.

```

182      \begingroup
183      \escapechar\m@ne
184      \csname mv@\math@version \endcsname

```

Then we set `\globaldefs` to 1 so that all following changes are done globally. The math font assignments recorded in `\math@fonts` are executed and `\glb@currsz` is set equal to `\f@size`. This signals that the fonts for math in this size are set up.

```

185      \globaldefs\@ne
186      \math@fonts
187      \let \glb@currsz \f@size
188      \endgroup

```

Finally we execute any code that is supposed to happen whenever the math font setup changes. This register will be executed in local mode which means that everything that is supposed to have any effect should be done globally inside. We can't execute it within `\globaldefs\@ne` as we don't know what ends up inside this register, e.g., it might contain calculations which use some local registers to calculate the final (global) value.

```

189      \the\every@math@size

```

Otherwise we announce that the math fonts are not set up for this size.

```

190 <*trace>
191      \else
192      \ifnum \tracingfonts>\tw@
193      \@font@info{No math setup for
194                  \f@size/\f@baselineskip}\fi
195 </trace>
196      \fi
197 }
198 </2ekernel | package | autoload>

```

`\baselinestretch` In `\selectfont` we used `\baselinestretch` as a factor when assigning a value to `\baselineskip`. We use 1 as a default (i.e. no stretch).

```

199 <*2ekernel | autoload>
200 \def\baselinestretch{1}

```

`\every@math@size` We must still define the hook `\every@math@size` we used in `\glb@settings`. We initialize it to nothing. It is important to remember that everything that goes into this hook should to global updates, local changes will have weird effects.

```

201 \newtoks\every@math@size
202 \every@math@size={}
203 </2ekernel | autoload>

```

32.2 Math fonts setup

32.2.1 Outline of algorithm for math font sizes

\TeX uses the the math fonts that are current when the end of a formula is reached. If we don't want to keep font setups local to every formula (which would result in an enormous overhead, we have to be careful not to end up with the wrong setup in case formulas are nested, e.g., we need to be able to handle

$$\$ a=b+c \text{ \mbox{\small for all } } \$b\$ \text{ and } \$c\$ \text{ in } \mathbb{Z} \$$$

Here the inner formulae `b` and `c\in Z` are typeset in `\small` but we have to return to `\normalsize` before we reach the closing `$` of the outer formula.

This is handled in the following way:

1. At any point in the document the global variable `\gbl@currsize` contains the point size for which the math fonts currently are set up.
2. Whenever we start a formula we compare its value with the local variable `\f@size` that describes the current text font size.
3. If both are the same we assume that we can use the current math font setup without adjustment.
4. If they differ we call `\gbl@settings` which changes the math font setup and updates `\gbl@currsize`.
 - (a) If we are recursively inside another formula (`\if@inmath`) we ensure that `\gbl@settings` is executed again in the outer formula, so that the old setup is automatically restored.
 - (b) Otherwise, we set the switch `@inmath` locally to `true` so that all nested formulae will be able to detect that they are nested in some outer formula.

The above algorithm has the following features:

- For sizes which are not containing any formula no math setup is done. Compared to the original algorithm of NFSS this results in the following savings:
 - No unnecessary loading of math fonts for sizes that are not used to typeset any math formulae (explicit or implicit ones).
 - No time overhead due to unnecessary changes of the math font setup on entrance and exit of the text font size.
- Math font setup changes for top-level formulae will survive (there is no restoration after the formula) thus any following formula in the same size will be directly typesettable. Compared to original implementation in NFSS2 the new algorithm has the overhead of one test per formula to see if the current math setup is valid (in the original algorithm the setup was always valid, thus no test was necessary).
- In nested formulae the math font setup is restored in the outer formula by a series of `\aftergroup` commands and checks. Compared to the original algorithm this involves additional checks ($2 \times \langle \text{non-math levels} \rangle$ per inner formula).

32.2.2 Code for math font size setting

`\check@mathfonts` In the `\check@mathfonts` macros we implement the steps 2 to 4 except that instead of a switch the macro `\init@restore@glb@settings` is used.

```

204 \ifx\package\autoload
205 \def\check@mathfonts{%
206   \ifx\gbl@currsize\f@size
207 \ifx\tracingfont
208   \ifnum\tracingfont>\thr@@
209     \font@info{*** MATH: no change \f@size\space
210       curr/global (\curr@math@size/\gbl@currsize)}\fi
211 \fi
212   \else
213 \ifx\tracingfont
214   \ifnum\tracingfont>\thr@@
215     \font@info{*** MATH: setting up \f@size\space
216       curr/global (\curr@math@size/\gbl@currsize)}\fi

```

```

217 </trace>
218     \glb@settings
219     \init@restore@glb@settings
220 \fi
221 \let\curr@math@size\f@size
222 \def\init@restore@glb@settings{\aftergroup\restglb@settings}%
223 }

```

`\init@restore@glb@settings` This macro does by default nothing but get redefined inside `\check@mathfonts` to initiate fontsize restoring in nested formulas.

```

224 <-trace>\let\init@restore@glb@settings\relax
225 <*trace>
226 \def\init@restore@glb@settings{%
227     \ifnum \tracingfonts>\thr@@
228         \@font@info{*** MATH: no resetting (not in
229                     nested math)}\fi
230 }
231 </trace>

```

`\restglb@settings` This macro will be executed the first time after the current formula.

```

232 \def\restglb@settings{%
233 <*trace>
234     \ifnum \tracingfonts>\thr@@
235         \@font@info{*** MATH: restoring}\fi
236 </trace>
237     \begingroup
238         \let\f@size\curr@math@size
239         \ifx\glb@currsize \f@size
240 <*trace>
241             \ifnum \tracingfonts>\thr@@
242                 \@font@info{*** MATH: ... already okay (\f@size)}\fi
243 </trace>
244             \else
245 <*trace>
246                 \ifnum \tracingfonts>\thr@@
247                     \@font@info{*** MATH: ... to \f@size}\fi
248 </trace>
249                 \glb@settings
250             \fi
251         \endgroup
252 }

```

32.2.3 Other code for math

`\use@mathgroup` The `\use@mathgroup` macro should be used in user macros to select a math group. Depending on whether or not the `margid` option is in force it has two or three arguments. For this reason it should be called as the last macro.

First we test if we are inside math mode since we don't want to apply a useless definition.

```

253 \def\use@mathgroup#1#2{\relax\ifmmode
254 <*trace>
255     \ifnum \tracingfonts>\tw@
256         \count@#2\relax
257         \@font@info{Using \noexpand\mathgroup
258                     (\the\count@) #2}\fi
259 </trace>

```

If so we first call the '=' macro (i.e. argument three) to set up special things for the selected math group. Then we call `\mathgroup` to select the group given by argument two and finally we place #1 (i.e. the argument of the *math alphabet identifier*) at the end. This part of the code is surrounded by two commands which

behave like `\begingroup` and `\endgroup` if we want $\langle\textit{math alphabet identifier}\rangle$ s but will expand into `\@empty` if we want simply switches to a new math group. Since argument number 2 may be a digit instead of a control sequence we add a `\relax`. Otherwise something like `\mit{1}` would switch to math group 11 (and back) instead of printing an oldstyle 1.

```
260 \math@bgroup
261 \expandafter\ifx\csname M@\f@encoding\endcsname#1\else
262 #1\fi
263 \mathgroup#2\relax
```

Before we reinsert the swallowed token (arg. three) into the input stream, in the case that the $\langle\textit{math alphabet identifier}\rangle$ isn't called in math mode, we remove the `\fi` with the `\expandafter` trick. This is necessary if the token is actually an macro with arguments. In such a case the `\fi` will be misinterpreted as the first argument which would be disastrous.

```
264 \expandafter\math@egroup\fi}%
```

The surrounding macros equal `\begingroup` and `\endgroup`. But using internal names makes it possible to overwrite their meaning in certain cases. This is for example used in \mathscr -TeX macros for placing accents.

`\math@egroup` If the `margid` option is in force (which can be tested by looking at the definition of `\math@bgroup` we change the `\math@egroup` command a bit to display the current $\langle\textit{math group number}\rangle$ after it closes the scope of $\langle\textit{math alphabet}\rangle$ with `\endgroup`.

```
265 \*trace)
266 \ifx\math@bgroup\bgroup
267 \def\math@egroup#1{#1\egroup
268 \ifnum \tracingfonts>\tw@
269 \@font@info{Restoring \noexpand\mathgroup
270 (\ifnum\mathgroup=\m@ne default\else \the\mathgroup \fi)}%
271 }\fi}
272 \fi
273 \*trace)
```

`\getanddefine@fonts` `\getanddefine@fonts` has two arguments: the $\langle\textit{math group number}\rangle$ and the *family/series/shape* name as a control sequence.

```
274 \def\getanddefine@fonts#1#2{%
```

First we turn of tracing when `\tracingfonts` is less than 4.

```
275 \*debug) \pushtracing
276 \*debug) \ifnum\tracingfonts<4 \tracingoff
277 \*debug) \else \tracingon\getanddefine@fonts \fi
```

```
278 \*trace)
279 \ifnum \tracingfonts>\tw@
280 \count@#1\relax
281 \@font@info{\noexpand\mathgroup (\the\count@) #1 :=\MessageBreak
282 \string#2 \tf@size/\sf@size/\ssf@size}\fi
283 \*trace)
```

We append the current `\tf@size` to `#2` to obtain the font name.⁶ Again, `font@name` is defined globally, for the reasons explained in the description of `\wrong@fontshape`.

```
284 \xdef\font@name{\csname \string#2/\tf@size\endcsname}%
```

Then we call `\pickup@font` to load it if necessary. We remember the internal name as `\textfont@name`.

```
285 \pickup@font \let\textfont@name\font@name
```

⁶One might ask why this expansion does not generate a macro name that starts with an additional `\` character. The solution is that `\escapechar` is set to `-1` before `\getanddefine@fonts` is called.

Same game for `\scriptfont` and `\scriptscriptfont`:

```
286 \xdef\font@name{\csname \string#2/\sf@size\endcsname}%
287 \pickup@font \let\scriptfont@name\font@name
288 \xdef\font@name{\csname \string#2/\ssf@size\endcsname}%
289 \pickup@font
```

Then we append the new `\textfont...` assignments to the `\math@fonts`.

```
290 \edef\math@fonts{\math@fonts
291     \textfont#1\textfont@name
292     \scriptfont#1\scriptfont@name
293     \scriptscriptfont#1\font@name}%
```

Just before ending this macro we have to pop the tracing stack if it was pushed before.

```
294 <+debug> \poptracing
295     }
296 </2ekernel | package | autoload>
```

33 Scaled font extraction

`\ifnot@nil` We begin with a simple auxiliary macro. It checks whether its argument is the token `\@nil`. If so, it expands to `\@gobble` which discards the following argument, otherwise it expands to `\@firstofone` which reproduces its argument.

```
297 <*2ekernel | autoload>
298 \def\ifnot@nil#1{\def\reserved@a{#1}%
299   \ifx\reserved@a\@nil \expandafter\@gobble
300   \else \expandafter\@firstofone\fi}
```

`\remove@to@nnil` Three other auxiliary macros will be needed in the following: `\remove@to@nnil` gobbles up everything up to, and including, the next `\@nnil` token, and `\remove@angles` and `\remove@star` do the same for the character `>` and `*`, respectively, instead of `\@nnil`.

```
301 \def\remove@to@nnil#1\@nnil{}
302 \def\remove@angles#1>{\set@simple@size@args}
303 \def\remove@star#1*{#1}
304 </2ekernel | autoload>
```

`\extract@sizefn` This macro takes a size specification and parses it into size function and the optional and mandatory arguments.

```
305 <*2ekernel | def2 | autoload>
306 \def\extract@sizefn#1*#2\@nil{%
307   \if>#2>\set@size@funct@args#1\@nil
308     \let\sizefn@info\@empty
309   \else\expandafter\set@size@funct@args\remove@star#2\@nil
310     \def\sizefn@info{#1}\fi
311 }
```

`\try@simple@size` This function tries to extract the given size (specified by `\f@size`) for the requested font shape. The font information must already be present in `\font@info`. The central macro that does the real work is `\extract@fontinfo`. We will first give a simple example how this macro works, and describe it in full generality later.

Assume that the requested parameters are: *encoding scheme* ‘OT1’, *family* ‘cm’, *series* ‘sansserif’, *shape* ‘normal’, and *size* ‘12’. The corresponding font definitions have already been extracted from the macro `\OT1/cm/sansserif/normal` and stored in `font@info`. (Otherwise `\extract@fontinfo` doesn’t get called.) This information consists of a token list made of characters of category code 12 of the form

```
<10*>cmss10<12*>cmss12<17*>cmss17
```

For reasonable packages one usually needs more sizes but this is sufficient to get the flavour. We will define a macro `\extract@fontinfo` to find the external font name ('cmss12') for us:

```
\def\extract@fontinfo#1<12*#2>#3<#4\@nnil{%
  \set@simple@size@args#3<#4\@nnil
  \execute@size@function{#2}}
```

so that when it gets called via

```
\extract@fontinfo<10*>cmss10<12*>cmss12<17*>cmss17\@nnil
```

#1 will contain all characters before <12*>, #2 will be empty, #3 will be exactly cmss12, and #4 will be 17>cmss17. The expansion is therefore

```
\set@simple@size@args cmss12<17*>cmss17\@nnil
\execute@size@function{}
```

This means: the default (empty) size function will be executed, with its optional argument argument set to empty and its mandatory argument set to `cmss12` by `\set@simple@size@args`. As we discussed earlier, the effect of the default size function is to load the given external font (cmss12) at the specified size (12)—which is exactly what was intended.

But this is only part of the whole story. It may be that the size requested does not occur in the token list `\font@info`. And the simple definition of `\extract@fontinfo` we gave above does not allow to specify give more than one size specification in front of the external font name.

Let's address these two problems separately. The first one is solved with the following trick: We define `\extract@fontinfo` as follows:

```
\def\extract@fontinfo#1<12*#2>#3<#4\@nnil{%
  \ifnot@nil{#3}%
  {\set@simple@size@args#3<#4\@nnil
   \execute@size@function{#2}%
  }%
}
```

How does this work? We call `\extract@fontinfo` via

```
\expandafter\extract@fontinfo\font@info<12*>\@nil<\@nnil
```

i.e. by appending `<12*>\@nil<\@nnil`. If the size ('12' in this case) appears in `\font@info` everything works as explained above, the only difference being that argument #4 of `\extract@fontinfo` additionally gets the tokens `<12*>\@nil<\@nnil`. However, if the size is not found everything up to the final `<12*>` is in argument #1, #3 gets `\@nil`, and #2 and #4 are empty. The macro `\ifnot@nil` will discard the calls to `\set@simple@size@args` and `\execute@size@function`, and hence `\font@info` will continue to be equal to `\@empty`. This means that no simple size specification matching the requested size could be found.

The second problem (more than one simple size specification for one external font name) will be addressed in `\set@simple@size@args` below.

The macros are hidden inside other control sequences so that we have to build `\extract@fontinfo` in several steps.

So here's the actual definition of `\extract@font` in `\try@simple@size`.

312 % % this could be replaced by `\try@size@range` making the subst slower!

313 \def\try@simple@size{%

`\reserved@a` is made an abbreviation for the head of the definition of the macro `\extract@fontinfo`.

314 \def\reserved@a{\def\extract@fontinfo####1}%

Now we can define `\extract@fontinfo`. Here we handle a small but convenient variation: in case of the default (empty) size function it is allowed to omit the * character.


```

315 \expandafter\reserved@a\expandafter<\f@size>##2<##3\@nnil{%
316 \ifnot@nil{##2}%
317 {\set@simple@size@args##2<##3\@nnil
318 \execute@size@function\sizefn@info
319 }}%

```

Now we call `\extract@fontinfo`. Note the `<\@nil` tokens at the end.

```

320 \expandafter\expandafter
321 \expandafter\extract@fontinfo\expandafter\font@info
322 \expandafter<\f@size>\@nil<\@nnil
323 }

```

`\set@simple@size@args` As promised above, the macro `\set@simple@size@args` will handle the case of several size specifications in a row. If another size specification follows, the very first token of its argument list is the character `<`. By starting the definition as follows,

```

324 \def\set@simple@size@args#1<{%

```

parameter `#1` is empty in this case, and contains the size function's arguments otherwise. We distinguish these two cases (Note that the character `<` cannot appear in `#1`) by calling `\remove@angles` for empty `#1` and `\extract@sizefn` otherwise. In the latter case we have to take care of the remaining character tokens and discard them. This is done by `\remove@to@nnil`. Note also the use of Kabelschacht's method.

```

325 \if<#1<%
326 \expandafter\remove@angles
327 \else
328 \extract@sizefn#1*\@nil
329 \expandafter\remove@to@nnil
330 \fi}

```

Now, we are through with the case of a simple size, except for calling the size function. This will be handled later, as it is the same mechanism for all types of size specification. We will now proceed to macros for extraction of size range specification.

`\extract@rangefontinfo` `\extract@rangefontinfo` goes through a font shape definition in the input until it recognizes the tokens `<\@nil->`. It looks for font ranges with font size functions. Its operation is rather simple: it discards everything up to the next size specification and passes this on to `\is@range` for inspection. The specification (parameter `#2` is inserted again, in case it is needed later.

```

331 \def\extract@rangefontinfo#1<#2>{%
332 \is@range#2->\@nil#2>}

```

`\is@range` `\is@range` is again a sort of dispatcher macro: if the size specification it is looking at is not a range specification it discards it and calls `\extract@rangefontinfo` to continue the search. Otherwise it calls `\check@range` to check the requested size against the specified range.

From the way `\is@range` is called inside `\extract@rangefontinfo` we see that `#2` is the character `>` if the size specification found is a simple one (as it does not contain a `-` character. This is checked easily enough and `\extract@rangefontinfo` called again. Note that the extra tokens inserted after the `\@nil` in the call to `\is@range` appear at the beginning of the first argument to `\extract@rangefontinfo` and are hence ignored.

```

333 \def\is@range#1-#2\@nil{%
334 \if>#2\expandafter\check@single\else
335 \expandafter\check@range\fi}

```

`\check@range` `\check@range` takes lower bound as parameter `#1`, upper bound as `#2`, size function as `#3` and the size function's arguments as `#4`. If `#3` is the special token `\@nil` `\font@info` is exhausted and we can stop searching.

```

336 \def\check@range#1-#2>#3<#4\@nnil{%
337   \ifnot@nil{#3}{%
    If #3 wasn't \@nil we have a range. We start by assuming that we have to recurse.
    Note that we have to reinsert an < as it was already removed by scanning.
338     \def\reserved@f{\extract@rangefontinfo<#4\@nnil}%
    We have to make sure that both boundaries are present, if not we have to set them.
    Here we check the upper bound. If \upper@bound is zero after the assignment we
    set it to \maxdimen (upper open range). We need to use a <dimen> register for
    the scan since we may have a decimal number as the boundary.
339     \upper@bound0#2\p@
340     \ifdim\upper@bound=\z@ \upper@bound\maxdimen\fi
    Now we check the upper boundary against \f@size. If it is larger or equal than
    \f@size this range is no good and we have to recurse.
341     \ifdim \f@size \p@<\upper@bound
    Otherwise we have to check the lower bound. This time it is not necessary to scan
    the boundary value into a register because if it is empty we get zero as desired.
    We could even omit the 0 which would result in 1pt as default lower boundary. If
    \f@size is smaller than the boundary we have to recurse.
342     \lower@bound0#1\p@
343     \ifdim \f@size \p@<\lower@bound
344     \else
    If both tests are passed we can try executing the size function.
345     \set@simple@size@args#3<#4\@nnil
346     \execute@size@function\sizefn@info
    If the function was successful it should have left an external font name in
    \external@font. We use this to see if we can stop scanning. Otherwise we
    recurse.
347     \ifx\external@font\@empty
348     \else
349     \let\reserved@f\@empty
350     \fi
351     \fi
352     \fi
353     \reserved@f}}
354 \</2ekernel | def2 | autoload>

```

\lower@bound We use two dimen registers **\lower@bound** and **\upper@bound** to store the lower and upper endpoints of the range we found.

```

355 \<*2ekernel | autoload>
356 \newdimen\lower@bound
357 \newdimen\upper@bound
358 \</2ekernel | autoload>

```

\check@single **\check@single** takes the size as parameter #1, size function as #2 and the size function's arguments as #3. We can assume that there is always something in the pipeline since the very last entry is a faked range (see above).

```

359 \<*2ekernel | def2 | autoload>
360 \def\check@single#1>#2<#3\@nnil{%
    We start by assuming that we have to recurse. Note that we have to reinsert an
    < as it was already removed by scanning.
361     \def\reserved@f{\extract@rangefontinfo<#3\@nnil}%
    Now we check the the size against \f@size. If it is not equal \f@size it is no
    good and we have to recurse.
362     \ifdim \f@size \p@=#1\p@

```

Otherwise if this test is passed we can try executing the size function.

```
363      \set@simple@size@args#2<#3\@nnil
364      \execute@size@function\sizefn@info
```

If the function was successful it should have left an external font name in `\external@font`. We use this to see if we can stop scanning. Otherwise we recurse.

```
365      \ifx\external@font\@empty
366      \else
367      \let\reserved@f\@empty
368      \fi
369      \fi
370      \reserved@f}
```

`\set@size@funct@args` This macro sets the optional and mandatory arguments for a size function. If the optional argument is not present it is set to the empty token list. The mandatory argument is delimited by the token `\@nil`.

```
371 \def\set@size@funct@args{\@ifnextchar[%
372   \set@size@funct@args@{\set@size@funct@args@[]}}
373 \def\set@size@funct@args@[#1]#2\@nil{%
374   \def\mandatory@arg{#2}%
375   \def\optional@arg{#1}}
376 \</2kernel | def2 | autoload\>
```

`\DeclareSizeFunction` This function defines a new size function hiding the internal from the designer. The body of the size function may use `\optional@arg` and `\mandatory@arg` denoting the optional and mandatory argument that may follow the size specification `<...>`.

```
377 \<2kernel | autoload\>
378 \def\DeclareSizeFunction#1#2{\@namedef{s@fct@#1}{#2}}
379 \@onlypreamble\DeclareSizeFunction
380 \</2kernel | autoload\>
```

`\execute@size@function` This macro is very simple. The only point worth noting is that calling an undefined size function will do nothing (actually execute a `\relax`).

```
381 \<2kernel | package | autoload\>
382 \def\execute@size@function#1{%      %%% could be added to autoload as well
383   \<trace\>
384     \@ifundefined{s@fct@#1}%
385     {\errmessage{Undefined font size function #1}%
386      \s@fct@}%
387     {\csname s@fct@#1\endcsname}%
388   \</trace\>
389   \<-trace\> \csname s@fct@#1\endcsname
390 }
391 \</2kernel | package | autoload\>
```

`\try@size@range` This macro tries to find a suitable range for requested size (specified by `\f@size`) in `\font@info`. All the relevant action is done in `\extract@rangefontinfo`. All that needs to be done is to stuff in the token list in `\font@info` so that `\extract@rangefontinfo` can inspect it. Note the `<-*\@nil>` token at the end to stop scanning.

```
392 \<2kernel | def2 | autoload\>
393 \def\try@size@range{%
394   \expandafter\extract@rangefontinfo\font@info <-*\@nil\<\@nnil
395 }
396 \</2kernel | def2 | autoload\>
```

`\try@size@substitution` This is the last thing that can be tried. If the desired `\f@size` is found neither among the simple size specifications nor in one of the ranges the whole list of size specifications is searched for a nearby simple size.

```

397 \*2kernel | defl)
398 \gdef\try@size@substitution{%
    First we do some initializations. \@tempdimb will hold the difference between the
    wanted size and the best solution found so far, so we initialise it with \maxdimen.
    The macro \best@size will hold the best size found, nothing found is indicated
    by the empty value.
399     \@tempdimb \maxdimen
400     \let \best@size \@empty
    Now we loop over the specification
401     \expandafter \try@simples \font@info <\number\M>\@nil<\@nnil
402 }
403 \*2kernel | defl)
404 \*autoload)
405 \def\try@size@substitution{\try@simples\try@size@substitution}
406 \*autoload)

```

`\font@submax` The macro `\font@submax` records the maximal deviation from the desired size encountered so far. Its value is used in a warning message at `\end{coument}`. The macro `\fontsubfuzz` contains the amount that will not cause terminal warnings (warnings still go into the transcript file).

```

407 \*2kernel | autoload)
408 \def\font@submax{0pt}
409 \def\fontsubfuzz{.4pt}
410 \*2kernel | autoload)
411 \+package)\def\fontsubfuzz{0pt}

```

`\try@simples` `\try@simples` goes through a font shape definition in the input until it recognizes the tokens `<*\@nil><`. It looks for simple sizes to determine the two closest sizes. It is assumed that simple sizes are in increasing order.

```

412 \*2kernel | defl)
413 \gdef\try@simples#1<#2>{%
414     \tryif@simple#2->\tryif@simple}
415 \*2kernel | defl)
416 \*autoload)
417 \def\try@simples{\@autoload{fss1}}
418 \*autoload)

```

`\tryis@simple` `\tryis@simple` is similar to `\is@range`. If it sees a simple size, it checks it against the value of `\f@size` and sets `\lower@font@size` or `\higher@font@size`. In the latter case, it stops the iteration. By adding `<\number\M>` at the end of the line we always have an end point. This is a hack which probably should be corrected.

First it checks whether it is finished already, then whether the size specification in question is a simple one.

```

419 \*2kernel | defl)
420 \gdef\tryif@simple#1-#2\tryif@simple{%
    Most common case for \reserved@f first:
421     \let \reserved@f \try@simples
422     \if>#2%

```

If so, it compares it to the value of `\f@size`. This is done using a `dimen` register since there may be fractional numbers.

```

423     \dimen@ #1\p@
424     \ifdim \dimen@<\M\p@

```

If `\dimen@` is `\M\p@` we have reached the end of the fontspec (hopefully) otherwise we compare the value with `\f@size` and compute in `\@tempdimc` the absolute value of the difference between the two values.

```

425     \ifdim \f@size\p<\dimen@
426         \@tempdimc \dimen@
427         \advance\@tempdimc -\f@size\p@
428     \else
429         \@tempdimc \f@size\p@
430         \advance\@tempdimc -\dimen@
431     \fi

```

The result is then compared with the smallest difference we have encountered, if the new value (in \@tempdimc is smaller) we have found a size which is a better approximation so we make it the \best@size and adjust \@tempdimb.

```

432     \ifdim \@tempdimc<\@tempdimb
433         \@tempdimb \@tempdimc
434     \def \best@size{#1}%
435     \fi

```

When we have reached the end of the fontspec we substitute the best size found (if any). We code this inline to save macro space; in the past this was done by a macro called \subst@size.

```

436     \else

```

\subst@size This macro substitutes the size recorded in \best@size for the unavailable size \f@size. \font@submax records the maximum difference between desired size and selected size in the whole run.

```

437 % \subst@size          %% coded inline
438 % \def\subst@size{%
439     \ifx \external@font\@empty
440         \ifx \best@size\@empty
441             \else
442                 \ifdim \@tempdimb>\font@submax \relax
443                     \xdef \font@submax {\the\@tempdimb}%
444                 \fi
445                 \let \f@user@size \f@size
446                 \let \f@size \best@size
447                 \ifdim \@tempdimb>\fontsubfuzz\relax
448                     \@font@warning{Font\space shape\space
449                         '\curr@fontshape'\space in\space size\space
450                         <\f@user@size>\space not\space available\MessageBreak
451                         size\space <\f@size>\space substituted}%
452                 \fi
453                 \try@simple@size
454                 \do@subst@correction
455             \fi
456         \fi
457 % }

```

This brings us back into the main part of \tryif@simple. Finally we get rid of any rubbish left over on the input stack.

```

458     \let \reserved@f \remove@to@nnil
459     \fi
460     \fi

```

If it's a range iterate also.

```

461     \reserved@f}
462 \</2ekernel | def1)

```

33.1 Sizefunctions

In the following we define some useful size functions.

`\sfct@` This is the default size function. Mandatory argument is an external font name, optional argument a scale factor. The font is scaled to `\f@size` if no optional argument is present, and to `\f@size` multiplied by the optional argument otherwise.

```

463 (*2kernel | autoload)
464 \DeclareSizeFunction{}\empty@sfcnt\@font@warning}
465 \DeclareSizeFunction{s}\empty@sfcnt\@font@info}
466 \endkernel | autoload)

467 (*2kernel | def2 | autoload)
468 \def\empty@sfcnt#1{%
469     \@tempdimb \f@size\p@
470     \ifx\optional@arg\empty
471     \else
472     \@tempdimb \optional@arg\@tempdimb
473     #1{Font\space shape\space '\curr@fontshape'\space
474         will\space be\MessageBreak
475         scaled\space to\space size\space \the\@tempdimb}%
476     \fi
477     \edef\external@font{\mandatory@arg\space at\the\@tempdimb}}
478 \endkernel | def2 | autoload)

```

`\sfct@gen` This size function generates the external name from the mandatory argument and the requested user size, and thus can be used for external names where the size is encoded in the font name. The optional argument a scale factor. The font is scaled to `\f@size` if no optional argument is present, and to `\f@size` multiplied by the optional argument otherwise.

```

479 (*2kernel | autoload)
480 \DeclareSizeFunction{gen}\gen@sfcnt\@font@warning}
481 \DeclareSizeFunction{sgen}\gen@sfcnt\@font@info}
482 \endkernel | autoload)

483 (*2kernel | def2 | autoload)
484 \def\gen@sfcnt{%
485     \edef\mandatory@arg{\mandatory@arg\f@size}%
486     \empty@sfcnt}
487 \endkernel | def2 | autoload)

```

`\sfct@genb` This size function is similar to `gen`, but for fonts where the size is encoded in the font name in centipoints, as in the DC fonts version 1.2. The font is scaled to `\f@size` if no optional argument is present, and to `\f@size` multiplied by the optional argument otherwise.

```

488 (*2kernel | autoload)
489 \DeclareSizeFunction{genb}\genb@sfcnt\@font@warning}
490 \DeclareSizeFunction{sgenb}\genb@sfcnt\@font@info}
491 \endkernel | autoload)

492 (*2kernel | def2 | autoload)
493 \def\genb@sfcnt{%
494     \edef\mandatory@arg{\mandatory@arg\expandafter\genb@x\f@size..\@}%
495     \empty@sfcnt}
496 \endkernel | def2 | autoload)

```

`\genb@x` The auxiliary macros `\genb@x` and `\genb@y` are used to convert the `\f@size` into centipoints.

```

497 (*2kernel | def2 | autoload)
498 \def\genb@x#1.#2.#3\@{\two@digits{#1}\genb@y#200\@}
499 \def\genb@y#1#2#3\@{\#1#2}
500 \endkernel | def2 | autoload)

```

`\sfct@sub` This size function handles font substitution. The mandatory argument is a family/series/shape combination, the optional argument (if present) is ignored. The

font encoding scheme cannot be changed. Therefore, the first thing we do is to prepend the encoding scheme.

```

501 \<*2kernel | autoloading
502 \DeclareSizeFunction{sub}{\sub@sfcnt\@font@warning}
503 \DeclareSizeFunction{ssub}{\sub@sfcnt\@font@info}
504 \>/2kernel | autoloading

505 \<*2kernel | def2 | autoloading
506 \def\sub@sfcnt#1{%
507     \edef\mandatory@arg{\f@encoding/\mandatory@arg}%

```

Next action is split the arg into its individual components and allow for a late font shape load.

```

508     \begingroup
509     \expandafter\split@name\mandatory@arg/\@nil
510     \try@load@fontshape
511     \endgroup

```

Then we record the current \f@size since it may get clobbered.

```

512     \let\f@user@size\f@size

```

Then we check whether this new combination is defined and give an error message if not. In this case we also switch to \error@fontshape.

```

513     \expandafter
514     \ifx\csname\mandatory@arg\endcsname\relax
515         \errmessage{No\space declaration\space for\space
516             shape\space \mandatory@arg}%
517         \error@fontshape
518     \else

```

Otherwise we warn the user about the substitution taking place.

```

519         #1{Font\space shape\space '\curr@fontshape'\space in\space
520             size\space <\f@size>\space not\space available\MessageBreak
521             Font\space shape\space '\mandatory@arg'\space tried\space
522             instead}%
523     \expandafter\split@name\mandatory@arg/\@nil
524     \fi

```

Then we restart the font specification scan by calling \get@external@font.

```

525     \edef\f@size{\f@user@size}%
526     \get@external@font

```

Finally \do@subst@correction is called to get the font name right.

```

527     \do@subst@correction
528 }
529 \</2kernel | def2 | autoloading

```

\s@fct@subf The subf size function allows substitution of another font. The mandatory argument is the external name of the font to be substituted, the optional argument a size scaling factor like in the default size function. The main difference to the default size function is the warning message.

```

530 \<*2kernel | autoloading
531 \DeclareSizeFunction{subf}{\subf@sfcnt\@font@warning}
532 \DeclareSizeFunction{ssubf}{\subf@sfcnt\@font@info}
533 \>/2kernel | autoloading

534 \<*2kernel | def2 | autoloading
535 \def\subf@sfcnt#1{%
536     #1{Font\space shape\space '\curr@fontshape'\space in\space
537         size\space \f@size\space not\space available\MessageBreak
538         external\space font\space '\mandatory@arg'\space used}%
539     \empty@sfcnt#1%
540 }
541 \>/2kernel | def2 | autoloading

```

`\sfct@fixed` The `fixed` size function is for using a font at a different size than requested. A warning message is printed, and the external font to be used is taken from the mandatory argument. If an optional argument is present it is used as the ‘at’ size for the font. Otherwise the font is loaded at its design size.

```

542 <*2kernel | autoloading>
543 \DeclareSizeFunction{fixed}{\fixed@sfcnt\@font@warning}
544 \DeclareSizeFunction{sfixed}{\fixed@sfcnt\@font@info}
545 </2kernel | autoloading>

546 <*2kernel | def2 | autoloading>
547 \def\fixed@sfcnt#1{%
548   \ifx\optional@arg\@empty
549     \let\external@font\mandatory@arg
550   \else
551     \edef\external@font{\mandatory@arg\space at\optional@arg pt}%
552   \fi
553   #1{External\space font\space ‘\external@font’\space loaded\space
554     for\space size\MessageBreak
555     <\f@size>}%
556 }
557 </2kernel | def2 | autoloading>

```


File q

ltfsscmp.dtx

This file contains the implementation of commands giving compatibility with the original ‘NFSS1’ release of the Font Selection Scheme.

Warning: The macro documentation is still basically the documentation from the first NFSS release and therefore in some cases probably not completely accurate.

34 Compatibility code for NFSS release 1

There have been a couple of commands which became obsolete with NFSS2. In the past they have been still part of the kernel code to make it possible to process old packages using those commands but since they take up valuable space we decided to remove them and instead auto-load their definitions if they are actually encountered in some file.

Thus the following code doesn’t really belong to this file but I put it here for the moment until finally a documented version of `ltfss.dtx` is available.

[auto-loading not activated]

`\new@fontshape` These macros are the interfaces in NFSS1 which shouldn’t be used any longer.
`\subst@fontshape` We all define them to call the macro `\scan@fontshape` which is an internal macro
`\extra@def` that loads the real definitions and then to execute themselves again. Once this
`\default@mextra` auto-loading has happened they have the definition shown below and thus execute
`\define@mathalphabet` their real code directly.
`\define@mathgroup`

```
1 (*autoload)
2 \def\new@fontshape{\scan@fontshape\new@fontshape}
3 \def\subst@fontshape{\scan@fontshape\subst@fontshape}
4 \def\extra@def{\scan@fontshape\extra@def}
5 \def\default@mextra{\scan@fontshape\default@mextra}
6 \def\define@mathalphabet{\scan@fontshape\define@mathalphabet}
7 \def\define@mathgroup{\scan@fontshape\define@mathgroup}
```

`\scan@fontshape` Here is the kernel definition for `\scan@fontshape` which loads the actual definitions from the file `nfsscmp.def`.

```
8 \def\scan@fontshape{\input{nfsscmp.def}}
```

The following definitions are now placed into the auto-load file.

Since we don’t know when this file will be read in we need to provide ourselves with standard `\catcode` settings. This is done by placing all definitions in a group and calling `\nfss@catcodes`. But this macro will also disable spaces which isn’t very appropriate for the following code because it contains a lot of helper messages. Therefore we change this back.

```
9 \begingroup
10 \nfss@catcodes
11 \catcode'\ =10\relax
12 \</autoload>
13 \<*compat>
```

`\new@fontshape` The interface is now `\DeclareFontShape`.

```
14 \gdef\new@fontshape#1#2#3#4{%
15     \warn@rel{i\new@fontshape\DeclareFontShape
16     \expandafter\scan@fontshape\@gobble#4<\@nil><<%
17     \DeclareFontShape U{#1}{#2}{#3}\reserved@f}
18 \<onlypreamble\new@fontshape
```

`\warn@rel@i` The warning message used above.

```
19 \gdef\warn@rel@i#1#2{%
20 \font@warning{*** NFSS release 1 command
21 \noexpand#1found\MessageBreak
22 *** Update by using release 2 command
23 \string#2.\MessageBreak
24 *** Recovery is probably possible}%
25 }
26 \@onlypreamble\warn@rel@i
```

`\scan@fontshape` This will scan the old font shape definition syntax.

```
27 \gdef\scan@fontshape{%
28 \let\reserved@f\@empty
29 \let\reserved@e\@empty % holds last info
30 \scan@@fontshape
31 }
32 \@onlypreamble\scan@fontshape
```

`\scan@@fontshape`

```
33 \gdef\scan@@fontshape#1>#2#3<{%
34 \ifx\@nil#1%
35 \edef\reserved@f{\reserved@f\reserved@e}%
36 \else
37 \def\reserved@b{#1}% nick names
38 \def\reserved@c{#3}%
39 \in@{ at}{#3}%
40 \ifin@
41 \in@{pt}{#3}% not a proof but a good chance
42 \ifin@
```

We grap also everything after pt and discard it if people have forgotten to place a percent sign there.

```
43 \def\reserved@a##1 at##2pt##3\@nil{%
44 \def\reserved@b{##2}%
45 \def\reserved@c{##1}%
46 }%
47 \reserved@a#3\@nil
48 \fi
49 \fi
50 \ifnum 0<0#2
51 \edef\reserved@d{subf*\reserved@c}%
52 \ifcase #2\or
53 \or
54 \else
55 \errmessage{*** What's this? NFSS release 0? ***}%
56 \fi
57 \else
58 \edef\reserved@d{#2\reserved@c}%
59 \fi
60 \ifx\reserved@d\reserved@e
61 \edef\reserved@f{\reserved@f<\reserved@b>}%
62 \else
63 \edef\reserved@f{\reserved@f\reserved@e<\reserved@b>}%add old info
64 \let\reserved@e\reserved@d
65 \fi
66 \expandafter\scan@@fontshape
67 \fi
68 }
69 \@onlypreamble\scan@@fontshape
```

`\subst@fontshape` This is now also handled by the extend syntax of `\DeclareFontShape`.

```
70 \gdef\subst@fontshape#1#2#3#4#5#6{%
```

```

71     \warn@rel@i\subst@fontshape\DeclareFontShape
72     \DeclareFontShape{U}{#1}{#2}{#3}{<->sub*#4/#5/#6}{}}
73 \onlypreamble\subst@fontshape

\extra@def This was replaced by \DeclareFontFamily.
74 \gdef\extra@def#1#2#3{%
75     \warn@rel@i\extra@def\DeclareFontFamily
76     \DeclareFontFamily{U}{#1}{}%
77 }
78 \onlypreamble\extra@def

\default@mextra The new name is \DeclareFontEncodingDefaults but in this case we don't feel
comfortable with this either.
79 \gdef\default@mextra{%
80     \warn@rel@i\default@mextra\DeclareFontEncodingDefaults
We pick up the argument to \default@mextra implicitly as the second argument
of \DeclareFontEncodingDefaults.
81     \DeclareFontEncodingDefaults\relax
82 }
83 \onlypreamble\default@mextra

\preload@sizes The new interface is \DeclarePreloadSizes.
84 \gdef\preload@sizes{%
85     \warn@rel@i\preload@sizes\DeclarePreloadSizes
86     \DeclarePreloadSizes U%
87 }
88 \onlypreamble\preload@sizes

\err@rel@i This macro is used in cases where emulation with NFSS2 features is not really
possible.
89 \gdef\err@rel@i#1#2{%
90     \@latex@error{*** NFSS release 1 command \noexpand#1found%
91         ^^J*** Recovery not possible. Use \string#2}%
92     {The new release of NFSS doesn't support the
93         \noexpand#1command^^Jany longer.
94         Please upgrade your file to the syntax of NFSS
95         release 2^^Jusing the \noexpand#2command.}%
Let's die.
96     \batchmode\input.\relax
97 }
98 \onlypreamble\err@rel@i

\newmathalphabet \newmathalphabet is the old form.
\newmathalphabet@@ 99 \gdef\newmathalphabet{%
\newmathalphabet@@@ 100 \if@no@font@opt
101     \@latex@error{*** NFSS release 1 command
102         \noexpand\newmathalphabet found%
103         ^^J \space*** Automatic recovery not possible.%
104         ^^J \space*** TYPE H for Help%
105         }%
106     {Please look at the file usrguide.tex for hints on
107         how to resolve this problem.}%
108 \else
109     \warn@rel@i\newmathalphabet\DeclareMathAlphabet
110     \fi
111     \@ifstar\newmathalphabet@@@
112     \newmathalphabet@@}
113 \gdef\newmathalphabet@@#1{\DeclareMathAlphabet#1{U}{-}{-}{-}}
114 \gdef\newmathalphabet@@@#1#2#3#4{%
115     \DeclareMathAlphabet{#1}{U}{#2}{#3}{#4}}

```

```

116 \@onlypreamble\newmathalphabet
117 \@onlypreamble\newmathalphabet@@
118 \@onlypreamble\newmathalphabet@@@

\if@no@font@opt
\@no@font@optfalse 119 \global\let\if@no@font@opt\iftrue
120 \gdef\@no@font@optfalse{\let\if@no@font@opt\iffalse}

\define@mathalphabet This is a case where dying is best.
121 \gdef\define@mathalphabet{%
122     \err@rel@i\define@mathalphabet\DeclareMathAlphabet
123 }
124 \@onlypreamble\define@mathalphabet

\define@mathgroup And here is another one
125 \gdef\define@mathgroup{%
126     \err@rel@i\define@mathgroup\DeclareSymbolFont
127 }
128 \@onlypreamble\define@mathgroup
129 \</compat>

\addtoversion \addtoversion is the old form.
130 \def\addtoversion#1#2{%
131     \warn@rel@i\addtoversion\SetMathAlphabet
132     \SetMathAlphabet#2{#1}{U}}
133 \@onlypreamble\addtoversion

```

That finishes the definitions for the old interfaces — but first we better finish the group.

```

134 \*autoload>
135 \endgroup
136 \</autoload>

```

File r

ltfssdcl.dtx

This file contains the main implementation of the font selection scheme commands. See other parts of the L^AT_EX distribution, or *The L^AT_EX Companion* for higher level documentation of these commands.

Warning: The macro documentation is still basically the documentation from the first NFSS release and therefore in some cases probably not completely accurate.

35 Interface Commands

`\in@` `\in@` is a utility macro with two arguments. It determines whether its first argument occurs in its second (after expanding it) and sets the switch `\ifin@` accordingly.

```
1 (*2ekernel | autoload)
2 \def\in@#1#2{%
3   \def\in@@##1#1##2##3\in@@{%
4     \ifx\in@@##2\in@false\else\in@true\fi}%
5   \in@@#2#1\in@\in@@}
6 \newif\ifin@
```

Before the `\begin{document}` command several *math versions* and *math alphabet identifiers* may be declared. In principle, there should be exactly one family/series/shape combination be declared for each version/alphabet pair. But we want to allow for defaults as well for automagical filling of holes.

While building the tables for math alphabet identifiers and math versions we keep several lists:

- the list of all math versions, `\version@list`, each entry prefixed by the control sequence `\version@elt`, i.e. this list has the following form

```
\version@elt<version1>\version@elt<version2>...
\version@elt<versionn>
```

- the list of all math alphabet identifiers. Here every entry has the form:

```
\group@elt<math group number>
{\{<default family>\}{<default series>\}{<default shape>\}}.
```

- Each defined math alphabet identifier holds a list containing Information about the *versions* for which it is defined. This list has a more complicated structure: it looks as follows:

```
\set@alpha<the alphabet identifier itself>
\reserved@c<math version><font info>
...
\@nil
```

where *font info* is either `\reserved@e` (if the combination is not defined yet) or

```
{\{<family>\}{<series>\}{<shape>\}}
```

`\version@list` We initialize the version list to be empty.

```
7 \let\version@list=\@empty
8 \@onlypreamble\version@list
```

```

\version@elt
    9 \let\version@elt\relax
    10 \@onlypreamble\version@elt

\new@mathversion The macro \new@mathversion is called with the version control sequence as its
argument.
    11 %\def\new@mathversion#1{%
The first thing this macro does is to check if the version identifier is already present
in \version@list. We enclose \version@list in braces since it might be empty
(if no version is defined yet). But this means that we need a suitable number of
\expandafter primitives.
    12 % \expandafter\in@\expandafter#1\expandafter{\version@list}%
    13 % \ifin@
If so it prints an error message. The \next macro is used to get rid of the four
characters \mv@ that would otherwise appear at the begin of the version name in
the error message.
    14 % \@latex@error{Math version
    15 % \expandafter\@gobblefour\string#1'
    16 % already defined}\@eha
Otherwise we have a new version, and we can proceed with entering it into the
tables. We add it to \version@list. This is very easy: we define \version@elt
(which is the delimiter in \version@list) to protect itself and the following token
from being expanded and simply redefine \version@list.
    17 % \else
    18 % \global\expandafter\newcount\csname c@\expandafter
    19 % \gobble\string#1\endcsname
    20 % \global\csname c@\expandafter
    21 % \gobble\string#1\endcsname\@ne
    22 % \def\version@elt{\noexpand\version@elt\noexpand}%
    23 % \edef\version@list{\version@list\version@elt#1}%
Then we prepare to enter the new version into all math alphabet identifier lists.
Remember that these lists use \reserved@c as delimiter, and that there appears
the control sequence \reserved@e that must not be expanded. Therefore we take
suitable precautions.
    24 % \def\reserved@c{\noexpand\reserved@c\noexpand}%
    25 % \let\reserved@e\relax
We will now go through the \alpha@list to process every math alphabet
identifier in turn. Since this list has \group@elt as a delimiter we define this
control sequence. It has three arguments as every entry consists of three items (as
explained above).
    26 % \def\group@elt##1##2##3{%
The first of these arguments is the math alphabet identifier. We redefine it
by appending the information about the new version at the end of the list con-
tained in it. However, there is one subtlety: the definitions for \reserved@c and
\reserved@e made above prevent the main part of the list from being expanded.
But we still have to take care of the header and the trailer. To do this we remove
the trailer by means of the macro \remove@nil which also protect the header from
being expanded. Its definition is given below. Now we can prepare to add the new
version.
    27 % \edef##1{\expandafter\remove@nil##1%
    28 % \reserved@c
    29 % #1%
    30 % \reserved@e
    31 % \noexpand\@nil}}%
Finally we call \alpha@list which will now execute the macro \group@elt once
for every defined math alphabet identifier. And that's all for now.

```

```

32 %      \alpha@list
33 %    \fi}

\alpha@list As we explained above every entry in \alpha@list has the form
\alpha@elt
<alphabet identifier><internal group number><default font assignments>...
We initialize it to \@empty.
34 \let\alpha@list\@empty
35 \@onlypreamble\alpha@list

\alpha@elt
36 \let\alpha@elt\relax
37 \@onlypreamble\alpha@elt

\newgroup Start the group (fam) allocation at 0. (Doesn't belong here.)
38 \count18=-1

\stepcounter

\select@group We surround \select@group with braces so that functions using it can be used
directly after _ or ^. However, if we use oldstyle syntax where the math alphabet
doesn't have arguments (ie if \math@bgroup is not \bgroup) we need to get rid of
the extra group.
39 \def\select@group#1#2#3#4{%
40   \ifx\math@bgroup\bgroup\else\relax\expandafter\@firstofone\fi
41   {%
42     \ifmmode
43       \ifnum\csname c@mv@\math@version\endcsname<\sixt@@n
44         \begingroup
45           \escapechar\m@ne
46           \getanddefine@fonts{\csname c@mv@\math@version\endcsname}#3%
47           \globaldefs\@ne \math@fonts
48         \endgroup
49         \init@restore@version
50         \xdef#1{\noexpand\use@mathgroup\noexpand#2%
51           {\number\csname c@mv@\math@version\endcsname}}}%
52         \global\advance\csname c@mv@\math@version\endcsname\@ne
53       \else
54         \let#1\relax
55         \@latex@error{Too many math alphabets used in
56           version \math@version}%
57         \@eha
58       \fi
59     \else \expandafter\non@alpherr\fi
60     #1{#4}%
61   }%
62 }
63 \@onlypreamble\restore@mathversion

\init@restore@version
64 \def\init@restore@version{%
65   \global\let\init@restore@version\relax
66   \xdef\restore@mathversion
67     {\expandafter\noexpand\csname mv@\math@version\endcsname
68     \global\csname c@mv@\math@version\endcsname
69     \number\csname c@mv@\math@version\endcsname\relax}%
70   \aftergroup\dorestore@version
71 }
72 \@onlypreamble\init@restore@version

```

`\non@alpherr`

```

73 </2kernel | autoloading>
74 <*2kernel | autoerr>
75 \gdef\non@alpherr#1{\@latex@error{%
The command here will have a space at the end of its name, so we make sure not
to insert an extra one.
76 \string#1allowed only in math mode}\@ehd}
77 </2kernel | autoerr>
78 <autoloading>\def\non@alpherr{\@autoerr\non@alpherr}
79 <*2kernel | autoloading>

```

`\dorestore@version`

```

80 \def\dorestore@version
81 {\ifmmode
82 \aftergroup\dorestore@version
83 \else
84 \gdef\init@restore@version{%
85 \global\let\init@restore@version\relax
86 \xdef\restore@mathversion
87 {\expandafter\noexpand\csname mv@\math@version\endcsname
88 \global\csname c@mv@\math@version\endcsname
89 \number\csname c@mv@\math@version\endcsname\relax}%
90 \aftergroup\dorestore@version
91 }%
92 \begingroup
93 \let\getanddefine@fonts\@gobbletwo
94 \restore@mathversion
95 \endgroup
96 \fi}%
97 \@onlypreamble\dorestore@version

```

`\document@select@group` We surround `\select@group` with braces so that functions using it can be used directly after `_` or `^`.

```

98 \def\document@select@group#1#2#3#4{%
99 \ifx\math@bgroup\bgroup\else\relax\expandafter\@firstofone\fi
100 {%
101 \ifmmode
102 \ifnum\csname c@mv@\math@version\endcsname<\sixt@@n
103 \begingroup
104 \escapechar\m@ne
105 \getanddefine@fonts{\csname c@mv@\math@version\endcsname}#3%
106 \globaldefs\@ne \math@fonts
107 \endgroup
108 \expandafter\extract@alph@from@version
109 \csname mv@\math@version\endcsname\expandafter\endcsname
110 \expandafter{\number\csname
111 c@mv@\math@version\endcsname}%
112 #1%
113 \global\advance\csname c@mv@\math@version\endcsname\@ne
114 \else
115 \let#1\relax
116 \@latex@error{Too many math alphabets used
117 in version \math@version}%
118 \@eha
119 \fi
120 \else \expandafter\non@alpherr\fi
121 #1{#4}%
122 }%
123 }

```

`\process@table`


```

124 \def\process@table{%
125     \def\cdp@elt##1##2##3##4{%
126         \@font@info{Checking defaults for
127             ##1/##2/##3/##4}%
128         \expandafter
129         \ifx\csname##1/##2/##3/##4\endcsname\relax

```

Grouping is important for two reasons, first `\cdp@elt` will get redefined if `\Declare...` functions are executed within the external `.fd` file and secondly `\try@load@fontshape` changes a lot of catcodes without surrounding itself with a group.

```

130         \begingroup
131         \def\f@encoding{##1}\def\f@family{##2}%
132         \try@load@fontshape
133         \endgroup
134         \fi
135         \expandafter
136         \ifx\csname##1/##2/##3/##4\endcsname\relax
137             \@latex@error{This NFSS system isn't set up properly}%
138                 {For encoding scheme ##1 the defaults
139                 ##2/##3/##4 do not form a valid font shape}%
140         \else
141             \@font@info{... okay}%
142         \fi}%
143     \cdp@list

```

Now we make sure that `\error@fontshape` is okay.

```

144     \begingroup
145     \escapechar\m@ne
146     \error@fontshape
147     \expandafter\ifx\csname \curr@fontshape\endcsname\relax
148         \begingroup
149         \try@load@fontshape
150         \endgroup
151     \fi
152     \expandafter\ifx\csname \curr@fontshape\endcsname\relax
153         \@latex@error{This NFSS system isn't set up properly}%
154             {The system maintainer forgot to specify a suitable
155             substitution
156             font shape using the \noexpand\DeclareErrorFont
157             command}%
158     \fi
159     \endgroup

```

Set `\select@group` to its meaning used within the document body.

```

160     \let\select@group\document@select@group

```

Install the default font attributes they are currently pointing to error font shape.
Don't use `\reset@font` since that would trigger `\selectfont`.

```

161     \fontencoding{\encodingdefault}%
162     \fontfamily{\familydefault}%
163     \fontseries{\seriesdefault}%
164     \fontshape{\shapedefault}%

```

kill all macros not longer needed. we need to add many more!!!!!!

```

165     \everyjob{}%
166 }
167 \@onlypreamble\process@table
168 %\@onlypreamble\set@mathradical

```

`\DeclareMathVersion`

```

169 \def\DeclareMathVersion#1{%
170     \expandafter\new@mathversion\csname mv@#1\endcsname}
171 \@onlypreamble\DeclareMathVersion

```

`\new@mathversion`

```

172 \def\new@mathversion#1{%
173   \expandafter\in@\expandafter#1\expandafter{\version@list}%
174   \ifin@
175     \@font@info{Redeclaring math version
176               '\expandafter\@gobblefour\string#1'}%
177   \else
178     \global\expandafter\newcount\csname c@\expandafter
179               \@gobble\string#1\endcsname
180     \def\version@elt{\noexpand\version@elt\noexpand}%
181     \edef\version@list{\version@list\version@elt#1}%
182   \fi

```

`\toks@` is used to gather all tokens for the math version. `\count@` will be used to count the math groups we add to this version.

```

183   \toks@{}%
184   \count@\z@

```

Now we loop over `\group@list` to add all math groups defined so far to the version and at the same time to count them.

```

185   \def\group@elt##1##2{%
186     \advance\count@\@ne
187     \addto@hook\toks@{\getanddefine@fonts##1##2}%
188   }%
189   \group@list

```

We set the counter for this math version to the number of math groups found in `\group@list`.

```

190   \global\csname c@\expandafter\@gobble\string#1\endcsname\count@

```

Now we loop over `\alpha@list` to add all math alphabets known so far. We have to distinguish the case that an alphabet by default should produce an error in new versions.

```

191   \def\alpha@elt##1##2##3{%
192     \ifx##2\no@alphabet@error
193       \toks@\expandafter{\the\toks@\install@mathalphabet##1%
194       {\no@alphabet@error##1}}%
195     \else
196       \toks@\expandafter{\the\toks@\install@mathalphabet##1%
197       {\select@group##1##2##3}}%
198     \fi
199   }%
200   \alpha@list

```

Finally we define the math version to expand to the contents of `\toks@`.

```

201   \xdef#1{\the\toks@}%
202 }
203 \@onlypreamble\new@mathversion

```

`\DeclareSymbolFont`

```

204 \def\DeclareSymbolFont#1#2#3#4#5{%
205   \@tempwafalse
206   \edef\reserved@b{#2}%
207   \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%
208     \ifx\reserved@b\reserved@c \@tempwattrue\fi}%
209   \cdp@list
210   \if@tempswa
211     \@ifundefined{sym#1}{%
212       \expandafter\new@mathgroup\csname sym#1\endcsname
213       \expandafter\new@symbolfont\csname sym#1\endcsname
214       {#2}{#3}{#4}{#5}}%
215     {%
216       \@font@info{Redeclaring symbol font '#1'}%

```

Update the group list.

```

217 \def\group@elt##1##2{%
218     \noexpand\group@elt\noexpand##1%
219     \expandafter\ifx\csname sym#1\endcsname##1%
220     \expandafter\noexpand\csname#2/#3/#4/#5\endcsname
221     \else
222     \noexpand##2%
223     \fi}%
224 \xdef\group@list{\group@list}%

```

Update the version list.

```

225 \def\version@elt##1{%
226     \expandafter
227     \SetSymbolFont@\expandafter##1\csname#2/#3/#4/#5\expandafter
228     \endcsname \csname sym#1\endcsname
229     }%
230 \version@list
231 }%
232 \else
233 \latex@error{Encoding scheme ‘#2’ unknown}\@eha
234 \fi
235 }
236 \onlypreamble\DeclareSymbolFont

```

\group@list

```

237 \let\group@list\@empty
238 \onlypreamble\group@list

```

\group@elt

```

239 \let\group@elt\relax
240 \onlypreamble\group@elt

```

\new@symbolfont

```

241 \def\new@symbolfont#1#2#3#4#5{%
242     \toks@\expandafter{\group@list}%
243     \edef\group@list{\the\toks@\noexpand\group@elt\noexpand#1%
244         \expandafter\noexpand\csname#2/#3/#4/#5\endcsname}%
245     \def\version@elt##1{\toks@\expandafter{##1}%
246         \edef##1{\the\toks@\noexpand\getanddefine@fonts
247             #1\expandafter\noexpand\csname#2/#3/#4/#5\endcsname}%
248         \global\advance\csname c@\expandafter
249             \gobble\string##1\endcsname\@ne
250         }%
251     \version@list
252 }
253 \onlypreamble\new@symbolfont

```

\SetSymbolFont

```

254 \def\SetSymbolFont#1#2#3#4#5#6{%
255     \@tempswafalse
256     \edef\reserved@b{#3}%
257     \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%
258         \ifx\reserved@b\reserved@c \@tempswatrue\fi}%
259     \cdp@list
260     \if@tempswa
261     \expandafter\SetSymbolFont@
262     \csname mv#2\expandafter\endcsname\csname#3/#4/#5/#6\expandafter
263     \endcsname \csname sym#1\endcsname
264     \else
265     \latex@error{Encoding scheme ‘#3’ unknown}\@eha
266     \fi
267 }
268 \onlypreamble\SetSymbolFont

```

\SetSymbolFont@

```

269 \def\SetSymbolFont@#1#2#3{%
270   \expandafter\in@\expandafter#1\expandafter{\version@list}%
271   \ifin@
272     \expandafter\in@\expandafter#3\expandafter{\group@list}%
273     \ifin@
274       \begingroup
275       \expandafter\get@cdp\string#2\@nil\reserved@a
276       \toks@{}%
277       \def\install@mathalphabet##1##2{%
278         \addto@hook\toks@{\install@mathalphabet##1{##2}}%
279       }%
280       \def\getanddefine@fonts##1##2{%
281         \ifnum##1=#3%
282           \addto@hook\toks@{\getanddefine@fonts#3#2}%
283           \expandafter\get@cdp\string##2\@nil\reserved@b
284           \ifx\reserved@a\reserved@b\else
285             \@font@info{Encoding ‘\reserved@b’ has changed
286               to ‘\reserved@a’ for symbol font\MessageBreak
287               ‘\expandafter\@gobblefour\string#3’ in the
288               math version ‘\expandafter
289                 \@gobblefour\string#1’}%
290             \fi
291             \@font@info{%
292               Overwriting symbol font
293               ‘\expandafter\@gobblefour\string#3’ in
294               version ‘\expandafter
295                 \@gobblefour\string#1’\MessageBreak
296               \spaces \expandafter\@gobble\string##2 -->
297                 \expandafter\@gobble\string#2}%
298             \else
299               \addto@hook\toks@{\getanddefine@fonts##1##2}%
300             \fi}%
301       #1%
302       \xdef#1{\the\toks@}%
303     \endgroup
304   \else
305     \@latex@error{Symbol font ‘\expandafter\@gobblefour\string#3’
306       not defined}\@eha
307   \fi
308 \else
309   \@latex@error{Math version ‘\expandafter\@gobblefour\string#1’
310     is not
311     defined}{You probably misspelled the name of the math
312     version.^^JOr you have to specify an additional package.}%
313   \fi
314 }
315 \@onlypreamble\SetSymbolFont@

```

\get@cdp

```

316 \def\get@cdp#1#2/#3\@nil#4{\def#4{#2}}
317 \@onlypreamble\get@cdp

```

\DeclareMathAlphabet

```

318 \def\DeclareMathAlphabet#1#2#3#4#5{%
319   \@tempswafalse
320   \edef\reserved@b{#2}%
321   \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%
322     \ifx\reserved@b\reserved@c \@tempswatrue\fi}%
323   \cdp@list
324   \if@tempswa
325     \expandafter\ifx

```

```

326 \csname\expandafter\@gobble\string#1\endcsname
327 \relax
328 \new@mathalphabet#1{#2}{#3}{#4}{#5}%
329 \else
    Check if it is already a math alphabet.
330 \edef\reserved@a{\noexpand\in@{\string\select@group}%
331 {\expandafter\meaning\csname \expandafter
332 \@gobble\string#1\space\endcsname}}%
333 \reserved@a
334 \ifin@
335 \@font@info{Redefining math alphabet \string#1}%
336 \def\version@elt##1{%
337 \expandafter\SetMathAlphabet@\expandafter
338 ##1\csname#2/#3/#4/#5\expandafter\endcsname
339 \csname M@#2\expandafter\endcsname
340 \csname \expandafter\@gobble\string#1\space\endcsname#1}%
341 \version@list
342 \else
    Check if it is a math alphabet defined via \DeclareSymbolFontAlphabet.
343 \edef\reserved@a{\noexpand\in@{\string\use@mathgroup}%
344 {\expandafter\meaning\csname \expandafter
345 \@gobble\string#1\space\endcsname}}%
346 \reserved@a
347 \ifin@
    In that case overwriting is simple since there is nothing inserted in the math
    version macros.
348 \@font@info{Redefining math alphabet \string#1}%
349 \new@mathalphabet#1{#2}{#3}{#4}{#5}%
    Otherwise panic.
350 \else
351 \@latex@error{Command '\string#1' already defined}\@eha
352 \fi
353 \fi
354 \fi
355 \else
356 \@latex@error{Encoding scheme '#2' unknown}\@eha
357 \fi
358 }
359 \@onlypreamble\DeclareMathAlphabet

\new@mathalphabet

360 \def\new@mathalphabet#1#2#3#4#5{%
361 \toks@{\expandafter{\alpha@list}}%
362 \edef#1{\expandafter\noexpand\csname \expandafter
363 \@gobble\string#1\space\endcsname
364 \if/#5/%
365 \noexpand\no@alphabet@error
366 \noexpand\no@alphabet@error
367 \else
368 \expandafter\noexpand\csname M@#2\endcsname
369 \expandafter\noexpand\csname#2/#3/#4/#5\endcsname
370 \fi
371 }%
372 \toks2\expandafter{#1}%
373 \edef\alpha@list{\the\toks@noexpand\alpha@elt\the\toks2}%
374 \def\version@elt##1{\toks@{\expandafter{##1}}%
375 \edef##1{\the\toks@install@mathalphabet
376 \expandafter\noexpand
377 \csname \expandafter\@gobble

```

```

378             \string#1\space\endcsname
379         {\if/#5/%
380             \noexpand\no@alphabet@error
381             \noexpand#1%
382         \else
383             \noexpand\select@group\the\toks2
384         \fi}}%
385     }%
386 \version@list
387 \expandafter\edef\csname \expandafter\@gobble
388     \string#1\space\endcsname{\if/#5/%
389     \noexpand\no@alphabet@error
390     \noexpand#1%
391     \else
392     \noexpand\select@group\the\toks2
393     \fi}}%
394 \edef#1{\noexpand\protect
395     \expandafter\noexpand\csname \expandafter
396     \@gobble\string#1\space\endcsname}%
397 }
398 \@onlypreamble\new@mathalphabet

```

\SetMathAlphabet

```

399 \def\SetMathAlphabet#1#2#3#4#5#6{%
400     \@tempswafalse
401     \edef\reserved@b{#3}%
402     \def\cdp@elt##1##2##3##4{\def\reserved@c{##1}%
403         \ifx\reserved@b\reserved@c \@tempswatrue\fi}%
404     \cdp@list
405     \if@tempswa
406         \expandafter\SetMathAlphabet@
407         \csname mv@#2\expandafter\endcsname\csname#3/#4/#5/#6\expandafter
408         \endcsname \csname M@#3\expandafter\endcsname
409         \csname \expandafter\@gobble\string#1\space\endcsname#1%
410     \else
411         \@latex@error{Encoding scheme ‘#3’ unknown}\@eha
412     \fi
413 }
414 \@onlypreamble\SetMathAlphabet

```

\SetMathAlphabet@

```

415 \def\SetMathAlphabet@#1#2#3#4#5{%
416     \expandafter\in@\expandafter#1\expandafter{\version@list}%
417     \ifin@
418         \expandafter\in@\expandafter#4\expandafter{\alpha@list}%
419     \ifin@
420         \begingroup
421         \toks@{}%
422         \def\getanddefine@fonts##1##2{%
423             \addto@hook\toks@{\getanddefine@fonts##1##2}%
424         }%
425         \def\reserved@c##1##2##3##4{%
426             \expandafter\@gobble\string##4}%
427         \def\install@mathalphabet##1##2{%
428             \ifx##1#4%
429                 \addto@hook\toks@
430                 {\install@mathalphabet#4{\select@group#4#3#2}}%
431             \font@info{Overwriting math alphabet
432             ‘\string#5’ in version ‘\expandafter
433             \@gobblefour\string#1’\MessageBreak
434             \@spaces \reserved@c##2 -->
435             \expandafter\@gobble\string#2}%

```

```

436         \else
437         \addto@hook\toks@{\install@mathalphabet##1{##2}}%
438         \fi
439     }%
440     #1%
441     \xdef#1{\the\toks@}%
442 \endgroup
443 \else

```

If the math alphabet was defined via `\DeclareSymbolFontAlphabet` we have remove its external definition and add it as a normal math alphabet to every version before trying to change it in one version.

```

444     \edef\reserved@a{%
445     \noexpand\in@{\string\use@mathgroup}{\meaning#4}}%
446     \reserved@a
447     \ifin@
448     \def\reserved@b##1\use@mathgroup##2##3{%
449     \def\reserved@b{##3}\def\reserved@c{##2}}%
450     \expandafter\reserved@b#4%
451     \begingroup
452     \def\install@mathalphabet##1##2{%
453     \addto@hook\toks@{\install@mathalphabet##1{##2}}%
454     }%
455     \def\getanddefine@fonts##1##2{%
456     \addto@hook\toks@{\getanddefine@fonts##1##2}%
457     \ifnum##1=\reserved@b
458     \expandafter
459     \addto@hook\expandafter\toks@
460     \expandafter{\expandafter\install@mathalphabet
461     \expandafter#4\expandafter
462     {\expandafter\select@group\expandafter
463     #4\reserved@c##2}}%
464     \fi
465     }%
466     \def\version@elt##1{%
467     \toks@{}%
468     ##1%
469     \xdef##1{\the\toks@}%
470     }%
471     \version@list
472 \endgroup

```

Put it into the `\alpha@list` with default ‘error’

```

473     \expandafter\gdef\expandafter\alpha@list\expandafter
474     {\alpha@list
475     \alpha@elt #4\no@alphabet@error \no@alphabet@error}%
476     \gdef#4{\no@alphabet@error #5}% fake things :-)

```

Then call the internal setting routine again:

```

477     \SetMathAlphabet@{#1}{#2}{#3}#4#5%
478     \else
479     \@latex@error{Command ‘\string#5’ not defined as a
480     math alphabet}%
481     {Use \noexpand\DeclareMathAlphabet to define it.}%
482     \fi
483 \fi
484 \else
485     \@latex@error{Math version ‘\expandafter@gobblefour\string#1’
486     is not
487     defined}{You probably misspelled the name of the math
488     version.^^JOr you have to specify an additional package.}%
489     \fi
490 }
491 \onlypreamble\SetMathAlphabet@

```

`\DeclareMathAlphabet` could do with more checks like allowing single number in #4 lowercase in #4 etc

```

492 \def\DeclareMathAccent#1#2#3#4{%
493   \expandafter\in@\csname sym#3\expandafter\endcsname
494     \expandafter{\group@list}%
495   \ifin@
496     \begingroup
497       \count\z@=#4\relax
498       \count\tw@\count\z@
499       \divide\count\z@\sist@n
500       \count@\count\z@
501       \multiply\count@\sist@n
502       \advance\count\tw@-\count@
503       \if\relax\noexpand#1% is command?
504         \edef\reserved@a{\noexpand\in@{\string\mathaccent}{\meaning#1}}%
505         \reserved@a
506         \ifin@
507           \expandafter\set@mathaccent
508             \csname sym#3\endcsname#1#2%
509             {\hexnumber@\count\z@}\hexnumber@\count\tw@}%
510           \@font@info{Redeclaring math accent \string#1}%
511         \else
512           \expandafter\ifx
513             \csname\expandafter\@gobble\string#1\endcsname
514             \relax
515             \expandafter\set@mathaccent
516               \csname sym#3\endcsname#1#2%
517               {\hexnumber@\count\z@}\hexnumber@\count\tw@}%
518           \else
519             \@latex@error{Command '\string#1' already defined}\@eha
520           \fi
521         \fi
522       \else
523         \@latex@error{Not a command name: '\noexpand#1'}\@eha
524       \fi
525     \endgroup
526   \else
527     \@latex@error{Symbol font '#3' is not defined}\@eha
528   \fi
529 }
530 \@onlypreamble\DeclareMathAccent

```

`\set@mathaccent`

```

531 \def\set@mathaccent#1#2#3#4{%
532   \xdef#2{\mathaccent"\mathchar@type#3\hexnumber@#1#4\relax}}
533 \@onlypreamble\set@mathaccent

```

`\DeclareMathSymbol`

```

534 \def\DeclareMathSymbol#1#2#3#4{%
535   \expandafter\in@\csname sym#3\expandafter\endcsname
536     \expandafter{\group@list}%
537   \ifin@
538     \begingroup
539       \count\z@=#4\relax
540       \count\tw@\count\z@
541       \divide\count\z@\sist@n
542       \count@\count\z@
543       \multiply\count@\sist@n
544       \advance\count\tw@-\count@
545       \if\relax\noexpand#1% is command?
546         \edef\reserved@a{\noexpand\in@{\string\mathchar}{\meaning#1}}%
547         \reserved@a
548       \ifin@

```



```

549         \expandafter\set@mathsymbol
550         \csname sym#3\endcsname#1#2%
551         {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}}%
552         \@font@info{Redefining math symbol \string#1}%
553     \else
554         \expandafter\ifx
555         \csname\expandafter\@gobble\string#1\endcsname
556         \relax
557         \expandafter\set@mathsymbol
558         \csname sym#3\endcsname#1#2%
559         {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}}%
560     \else
561         \@latex@error{Command '\string#1' already defined}\@eha
562     \fi
563 \fi
564 \else
565     \expandafter\set@mathchar
566     \csname sym#3\endcsname#1#2
567     {\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}}%
568 \fi
569 \endgroup
570 \else
571     \@latex@error{Symbol font '#3' is not defined}\@eha
572 \fi
573 }
574 \@onlypreamble\DeclareMathSymbol

```

\set@mathchar

```

575 \def\set@mathchar#1#2#3#4{%
576     \global\mathcode'#2="\mathchar@type#3\hexnumber@#1#4\relax}
577 \@onlypreamble\set@mathchar

```

\set@mathsymbol

```

578 \def\set@mathsymbol#1#2#3#4{%
579     \global\mathchardef#2="\mathchar@type#3\hexnumber@#1#4\relax}
580 \@onlypreamble\set@mathsymbol

581 %\def\mathsymbol#1#2#3{%
582 %    \@tempcnta=#3\relax
583 %    \@tempcntb\@tempcnta
584 %    \divide\@tempcnta\sixt@@n
585 %    \count@\@tempcnta
586 %    \multiply\count@\sixt@@n
587 %    \advance\@tempcntb-\count@
588 %    \mathchar"\mathchar@type#1\hexnumber@#2%
589 %        \hexnumber@\@tempcnta\hexnumber@\@tempcntb\relax}
590 %
591 %\def\DeclareMathAlphabetCharacter#1#2#3{%
592 %    \DeclareMathSymbol{#1}7{#2}{#3}}

```

\DeclareMathDelimiter

```

593 \def\DeclareMathDelimiter#1{%
594     \if\relax\noexpand#1%
595         \expandafter\@DeclareMathDelimiter
596     \else
597         \expandafter\@xxDeclareMathDelimiter
598     \fi
599     #1}
600 \@onlypreamble\DeclareMathDelimiter

```

`\@xxDeclareMathDelimiter` This macro checks if the second arg is a “math type” such as `\mathopen`. The undocumented original code didn’t use math types when the delimiter was a single letter. For this reason the coding is a bit strange as it tries to support the undocumented syntax for compatibility reasons.

```
601 \def\@xxDeclareMathDelimiter#1#2#3#4{%
```

7 is the default value returned in the case that `\mathchar@type` is passed something unexpected, like a math symbol font name. We locally move `\mathalpha` out of the way so if you use that the right branch is taken. This will still fail if an explicit number 7 is used!

```
602   \begingroup
603   \let\mathalpha\mathord
604   \ifnum7=\mathchar@type{#2}%
605   \endgroup
```

If this branch is taken we have old syntax (5 arguments).

```
606     \expandafter\@firstofone
607     \else
```

If this branch is taken `\mathchar@type` is different from 7 so we assume new syntax. In this case we also use the arguments to set up the letter as a math symbol for the case where it is not used as a delimiter.

```
608     \endgroup
609     \DeclareMathSymbol#1{#2}{#3}{#4}%
```

Then we arrange that `\@xDeclareMathDelimiter` only gets #1, #3, #4 ... as it does not expect a math type as argument.

```
610     \expandafter\@firstoftwo
611     \fi
612     {\@xDeclareMathDelimiter#1}{#2}{#3}{#4}}
613 \@onlypreamble\@xxDeclareMathDelimiter
```

`\@DeclareMathDelimiter`

```
614 \def\@DeclareMathDelimiter#1#2#3#4#5#6{%
615   \expandafter\in@\csname sym#3\expandafter\endcsname
616   \expandafter{\group@list}%
617   \ifin@
618     \expandafter\in@\csname sym#5\expandafter\endcsname
619     \expandafter{\group@list}%
620     \ifin@
621       \begingroup
622       \count\z@=#4\relax
623       \count\tw@\count\z@
624       \divide\count\z@\sist@@n
625       \count@\count\z@
626       \multiply\count@\sist@@n
627       \advance\count\tw@-\count@
628       \edef\reserved@c{\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
629       %
630       \count\z@=#6\relax
631       \count\tw@\count\z@
632       \divide\count\z@\sist@@n
633       \count@\count\z@
634       \multiply\count@\sist@@n
635       \advance\count\tw@-\count@
636       \edef\reserved@d{\hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
637       %
638       \edef\reserved@a{\noexpand\in@{\string\delimiter}{\meaning#1}}%
639       \reserved@a
640       \ifin@
641         \expandafter\set@mathdelimiter
642         \csname sym#3\expandafter\endcsname
643         \csname sym#5\endcsname#1#2%
```

```

644         \reserved@c\reserved@d
645         \@font@info{Redefining math delimiter \string#1}%
646     \else
647         \expandafter\ifx
648         \csname\expandafter\@gobble\string#1\endcsname
649         \relax
650         \expandafter\set@mathdelimiter
651         \csname sym#3\expandafter\endcsname
652         \csname sym#5\endcsname#1#2%
653         \reserved@c\reserved@d
654     \else
655         \@latex@error{Command '\string#1' already defined}\@eha
656     \fi
657 \fi
658 \endgroup
659 \else
660     \@latex@error{Symbol font '#5' is not defined}\@eha
661 \fi
662 \else
663     \@latex@error{Symbol font '#3' is not defined}\@eha
664 \fi
665 }
666 \@onlypreamble\@DeclareMathDelimiter

```

\@xDeclareMathDelimiter

```

667 \def\@xDeclareMathDelimiter#1#2#3#4#5{%
668     \expandafter\in@\csname sym#2\expandafter\endcsname
669     \expandafter{\group@list}%
670     \ifin@
671         \expandafter\in@\csname sym#4\expandafter\endcsname
672         \expandafter{\group@list}%
673     \ifin@
674         \begingroup
675         \count\z@=#3\relax
676         \count\tw@\count\z@
677         \divide\count\z@\sixt@@n
678         \count@\count\z@
679         \multiply\count@\sixt@@n
680         \advance\count\tw@-\count@
681         \edef\reserved@c{\hexnumber@\count\z@}\hexnumber@\count\tw@}%
682     %
683         \count\z@=#5\relax
684         \count\tw@\count\z@
685         \divide\count\z@\sixt@@n
686         \count@\count\z@
687         \multiply\count@\sixt@@n
688         \advance\count\tw@-\count@
689         \edef\reserved@d{\hexnumber@\count\z@}\hexnumber@\count\tw@}%
690         \expandafter\set@mathdelimiter
691         \csname sym#2\expandafter\endcsname\csname sym#4\endcsname#1%
692         \reserved@c\reserved@d
693     \endgroup
694 \else
695     \@latex@error{Symbol font '#4' is not defined}\@eha
696 \fi
697 \else
698     \@latex@error{Symbol font '#2' is not defined}\@eha
699 \fi
700 }
701 \@onlypreamble\@xDeclareMathDelimiter

```

\set@mathdelimiter We have to end the definition of a math delimiter like \lfloor with a space and not with \relax as we did before, because otherwise constructs involving

\abovewithdelims will prematurely end (pr/1329)

```
702 \def\set@mathdelimiter#1#2#3#4#5#6{%
703   \xdef#3{\delimiter"\mathchar@type#4\hexnumber@#1#5%
704                                     \hexnumber@#2#6 }}
705 \@onlypreamble\set@mathdelimiter
```

\set@@mathdelimiter

```
706 \def\set@@mathdelimiter#1#2#3#4#5{%
707   \global\delcode'#3="\hexnumber@#1#4\hexnumber@#2#5\relax}
708 \@onlypreamble\set@@mathdelimiter
```

\DeclareMathRadical

```
709 \def\DeclareMathRadical#1#2#3#4#5{%
```

Below is a crude fix to make this macro work if #1 is undefined or \relax. Should be improved!

```
710   \expandafter\ifx
711     \csname\expandafter@gobble\string#1\endcsname
712     \relax
713     \let#1\radical
714   \fi
715   \edef\reserved@a{\noexpand\in@{\string\radical}{\meaning#1}}%
716   \reserved@a
717   \ifin@
718     \expandafter\in@\csname sym#2\expandafter\endcsname
719     \expandafter{\group@list}%
720   \ifin@
721     \expandafter\in@\csname sym#4\expandafter\endcsname
722     \expandafter{\group@list}%
723   \ifin@
724     \begingroup
725       \count\z@=#3\relax
726       \count\tw@\count\z@
727       \divide\count\z@\sixt@@n
728       \count@\count\z@
729       \multiply\count@\sixt@@n
730       \advance\count\tw@-\count@
731       \edef\reserved@c{%
732         \hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
733       \count\z@=#5\relax
734       \count\tw@\count\z@
735       \divide\count\z@\sixt@@n
736       \count@\count\z@
737       \multiply\count@\sixt@@n
738       \advance\count\tw@-\count@
739       \edef\reserved@d{%
740         \hexnumber@{\count\z@}\hexnumber@{\count\tw@}}%
```

Coded inline instead of using \set@mathradical

```
741 %   \expandafter\set@mathradical
742 %   \csname sym#2\expandafter\endcsname
743 %   \csname sym#4\endcsname#1%
744 %   \reserved@c\reserved@d
745   \xdef#1{\radical"\expandafter\hexnumber@
746                                     \csname sym#2\endcsname\reserved@c
747                                     \expandafter\hexnumber@
748                                     \csname sym#4\endcsname\reserved@d
749                                     \relax}%
750   \endgroup
751 \else
752   \@latex@error{Symbol font '#4' is not defined}\@eha
753 \fi
```

```

754 \else
755 \latex@error{Symbol font '#2' is not defined}\@eha
756 \fi
757 \else
758 \latex@error{Command '\string#1' already defined}\@eha
759 \fi
760 }
761 \@onlypreamble\DeclareMathRadical

```

Definition below was wrong it contained \delimiter !

```

\def\set@mathradical#1#2#3#4#5{%
  \xdef#3{\radical"\hexnumber@#1#4\hexnumber@#2#5\relax}}

```

\mathalpha just a dummy currently

```
762 \let\mathalpha\relax
```

\mathchar@type

```

763 \def\mathchar@type#1{%
764 \ifodd 2#1#1 #1\else % is this non-negative number?
765 \ifx#1\mathord 0\else
766 \ifx#1\mathop 1\else
767 \ifx#1\mathbin 2\else
768 \ifx#1\mathrel 3\else
769 \ifx#1\mathopen 4\else
770 \ifx#1\mathclose 5\else
771 \ifx#1\mathpunct 6\else
772 7% % anything else is variable ord
773 \fi
774 \fi
775 \fi
776 \fi
777 \fi
778 \fi
779 \fi
780 \fi}
781 \@onlypreamble\mathchar@type

```

\DeclareSymbolFontAlphabet

```

782 \def\DeclareSymbolFontAlphabet#1#2{%
783 \expandafter\DeclareSymbolFontAlphabet@
784 \csname \expandafter\@gobble\string#1\space\endcsname{#2}#1}
785 \@onlypreamble\DeclareSymbolFontAlphabet

```

\DeclareSymbolFontAlphabet@

```

786 \def\DeclareSymbolFontAlphabet@#1#2#3{%
  We use the switch \if@tempswa to decide if we can declare this symbol font
  alphabet.
787 \@tempswatrue
  First check if #2 is known to be a symbol font
788 \expandafter\in@\csname sym#2\expandafter\endcsname
789 \expandafter{\group@list}%
790 \ifin@
  Check if #1 is defined as a math alphabet defined via \DeclareMathAlphabet:
791 \expandafter\in@\expandafter#1\expandafter{\alpha@list}%
792 \ifin@
  If so remove it from the \alpha@list and from all math version macros.
793 \@font@info{Redefining math alphabet \string#3}%
794 \toks@{}%

```

```

795     \def\alpha@elt##1##2##3{%
796         \ifx##1#1\else\addto@hook\toks@{\alpha@elt##1##2##3}\fi}%
797     \alpha@list
798     \xdef\alpha@list{\the\toks@}%

```

Now we loop over all versions and remove the math alphabet:

```

799     \def\version@elt##1{%
800         \begingroup
801         \toks@{}%
802         \def\getanddefine@fonts####1####2{%
803             \addto@hook\toks@{\getanddefine@fonts####1####2}}%
804         \def\install@mathalphabet####1####2{%
805             \ifx####1#1\else
806                 \addto@hook\toks@{\install@mathalphabet
807                                     ####1{####2}}\fi}%
808             ##1%
809             \xdef##1{\the\toks@}%
810         \endgroup
811     }%
812     \version@list
813     \else

```

If #3 is not defined as a math alphabet check if it is defined at all:

```

814     \expandafter\ifx
815     \csname\expandafter@gobble\string#1\space\endcsname
816     \relax

```

If it is undefined, fine otherwise check if it is a math alphabet defined via `\DeclareSymbolFontAlphabet`:

```

817     \else
818         \edef\reserved@a{%
819             \noexpand\in@{\string\use@mathgroup}{\meaning#1}}%
820         \reserved@a
821         \ifin@
822             \@font@info{Redeclaring math alphabet \string#3}%
823         \else

```

Since the command #3 is defined to be something which is not a math alphabet we have to skip redefining it.

```

824         \@tempswafalse
825         \@latex@error{Command '\string#3' already defined}\@eha
826     \fi
827     \fi
828     \fi
829     \else

```

Since the symbol font is not known we better skip defining this alphabet.

```

830         \@tempswafalse
831         \@latex@error{Unknown symbol font '#2'}\@eha
832     \fi
833     \if@tempswa

```

When we reach this point we are allowed to define #1 to be a symbol font math alphabet. This means that we have to set it to

`\use@mathgroup <math-settings> \sym<name>`

The `<math-settings>` are the one for the encoding that is used in the font shape where `\sym<name>` is pointing to. This means that we have to get it from the information stored in `\group@list`. Thus we loop through that list after defining `\group@elt` in a suitable way.

```

834     \def\group@elt##1##2{%
835         \expandafter\ifx\csname sym#2\endcsname##1%
836         \expandafter\reserved@a\string##2\@nil
837         \fi}%

```

```

838 \def\reserved@a##1##2/##3\@nil{%
839 \def\reserved@a{##2}}%
840 \group@list
841 \toks@{\relax\ifmmode \else \non@alpherr#1\fi}%
842 \edef#1{\the\toks@
843 \noexpand\use@mathgroup
844 \expandafter\noexpand\csname M@\reserved@a\endcsname
845 \csname sym#2\endcsname}%
846 \def#3{\protect#1}%
847 \fi
848 }
849 \@onlypreamble\DeclareSymbolFontAlphabet@
850 </2kernel | autoload>

```

File s

ltfssini.dtx

This file contains the top level L^AT_EX interface to the font selection scheme commands. See other parts of the L^AT_EX distribution, or *The L^AT_EX Companion* for higher level documentation of these commands.

36 NFSS Initialisation

Finally, there are six commands that are to be used in L^AT_EX and that we will therefore protect against expansion at the wrong point: `\fontfamily`, `\fontseries`, `\fontshape`, `\fontsize`, `\selectfont`, and `\mathversion`.

36.1 Providing math *versions*

L^AT_EX provides two *versions*. We call them **normal** and **bold**, respectively.

```
1 \DeclareMathVersion{normal}
2 \DeclareMathVersion{bold}
```

Now we define the standard font change commands. We don't allow the use of `\rmfamily` etc. in math mode.

First the changes to another *family*:

```
3 \DeclareRobustCommand\rmfamily
4     {\not@math@alphabet\rmfamily\mathrm
5      \fontfamily\rmdefault\selectfont}
6 \DeclareRobustCommand\sffamily
7     {\not@math@alphabet\sffamily\mathsf
8      \fontfamily\sfdefault\selectfont}
9 \DeclareRobustCommand\ttfamily
10    {\not@math@alphabet\ttfamily\mathtt
11     \fontfamily\ttdefault\selectfont}
```

Then the commands changing the *series*:

```
12 \DeclareRobustCommand\bfseries
13     {\not@math@alphabet\bfseries\mathbf
14      \fontseries\bfdefault\selectfont}
15 \DeclareRobustCommand\mdseries
16     {\not@math@alphabet\mdseries\relax
17      \fontseries\mddefault\selectfont}
18 \DeclareRobustCommand\upshape
19     {\not@math@alphabet\upshape\relax
20      \fontshape\updefault\selectfont}
```

Then the commands changing the *shape*:

```
21 \DeclareRobustCommand\slshape
22     {\not@math@alphabet\slshape\relax
23      \fontshape\sldefault\selectfont}
24 \DeclareRobustCommand\scshape
25     {\not@math@alphabet\scshape\relax
26      \fontshape\scdefault\selectfont}
27 \DeclareRobustCommand\itshape
28     {\not@math@alphabet\itshape\mathit
29      \fontshape\itdefault\selectfont}
```

We also have to define the *emphasize* font change command (i.e. `\em`). This command will look is the current font is sloped (i.e. has a positive `\fontdimen1`) and will then select either `\upshape` or `\itshape`.

```
30 \DeclareRobustCommand\em
31     {\@nomath\em \ifdim \fontdimen\@ne\font >\z@
32      \upshape \else \itshape \fi}
```


`\not@math@alphabet` This function generates an error message when it is called in math mode. The same function should be defined in `newlfont.sty`.

```

33 \def\not@math@alphabet#1#2{%
34   \relax
35   \ifmmode
36     \@latex@error{Command \noexpand#1invalid in math mode}%
37     {%
38       Please
39       \ifx#2\relax
40         define a new math alphabet^^J%
41         if you want to use a special font in math mode%
42       \else
43         use the math alphabet \noexpand#2instead of
44         the #1command%
45       \fi
46       .
47     }%
48   \fi}

```

We have to a `\noexpand` below to prevent expansion of `#2`. In case of `#1` we can omit this (due to the current definition of robust commands since they do come out right there :-).

```

49 \def\boldmath{\@nomath\boldmath
50   \mathversion{bold}}
51 \def\unboldmath{\@nomath\unboldmath
52   \mathversion{normal}}

```

Here we switch to the default math version by defining the internal macro `\math@version`. We dare not to call `\mathversion` at this place because this would call `\glb@settings`.

```

53 \def\math@version{normal}

```

36.2 Miscellaneous

`\newfont` We start by defining a few macros that are part of standard L^AT_EX's user interface.
`\symbol` The use of these functions is not encouraged, but they will allow to process older documents without changes to the source.

```

54 \def\newfont#1#2{\@ifdefinable#1{\font#1=#2\relax}}
55 \def\symbol#1{\char #1\relax}

```

`\@setfontsize` This abbreviation is used by L^AT_EX's user level size changing commands, such as
`\@setsize` `\large`.

```

56 \def\@setfontsize#1#2#3{\@nomath#1%

```

For the benefit of people relying on keeping the name of the current font command saved in `\@currsize` we define it. To ensure that `\@setfontsize` keeps being robust we omit this assignment during times where `\protect` differs from `\@typeset@protect`.

```

57   \ifx\protect\@typeset@protect
58     \let\@currsize#1%
59   \fi
60   \fontsize{#2}{#3}\selectfont}

```

For compatibility we also define `\@setsize` the 209 command

```

61 \(*compat)
62 \def\@setsize#1#2#3#4{\@setfontsize#1{#4}{#2}}
63 \(/compat)

```

`\oldstylenums` This macro implements old style numerals but only works if we assume that the standard math fonts are used. Thus it needs changing in case other math encodings are used.

```

64 \def\oldstylenums#1{%
65   \begingroup
Provide spacing using the interword space of the current font.
66   \spaceskip\fontdimen\tw@\font
Then switch to the math italic font. We don't change the current value of
\bfseries which means that you can use bold numerals if \bfseries is in force.
As family we use \rmdefault which means that this only works if there exist an
OML encoded version of that font or rather a corresponding .fd file (which is the
case for standard LATEX fonts even though they only contain substitutions).
67   \usefont{OML}{\rmdefault}{\f@series}{it}%
68   \mathgroup\symletters #1%
69   \endgroup
70 }

```

`\hexnumber@` To set up L^AT_EX's special math character definitions we first provide a macro to generate hexadecimal numbers. It is a rather simple `\ifcase`.

```

71 \def\hexnumber@#1{\ifcase\number#1
72 0\or 1\or 2\or 3\or 4\or 5\or 6\or 7\or 8\or
73 9\or A\or B\or C\or D\or E\or F\fi}

```

`\nfss@text` In its simplest form `\nfss@text` is an `\mbox`. This will produce unbreakable text outside math and inside math you will get text with the same fonts as outside. The only drawback is that such item won't change sizes in subscripts. But this behavior can be easily changed. With the `amstex` style option one will get a sub style called `amstext` which will redefine the `\nfss@text` macro to produce correct text in all sizes.

We have to use `\def` instead of the shorter `\let` since `\mbox` is undefined when we reach this point.

```

74 \def\nfss@text#1{{\mbox{#1}}}

```

`\copyright` The definition of `\copyright` was changed so that it works in other type styles, and to make it robust. We leave the family untouched so that the copyright notice will come out differently if a different font family is in use. This command is commented out, since it is now defined in `ltoutenc.dtx`.

```

75 %\DeclareRobustCommand\copyright
76 %   {{\ooalign{\hfil
77 %     \raise.07ex\hbox{\mdseries\upshape c}\hfil\crcr
78 %     \mathhexbox20D}}}

```

`\normalfont` The macro `\reset@font` is used in L^AT_EX to switch to a standard font, in order to initialize the current font in situations where typesetting is done in a new visual context (e.g. in a footnote). We define it here to allow the test for the new L^AT_EX version above but nevertheless are able to run all kind of mixtures.

The user interface name for `\reset@font` is `\normalfont`:

```

79 \DeclareRobustCommand\normalfont
80   {\usefont\encodingdefault
81     \familydefault
82     \seriesdefault
83     \shapedefault
84     \relax}
85 \let\reset@font\normalfont

```

We left out the special L^AT_EX fonts which are not automatically included in the base version of the font selection since these fonts contain only a few characters

which are also included in the AMS fonts so anybody who is using these fonts doesn't need them. But for compatibility reasons we will define these symbols.

```

86 \def\not@base#1{\@latex@error
87   {Command \noexpand#1not provided in base LaTeX2e}%
88   {Load the latexsym or the amsfonts package to
89    define this symbol}}
90 \def\mho{\not@base\mho}
91 \def\Join{\not@base\Join}
92 \def\Box{\not@base\Box}
93 \def\Diamond{\not@base\Diamond}
94 \def\leadsto{\not@base\leadsto}
95 \def\squsubset{\not@base\squsubset}
96 \def\squsupset{\not@base\squsupset}
97 \def\lhd{\not@base\lhd}
98 \def\unlhd{\not@base\unlhd}
99 \def\rhd{\not@base\rhd}
100 \def\unrhd{\not@base\unrhd}

```

We now initialize all variables set by `\DeclareErrorFont`. These values are not really important since they will be overwritten later on by the definition in `fontdef.ltx`.

However, if `fontdef.cfg` is corrupted then at least a hopefully suitable error font is present.

```

101 \DeclareErrorFont{OT1}{cmr}{m}{n}{10}  %% don't modify this setting
102                                         %% overwrite it in fontdef.cfg
103                                         %% if necessary

```

We now load the customizable parts of NFSS.

```

104 \ifnum\inputlineno=\m@ne

```

Still using \TeX 2. need a configuration file to avoid setting the 8bit characters.

```

105 \InputIfFileExists{fonttext.cfg}
106     {\typeout{=====^^J%
107              ^^J%
108              Local config file fonttext.cfg used^^J%
109              ^^J%
110              =====}%
111      \def\@addtofilelist##1{\xdef\@filelist{\@filelist,##1}}%
112      }
113     {\typeout{!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J%
114              !^^J%
115              ! You MUST use a fonttext.cfg file!^^J%
116              ! As you are still using TeX2!!!!^^J%
117              !^^J%
118              ! See the documentation file tex2.txt^^J%
119              !^^J%
120              !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!}%
121      \batchmode \@@end}
122 \else

```

With \TeX 3 can use the standard `ltx` file if no configuration file exists.

```

123 \InputIfFileExists{fonttext.cfg}
124     {\typeout{=====^^J%
125              ^^J%
126              Local config file fonttext.cfg used^^J%
127              ^^J%
128              =====}%
129      \def\@addtofilelist##1{\xdef\@filelist{\@filelist,##1}}%
130      }
131     {\input{fonttext.ltx}}
132 \fi
133 \let\@addtofilelist\@gobble

```

Ditto for math although I don't think that we will get a lot of customisation

:-)

```

134 \InputIfFileExists{fontmath.cfg}
135     {\typeout{=====^^J%
136             ^^J%
137             Local config file fontmath.cfg used^^J%
138             ^^J%
139             =====}%
140     \def\@addtofilelist##1{\xdef\@filelist{\@filelist,##1}}%
141     }
142     {\input{fontmath.ltx}}
143 \let\@addtofilelist\@gobble

```

Then we preload several fonts. This file might be customized *without* changing the behavior of the format (i.e. necessary font definitions will be loaded at runtime if they are not preloaded). This is done in the file `preload.ltx`.

```

144 \InputIfFileExists{preload.cfg}
145     {\typeout{=====^^J%
146             ^^J%
147             Local config file preload.cfg used^^J%
148             ^^J%
149             =====}%
150     \def\@addtofilelist##1{\xdef\@filelist{\@filelist,##1}}%
151     }
152     {\input{preload.ltx}}
153 \let\@addtofilelist\@gobble

```

\@acci We also save the values of some accents in \@acci, \@accii and \@acciii so they
\@accii can be restored by a `minipage` inside a `tabbing` environment.
\@acciii 154 \let\@acci\' \let\@accii\' \let\@acciii\=

\cal Here were the two old *⟨alphabet identifiers⟩*.

\mit

File t

fontdef.dtx

37 Introduction

This file is used to generate the files `fonttext.ltx` (text font declarations) and `fontmath.ltx` (math font declarations), which are used during the format generation. It contains the declaration of the standard text encodings used at the site as well as a minimal subset of font shape groups that NFSS will look at to ensure that the specified encodings are valid.

The math part contains the setup for math encodings as well as the default math symbol declarations that belong to the encoding.

It is possible to change this setup (by using other fonts, or defaults) without losing the ability to process documents written at other sites. Portability in this sense means that a document will compile without errors. It does not mean, however, that identical output will be produced. For this it is necessary that the distributed setup is used at both installations.

38 Customization

You are not allowed to change this source file! If you want to change the default encodings and/or the font shape groups preloaded you should create a copy of `fonttext.ltx` under the name `fonttext.cfg` and change this copy. If \LaTeX 2 ϵ finds a file of this name it will use it, otherwise it uses the standard file which is `fontdef.ltx`.

If you don't plan to use Computer Modern much or at all, it might (!) be a good idea to make your own `fonttext.cfg`. Look at the comments below (docstrip module 'text') to see what should go into such a file.

To change the math font setup use a copy of `fontmath.ltx` under the name `fontmath.cfg` and change this copy. However, dealing with this interface is even more a job for an expert than changing the text font setup — in short, we don't encourage either.

Warning: please note that we don't support customised \LaTeX versions. Thus, before sending in a bug report please try your test file with a \LaTeX format which is not customised and send in the log from that version (unless the problem goes away).

Please note: the following standard encodings have to be defined in all local variants of `font....cfg` to guarantee that all \LaTeX installations behave in the same way.

T1	Cork \TeX text encoding
OT1	old \TeX text encoding
U	unknown encoding
OML	old \TeX math letters encoding
OMS	old \TeX math symbols encoding
OMX	old \TeX math extension symbols encoding

Notice that some of these encodings are 'old' in the sense that we hope that they will be superseded soon by encoding standards defined by the \TeX user community. Therefore this set of default encodings may change in the future.

The first candidate is OT1 which will soon be replaced by T1, the official \TeX text encoding.

Warning: If you add additional encodings to this file there is no guarantee any longer that files processable at your installation will also

be processable at other installations. Thus, if you make use of such an encoding in your document, e.g. if you intend to typeset in Cyrillic (OT2 encoding), you need to specify this encoding in the preamble of your document prior to sending it to another installation. Once the encoding is specified in that place in your document, the document is processable at all L^AT_EX installations (provided they have suitable fonts installed).

For this reason we suggest that you define a short package file that sets up an additional encoding used at your site (rather than putting the encoding into this file) since this package can easily be shipped with your document.

39 The docstrip modules

The following modules are used to direct `docstrip` in generating external files:

<code>driver</code>	produce a documentation driver file
<code>text</code>	produce the file <code>fonttext.ltx</code>
<code>math</code>	produce the file <code>fontmath.ltx</code>
<code>cfgtext</code>	produce a dummy <code>fonttext.cfg</code> file
<code>cfgmath</code>	produce a dummy <code>fontmath.cfg</code> file

A typical `docstrip` command file would then have entries like:

```
\generateFile{fonttext.ltx}{t}{\from{fontdef.dtx}{text}}
```

40 A driver for this document

The next bit of code contains the documentation driver file for T_EX, i.e. the file that will produce the documentation you are currently reading. It will be extracted from this file by the DOCSTRIP program.

```
1 \<*driver>
2 \documentclass{ltxdoc}
3 \GetFileInfo{fontdef.dtx}
4 \begin{document}
5   \DocInput{fontdef.dtx}
6 \end{document}
7 \</driver>
```

41 The fonttext.ltx file

The identification is done earlier on with a `\ProvidesFile` declaration.

```
8 \<*text>
9 \typeout{=== Don't modify this file, use a .cfg file instead ===^^J}
```

41.1 Encodings

This file declares the standard encodings for text and math fonts. All others should be declared in packages or in the documents directly.

For every text encoding there are normally a number of encoding specific commands, e.g. accents, special characters, etc. (The definition for such a command might have to change when the encoding is changed, because the character is in a different position, or not available at all, or the accent is produced in a different way.) This is handled by a general mechanism which is described in `ltoutenc.dtx`.

By convention, text encoding specific declarations, including the declaration `\DeclareFontEncoding`, are kept in separate file of the form `\enc\enc.def`,

e.g. `ot1enc.def`. This allows other applications to make use of the declarations as well.

Similar to the default encoding, the loading of the encoding files for the two major text encodings shouldn't be changed. In particular, the `inputenc` package depends on this.

```
10 \input {omlenc.def}
11 \input {t1enc.def}
12 \input {ot1enc.def}      % <- should come after T1 for speed
13 \input {omsenc.def}
```

We then set the default text font encoding. This will hopefully change some day to T1. This setting should *not* be changed to produce a portable format.

```
14 \fontencoding{OT1}
```

If different encodings for text fonts are in use one could put the common setup into `\DeclareFontEncodingDefaults`. There is now a better mechanism so using this interface is discouraged!

```
15 \DeclareFontEncodingDefaults{}{}
```

Then we define the default substitution for every encoding. This release of $\text{\LaTeX} 2_{\epsilon}$ assumes that the ec fonts are available. It is possible to change this to point to some other font family (e.g., Times with the appropriate encoding if it is available) without making documents non-portable. However, in such a case documents will produce different page breaks at other sites. The substitution defaults can all be changed without losing portability as long as there are font shape definitions for the selected substitutions.

```
16 \DeclareFontSubstitution{T1}{cmr}{m}{n}
17 \DeclareFontSubstitution{OT1}{cmr}{m}{n}
```

For every encoding declaration, $\text{\LaTeX} 2_{\epsilon}$ will try to verify that the given substitution information makes sense, i.e. that it is impossible to go into an endless loop if font substitution happens. This is done at the moment the `\begin{document}` is encountered. $\text{\LaTeX} 2_{\epsilon}$ will then check that for every encoding the substitution defaults form a valid font shape group, which means that it will check if there is a `\DeclareFontShape` declaration for this combination. We will therefore load the corresponding `.fd` files now. If we don't do this they would be loaded at verification time (i.e. at `\begin{document}`) which would delay processing unnecessarily.

Warning: Please note that this means that you have to regenerate the format whenever you change any of these `.fd` files since $\text{\LaTeX} 2_{\epsilon}$ will not read `.fd` files if it already knows about the encoding/family combination.

The `\nfss@catcodes` ensures that white space is ignored in any definitions made in the `fd` files.

```
18 \begingroup
19 \nfss@catcodes
20 \input {t1cmr.fd}
21 \input {ot1cmr.fd}
22 \endgroup
```

We also load some other font definition files which are normally needed in a document. This is only done for processing speed and you can comment the next two lines out to save some memory. If necessary these files are then loaded when your document is processed. (Loading `.fd` files is a less drastic step compared to preloading fonts because the number of fonts is limited 255 at (nearly) every \TeX installation, while the amount of main memory is not a limiting factor at most installations.)

```
23 \begingroup
24 \nfss@catcodes
25 \input {ot1cmss.fd}
26 \input {ot1cmtt.fd}
27 \endgroup
```

Even with all the precautions it is still possible that NFSS will run into problems, for example, when a .fd file contains corrupted data. To guard against such cases NFSS has a very low-level fallback font that is installed with the following line.

```
28 \DeclareErrorFont{OT1}{cmr}{m}{n}{10}
```

This means, “if everything else fails use Computer Modern Roman normal shape at 10pt in the old text encoding”. You can change the font used but the encoding should be the same as the one specified with `\fontencoding` above.

41.2 Defaults

To allow the use of `\rmfamily`, `\sffamily`, etc. in documents even if non-standard families are used we provide nine macros which hold the name of the corresponding families, series, and so on. This makes it easy to use other font families (like Times Roman, etc.). One simply has to redefine these defaults.

All these hooks have to be defined in this file but you can change their meaning (except for `\encodingdefault`) without making documents non-portable.

```
\rmdefault  The following three definitions set up the meaning for \rmfamily, \sffamily, and
\sfddefault \ttfamily.
\tddefault  29 \newcommand\rmdefault{cmr}
              30 \newcommand\sfddefault{cmss}
              31 \newcommand\tddefault{cmtt}

\bfdefault  Series changing commands are influenced by the following hooks.
\mddefault  32 \newcommand\bfdefault{bx}
              33 \newcommand\mddefault{m}

\itdefault  Shape changing commands use the following hooks.
\sldefault  34 \newcommand\itdefault{it}
\scdefault  35 \newcommand\sldefault{sl}
\updefault  36 \newcommand\scdefault{sc}
              37 \newcommand\updefault{n}

\encodingdefault Finally we have the hooks that describe the behaviour of the \normalfont com-
\familydefault  mand. To stay portable, the definition of \encodingdefault should not be
\seriesdefault  changed and should match the setting above for \fontencoding. All other values
\shapedefault   can be set according to your taste.
              38 \newcommand\encodingdefault{OT1}
              39 \newcommand\familydefault{\rmdefault}
              40 \newcommand\seriesdefault{\mddefault}
              41 \newcommand\shapedefault{\updefault}
```

This finishes the low-level setup in `fonttext.ltx`.

```
42 </text>
```

42 The fontmath.ltx file

The identification is done earlier on with a `\ProvidesFile` declaration.

```
43 <*math>
44 \typeout{=== Don't modify this file, use a .cfg file instead ===^^J}
```

42.1 The font encodings used

```
45 \DeclareFontEncoding{OML}{}{}
46 \DeclareFontEncoding{OMS}{}{}
47 \DeclareFontEncoding{OMX}{}{}
```


Finally a declaration for U encoding which serves for all fonts that do not fit standard encodings. For math this sets up `\noaccents@` providing for AMS- \LaTeX . This macro is used therein to handle accented characters if they are not supported by the font. In other words, if fonts with U encoding are used in math, all accents (like from `\breve`) are obtained from some other font that has them.

```
48 \DeclareFontEncoding{U}{\noaccents@}
```

The encodings for math are next:

```
49 \DeclareFontSubstitution{OML}{cmm}{m}{it}
50 \DeclareFontSubstitution{OMS}{cmsy}{m}{n}
51 \DeclareFontSubstitution{OMX}{cmex}{m}{n}
52 \DeclareFontSubstitution{U}{cmr}{m}{n}

53 \begingroup
54 \nfss@catcodes
55 \input {omlcmm.fd}
56 \input {omscmsy.fd}
57 \input {omxcmex.fd}
58 \input {ucmr.fd}
59 \endgroup
```

42.1.1 Symbolfont and Alphabet declarations

We now define the basic symbol fonts used by \LaTeX . These four symbol fonts must be defined by this file.

It is possible to make the symbol fonts point to other external fonts without losing the ability to process documents written at other sites, as long as one defines the same symbol font names with the same encodings, e.g. `operators` with `OT1` etc. If other encodings are used documents become non-portable. Such a change should therefore be done in a package file.

```
60 \DeclareSymbolFont{operators} {OT1}{cmr}{m}{n}
61 \DeclareSymbolFont{letters} {OML}{cmm}{m}{it}
62 \DeclareSymbolFont{symbols} {OMS}{cmsy}{m}{n}
63 \DeclareSymbolFont{largesymbols}{OMX}{cmex}{m}{n}

64 \SetSymbolFont{operators}{bold}{OT1}{cmr}{bx}{n}
65 \SetSymbolFont{letters} {bold}{OML}{cmm}{b}{it}
66 \SetSymbolFont{symbols} {bold}{OMS}{cmsy}{b}{n}
```

Below are the seven math alphabets which are defined by NFSS. Again they must be defined by this file. However, as before you can change the fonts used without losing portability, but you should be careful when changing the encoding since that may make documents come out wrong.

```
67 \DeclareSymbolFontAlphabet{\mathrm} {operators}
68 \DeclareSymbolFontAlphabet{\mathnormal}{letters}
69 \DeclareSymbolFontAlphabet{\mathcal} {symbols}
70 \DeclareMathAlphabet {\mathbf}{OT1}{cmr}{bx}{n}
71 \DeclareMathAlphabet {\mathsf}{OT1}{cmss}{m}{n}
72 \DeclareMathAlphabet {\mathit}{OT1}{cmr}{m}{it}
73 \DeclareMathAlphabet {\mathtt}{OT1}{cmtt}{m}{n}
```

Given the currently available fonts we cannot bold-en `\mathbf` and `\mathtt` but in principle one could use ‘ultra bold’ or something. The alphabets defined via `\DeclareSymbolFontAlphabet` will change automatically in a new math version if the corresponding symbol font changes.

```
74 \SetMathAlphabet\mathsf{bold}{OT1}{cmss}{bx}{n}
75 \SetMathAlphabet\mathit{bold}{OT1}{cmr}{bx}{it}
```

42.2 Math font sizes

The declarations below declare the text, script and scriptscript size to be used for each text font size.

All occurrences of sizes longer than a single character are replaced with the macro name that holds them, saving a number of tokens (but losing a bit of speed, so this may not stay this way).

```

76 \DeclareMathSizes{5}{5}{5}{5}
77 \DeclareMathSizes{6}{6}{5}{5}
78 \DeclareMathSizes{7}{7}{5}{5}
79 \DeclareMathSizes{8}{8}{6}{5}
80 \DeclareMathSizes{9}{9}{6}{5}
81 \DeclareMathSizes{\@xpt}{\@xpt}{7}{5}
82 \DeclareMathSizes{\@xipt}{\@xipt}{8}{6}
83 \DeclareMathSizes{\@xipt}{\@xipt}{8}{6}
84 \DeclareMathSizes{\@xivpt}{\@xivpt}{\@xpt}{7}
85 \DeclareMathSizes{\@xvipt}{\@xvipt}{\@xipt}{\@xpt}
86 \DeclareMathSizes{\@xxpt}{\@xxpt}{\@xivpt}{\@xipt}
87 \DeclareMathSizes{\@xxvpt}{\@xxvpt}{\@xxpt}{\@xvipt}

```

42.3 The math symbol assignments

We start by setting up math codes for most of the characters typed in directly from the keyboard. Most of them are normally already setup up in the same way by Init_{TeX} . However, we repeat them here to have a complete setup which can be exchanged with another if desired.

42.3.1 The letters

```

88 \DeclareMathSymbol{a}{\mathalpha}{letters}{‘a}
89 \DeclareMathSymbol{b}{\mathalpha}{letters}{‘b}
90 \DeclareMathSymbol{c}{\mathalpha}{letters}{‘c}
91 \DeclareMathSymbol{d}{\mathalpha}{letters}{‘d}
92 \DeclareMathSymbol{e}{\mathalpha}{letters}{‘e}
93 \DeclareMathSymbol{f}{\mathalpha}{letters}{‘f}
94 \DeclareMathSymbol{g}{\mathalpha}{letters}{‘g}
95 \DeclareMathSymbol{h}{\mathalpha}{letters}{‘h}
96 \DeclareMathSymbol{i}{\mathalpha}{letters}{‘i}
97 \DeclareMathSymbol{j}{\mathalpha}{letters}{‘j}
98 \DeclareMathSymbol{k}{\mathalpha}{letters}{‘k}
99 \DeclareMathSymbol{l}{\mathalpha}{letters}{‘l}
100 \DeclareMathSymbol{m}{\mathalpha}{letters}{‘m}
101 \DeclareMathSymbol{n}{\mathalpha}{letters}{‘n}
102 \DeclareMathSymbol{o}{\mathalpha}{letters}{‘o}
103 \DeclareMathSymbol{p}{\mathalpha}{letters}{‘p}
104 \DeclareMathSymbol{q}{\mathalpha}{letters}{‘q}
105 \DeclareMathSymbol{r}{\mathalpha}{letters}{‘r}
106 \DeclareMathSymbol{s}{\mathalpha}{letters}{‘s}
107 \DeclareMathSymbol{t}{\mathalpha}{letters}{‘t}
108 \DeclareMathSymbol{u}{\mathalpha}{letters}{‘u}
109 \DeclareMathSymbol{v}{\mathalpha}{letters}{‘v}
110 \DeclareMathSymbol{w}{\mathalpha}{letters}{‘w}
111 \DeclareMathSymbol{x}{\mathalpha}{letters}{‘x}
112 \DeclareMathSymbol{y}{\mathalpha}{letters}{‘y}
113 \DeclareMathSymbol{z}{\mathalpha}{letters}{‘z}

114 \DeclareMathSymbol{A}{\mathalpha}{letters}{‘A}
115 \DeclareMathSymbol{B}{\mathalpha}{letters}{‘B}
116 \DeclareMathSymbol{C}{\mathalpha}{letters}{‘C}
117 \DeclareMathSymbol{D}{\mathalpha}{letters}{‘D}
118 \DeclareMathSymbol{E}{\mathalpha}{letters}{‘E}
119 \DeclareMathSymbol{F}{\mathalpha}{letters}{‘F}
120 \DeclareMathSymbol{G}{\mathalpha}{letters}{‘G}
121 \DeclareMathSymbol{H}{\mathalpha}{letters}{‘H}
122 \DeclareMathSymbol{I}{\mathalpha}{letters}{‘I}
123 \DeclareMathSymbol{J}{\mathalpha}{letters}{‘J}

```

```

124 \DeclareMathSymbol{K}{\mathalpha}{letters}{'K}
125 \DeclareMathSymbol{L}{\mathalpha}{letters}{'L}
126 \DeclareMathSymbol{M}{\mathalpha}{letters}{'M}
127 \DeclareMathSymbol{N}{\mathalpha}{letters}{'N}
128 \DeclareMathSymbol{O}{\mathalpha}{letters}{'O}
129 \DeclareMathSymbol{P}{\mathalpha}{letters}{'P}
130 \DeclareMathSymbol{Q}{\mathalpha}{letters}{'Q}
131 \DeclareMathSymbol{R}{\mathalpha}{letters}{'R}
132 \DeclareMathSymbol{S}{\mathalpha}{letters}{'S}
133 \DeclareMathSymbol{T}{\mathalpha}{letters}{'T}
134 \DeclareMathSymbol{U}{\mathalpha}{letters}{'U}
135 \DeclareMathSymbol{V}{\mathalpha}{letters}{'V}
136 \DeclareMathSymbol{W}{\mathalpha}{letters}{'W}
137 \DeclareMathSymbol{X}{\mathalpha}{letters}{'X}
138 \DeclareMathSymbol{Y}{\mathalpha}{letters}{'Y}
139 \DeclareMathSymbol{Z}{\mathalpha}{letters}{'Z}

```

42.3.2 The digits

```

140 \DeclareMathSymbol{0}{\mathalpha}{operators}{'0}
141 \DeclareMathSymbol{1}{\mathalpha}{operators}{'1}
142 \DeclareMathSymbol{2}{\mathalpha}{operators}{'2}
143 \DeclareMathSymbol{3}{\mathalpha}{operators}{'3}
144 \DeclareMathSymbol{4}{\mathalpha}{operators}{'4}
145 \DeclareMathSymbol{5}{\mathalpha}{operators}{'5}
146 \DeclareMathSymbol{6}{\mathalpha}{operators}{'6}
147 \DeclareMathSymbol{7}{\mathalpha}{operators}{'7}
148 \DeclareMathSymbol{8}{\mathalpha}{operators}{'8}
149 \DeclareMathSymbol{9}{\mathalpha}{operators}{'9}

```

42.3.3 Punctuation, brace, etc. keys

```

150 \DeclareMathSymbol{!}{\mathclose}{operators}{"21}
151 \DeclareMathSymbol{*}{\mathbin}{symbols}{"03} % \ast
152 \DeclareMathSymbol{+}{\mathbin}{operators}{"2B}
153 \DeclareMathSymbol{,}{\mathpunct}{letters}{"3B}
154 \DeclareMathSymbol{-}{\mathbin}{symbols}{"00}
155 \DeclareMathSymbol{.}{\mathord}{letters}{"3A}
156 \DeclareMathSymbol{:}{\mathrel}{operators}{"3A}
157 \DeclareMathSymbol{;}{\mathpunct}{operators}{"3B}
158 \DeclareMathSymbol{=}{\mathrel}{operators}{"3D}
159 \DeclareMathSymbol{?}{\mathclose}{operators}{"3F}

```

The following symbols are defined as delimiters below which automatically defines them as math symbols.

```

160 %\DeclareMathSymbol{(}{\mathopen}{operators}{"28}
161 %\DeclareMathSymbol{)}{\mathclose}{operators}{"29}
162 %\DeclareMathSymbol{/}{\mathord}{letters}{"3D}
163 %\DeclareMathSymbol{[}{\mathopen}{operators}{"5B}
164 %\DeclareMathSymbol{]}{\mathclose}{operators}{"5D}
165 %\DeclareMathSymbol{|}{\mathord}{symbols}{"6A}
166 %\DeclareMathSymbol{<}{\mathrel}{letters}{"3C}
167 %\DeclareMathSymbol{>}{\mathrel}{letters}{"3E}

```

Should all of the following being activated by default? Probably not.

```

168 %\DeclareMathSymbol{'}{\mathopen}{symbols}{"66}
169 %\DeclareMathSymbol{'\'}{\mathclose}{symbols}{"67}
170 %\DeclareMathSymbol{'\'}{\mathord}{symbols}{"6E} % \backslash
171 \mathcode'\ =8000 % \space
172 \mathcode'\ =8000 % ^\prime
173 \mathcode'\_ =8000 % \_

```

42.3.4 Delimitercodes for characters

[to be completed]

Finally, $\text{\texttt{InitEX}}$ sets all $\text{\texttt{\delcode}}$ values to -1, except $\text{\texttt{\delcode'}.=0}$

```

174 \DeclareMathDelimiter{\mathopen}{operators}{28}{largesymbols}{00}
175 \DeclareMathDelimiter{\mathclose}{operators}{29}{largesymbols}{01}
176 \DeclareMathDelimiter{\mathopen}{operators}{5B}{largesymbols}{02}
177 \DeclareMathDelimiter{\mathclose}{operators}{5D}{largesymbols}{03}

```

The next two are considered to be relations when not used in the context of a delimiter! And worse, they do even represent different glyphs when being used as delimiter and not as delimiter. This is a user level syntax inherited from plain \TeX . Therefore we explicitly redefine the math symbol definitions for these symbols afterwards.

```

178 \DeclareMathDelimiter{\mathopen}{symbols}{68}{largesymbols}{0A}
179 \DeclareMathDelimiter{\mathclose}{symbols}{69}{largesymbols}{0B}
180 \DeclareMathSymbol{\mathrel}{letters}{3C}
181 \DeclareMathSymbol{\mathrel}{letters}{3E}

```

And here is another case where the non-delimiter version produces a glyph different from the delimiter version.

```

182 \DeclareMathDelimiter{\mathord}{operators}{2F}{largesymbols}{0E}
183 \DeclareMathSymbol{\mathord}{letters}{3D}

184 \DeclareMathDelimiter{\mathord}{symbols}{6A}{largesymbols}{0C}

185 \expandafter\DeclareMathDelimiter\@backslashchar
186         {\mathord}{symbols}{6E}{largesymbols}{0F}

```

N.B. { and } should NOT get delcodes; otherwise parameter grouping fails!

42.4 Symbols accessed via control sequences

42.4.1 Greek letters

```

187 \DeclareMathSymbol{\alpha}{\mathord}{letters}{0B}
188 \DeclareMathSymbol{\beta}{\mathord}{letters}{0C}
189 \DeclareMathSymbol{\gamma}{\mathord}{letters}{0D}
190 \DeclareMathSymbol{\delta}{\mathord}{letters}{0E}
191 \DeclareMathSymbol{\epsilon}{\mathord}{letters}{0F}
192 \DeclareMathSymbol{\zeta}{\mathord}{letters}{10}
193 \DeclareMathSymbol{\eta}{\mathord}{letters}{11}
194 \DeclareMathSymbol{\theta}{\mathord}{letters}{12}
195 \DeclareMathSymbol{\iota}{\mathord}{letters}{13}
196 \DeclareMathSymbol{\kappa}{\mathord}{letters}{14}
197 \DeclareMathSymbol{\lambda}{\mathord}{letters}{15}
198 \DeclareMathSymbol{\mu}{\mathord}{letters}{16}
199 \DeclareMathSymbol{\nu}{\mathord}{letters}{17}
200 \DeclareMathSymbol{\xi}{\mathord}{letters}{18}
201 \DeclareMathSymbol{\pi}{\mathord}{letters}{19}
202 \DeclareMathSymbol{\rho}{\mathord}{letters}{1A}
203 \DeclareMathSymbol{\sigma}{\mathord}{letters}{1B}
204 \DeclareMathSymbol{\tau}{\mathord}{letters}{1C}
205 \DeclareMathSymbol{\upsilon}{\mathord}{letters}{1D}
206 \DeclareMathSymbol{\phi}{\mathord}{letters}{1E}
207 \DeclareMathSymbol{\chi}{\mathord}{letters}{1F}
208 \DeclareMathSymbol{\psi}{\mathord}{letters}{20}
209 \DeclareMathSymbol{\omega}{\mathord}{letters}{21}
210 \DeclareMathSymbol{\varepsilon}{\mathord}{letters}{22}
211 \DeclareMathSymbol{\vartheta}{\mathord}{letters}{23}
212 \DeclareMathSymbol{\varpi}{\mathord}{letters}{24}
213 \DeclareMathSymbol{\varrho}{\mathord}{letters}{25}
214 \DeclareMathSymbol{\varsigma}{\mathord}{letters}{26}
215 \DeclareMathSymbol{\varphi}{\mathord}{letters}{27}
216 \DeclareMathSymbol{\Gamma}{\mathalpha}{operators}{00}
217 \DeclareMathSymbol{\Delta}{\mathalpha}{operators}{01}
218 \DeclareMathSymbol{\Theta}{\mathalpha}{operators}{02}
219 \DeclareMathSymbol{\Lambda}{\mathalpha}{operators}{03}
220 \DeclareMathSymbol{\Xi}{\mathalpha}{operators}{04}

```

```

221 \DeclareMathSymbol{\Pi}{\mathalpha}{operators}{"05}
222 \DeclareMathSymbol{\Sigma}{\mathalpha}{operators}{"06}
223 \DeclareMathSymbol{\Upsilon}{\mathalpha}{operators}{"07}
224 \DeclareMathSymbol{\Phi}{\mathalpha}{operators}{"08}
225 \DeclareMathSymbol{\Psi}{\mathalpha}{operators}{"09}
226 \DeclareMathSymbol{\Omega}{\mathalpha}{operators}{"0A}

```

42.4.2 Ordinary symbols

```

227 \DeclareMathSymbol{\aleph}{\mathord}{symbols}{"40}
228 \def\hbar{{\mathchar'26\mkern-9mu h}}
229 \DeclareMathSymbol{\imath}{\mathord}{letters}{"7B}
230 \DeclareMathSymbol{\jmath}{\mathord}{letters}{"7C}
231 \DeclareMathSymbol{\ell}{\mathord}{letters}{"60}
232 \DeclareMathSymbol{\wp}{\mathord}{letters}{"7D}
233 \DeclareMathSymbol{\Re}{\mathord}{symbols}{"3C}
234 \DeclareMathSymbol{\Im}{\mathord}{symbols}{"3D}
235 \DeclareMathSymbol{\partial}{\mathord}{letters}{"40}
236 \DeclareMathSymbol{\infty}{\mathord}{symbols}{"31}
237 \DeclareMathSymbol{\prime}{\mathord}{symbols}{"30}
238 \DeclareMathSymbol{\emptyset}{\mathord}{symbols}{"3B}
239 \DeclareMathSymbol{\nabla}{\mathord}{symbols}{"72}
240 \def\surd{{\mathchar"1270}}
241 \DeclareMathSymbol{\top}{\mathord}{symbols}{"3E}
242 \DeclareMathSymbol{\bot}{\mathord}{symbols}{"3F}
243 \def\angle{{\vbox{\ialign{$\m@th\scriptstyle##$\crrc
244     \not\mathrel{\mkern14mu}\crrc
245     \noalign{\nointerlineskip}
246     \mkern2.5mu\leaders\hrule \@height.34pt\hfill\mkern2.5mu\crrc}}}}
247 \DeclareMathSymbol{\triangle}{\mathord}{symbols}{"34}
248 \DeclareMathSymbol{\forall}{\mathord}{symbols}{"38}
249 \DeclareMathSymbol{\exists}{\mathord}{symbols}{"39}
250 \DeclareMathSymbol{\neg}{\mathord}{symbols}{"3A}
251 \let\not=\neg
252 \DeclareMathSymbol{\flat}{\mathord}{letters}{"5B}
253 \DeclareMathSymbol{\natural}{\mathord}{letters}{"5C}
254 \DeclareMathSymbol{\sharp}{\mathord}{letters}{"5D}
255 \DeclareMathSymbol{\clubsuit}{\mathord}{symbols}{"7C}
256 \DeclareMathSymbol{\diamondsuit}{\mathord}{symbols}{"7D}
257 \DeclareMathSymbol{\heartsuit}{\mathord}{symbols}{"7E}
258 \DeclareMathSymbol{\spadesuit}{\mathord}{symbols}{"7F}

```

42.4.3 Large Operators

```

259 \DeclareMathSymbol{\coprod}{\mathop}{largesymbols}{"60}
260 \DeclareMathSymbol{\bigvee}{\mathop}{largesymbols}{"57}
261 \DeclareMathSymbol{\bigwedge}{\mathop}{largesymbols}{"56}
262 \DeclareMathSymbol{\biguplus}{\mathop}{largesymbols}{"55}
263 \DeclareMathSymbol{\bigcap}{\mathop}{largesymbols}{"54}
264 \DeclareMathSymbol{\bigcup}{\mathop}{largesymbols}{"53}
265 \DeclareMathSymbol{\intop}{\mathop}{largesymbols}{"52}
266 \def\int{\intop\nolimits}
267 \DeclareMathSymbol{\prod}{\mathop}{largesymbols}{"51}
268 \DeclareMathSymbol{\sum}{\mathop}{largesymbols}{"50}
269 \DeclareMathSymbol{\bigotimes}{\mathop}{largesymbols}{"4E}
270 \DeclareMathSymbol{\bigoplus}{\mathop}{largesymbols}{"4C}
271 \DeclareMathSymbol{\bigodot}{\mathop}{largesymbols}{"4A}
272 \DeclareMathSymbol{\ointop}{\mathop}{largesymbols}{"48}
273 \def\oint{\ointop\nolimits}
274 \DeclareMathSymbol{\bigsqcup}{\mathop}{largesymbols}{"46}
275 \DeclareMathSymbol{\smallint}{\mathop}{symbols}{"73}

```

42.4.4 Binary symbols

```

276 \DeclareMathSymbol{\triangleleft}{\mathbin}{letters}{"2F}

```

```

277 \DeclareMathSymbol{\triangleright}{\mathbin}{letters}{"2E}
278 \DeclareMathSymbol{\bigtriangleright}{\mathbin}{symbols}{"34}
279 \DeclareMathSymbol{\bigtriangledown}{\mathbin}{symbols}{"35}
280 \let \varbigtriangledown \bigtriangledown
281 \let \varbigtriangleright \bigtriangleright

```

These last two synonyms are needed because the `stamryd` package redefines them as Operators.

```

282 \DeclareMathSymbol{\wedge}{\mathbin}{symbols}{"5E}
283 \let \land = \wedge
284 \DeclareMathSymbol{\vee}{\mathbin}{symbols}{"5F}
285 \let \lor = \vee
286 \DeclareMathSymbol{\cap}{\mathbin}{symbols}{"5C}
287 \DeclareMathSymbol{\cup}{\mathbin}{symbols}{"5B}
288 \DeclareMathSymbol{\ddagger}{\mathbin}{symbols}{"7A}
289 \DeclareMathSymbol{\dagger}{\mathbin}{symbols}{"79}
290 \DeclareMathSymbol{\sqcap}{\mathbin}{symbols}{"75}
291 \DeclareMathSymbol{\sqcup}{\mathbin}{symbols}{"74}
292 \DeclareMathSymbol{\uplus}{\mathbin}{symbols}{"5D}
293 \DeclareMathSymbol{\amalg}{\mathbin}{symbols}{"71}
294 \DeclareMathSymbol{\diamond}{\mathbin}{symbols}{"05}
295 \DeclareMathSymbol{\bullet}{\mathbin}{symbols}{"0F}
296 \DeclareMathSymbol{\wr}{\mathbin}{symbols}{"6F}
297 \DeclareMathSymbol{\div}{\mathbin}{symbols}{"04}
298 \DeclareMathSymbol{\odot}{\mathbin}{symbols}{"0C}
299 \DeclareMathSymbol{\oslash}{\mathbin}{symbols}{"0B}
300 \DeclareMathSymbol{\otimes}{\mathbin}{symbols}{"0A}
301 \DeclareMathSymbol{\ominus}{\mathbin}{symbols}{"09}
302 \DeclareMathSymbol{\oplus}{\mathbin}{symbols}{"08}
303 \DeclareMathSymbol{\mp}{\mathbin}{symbols}{"07}
304 \DeclareMathSymbol{\pm}{\mathbin}{symbols}{"06}
305 \DeclareMathSymbol{\circ}{\mathbin}{symbols}{"0E}
306 \DeclareMathSymbol{\bigcirc}{\mathbin}{symbols}{"0D}
307 \DeclareMathSymbol{\setminus}{\mathbin}{symbols}{"6E}
308 \DeclareMathSymbol{\cdot}{\mathbin}{symbols}{"01}
309 \DeclareMathSymbol{\ast}{\mathbin}{symbols}{"03}
310 \DeclareMathSymbol{\times}{\mathbin}{symbols}{"02}
311 \DeclareMathSymbol{\star}{\mathbin}{letters}{"3F}

```

42.4.5 Relations

```

312 \DeclareMathSymbol{\propto}{\mathrel}{symbols}{"2F}
313 \DeclareMathSymbol{\sqsubseteq}{\mathrel}{symbols}{"76}
314 \DeclareMathSymbol{\sqsupseteq}{\mathrel}{symbols}{"77}
315 \DeclareMathSymbol{\parallel}{\mathrel}{symbols}{"6B}
316 \DeclareMathSymbol{\mid}{\mathrel}{symbols}{"6A}
317 \DeclareMathSymbol{\dashv}{\mathrel}{symbols}{"61}
318 \DeclareMathSymbol{\vdash}{\mathrel}{symbols}{"60}
319 \DeclareMathSymbol{\nearrow}{\mathrel}{symbols}{"25}
320 \DeclareMathSymbol{\searrow}{\mathrel}{symbols}{"26}
321 \DeclareMathSymbol{\nrightarrow}{\mathrel}{symbols}{"2D}
322 \DeclareMathSymbol{\swarrow}{\mathrel}{symbols}{"2E}
323 \DeclareMathSymbol{\Leftrightarrow}{\mathrel}{symbols}{"2C}
324 \DeclareMathSymbol{\Leftarrow}{\mathrel}{symbols}{"28}
325 \DeclareMathSymbol{\Rightarrow}{\mathrel}{symbols}{"29}
326 \def \neq {\not=} \let \neq = \neq
327 \DeclareMathSymbol{\leq}{\mathrel}{symbols}{"14}
328 \let \le = \leq
329 \DeclareMathSymbol{\geq}{\mathrel}{symbols}{"15}
330 \let \ge = \geq
331 \DeclareMathSymbol{\succ}{\mathrel}{symbols}{"1F}
332 \DeclareMathSymbol{\prec}{\mathrel}{symbols}{"1E}
333 \DeclareMathSymbol{\approx}{\mathrel}{symbols}{"19}
334 \DeclareMathSymbol{\succeeds}{\mathrel}{symbols}{"17}

```

```

335 \DeclareMathSymbol{\preceq}{\mathrel}{symbols}{"16}
336 \DeclareMathSymbol{\supset}{\mathrel}{symbols}{"1B}
337 \DeclareMathSymbol{\subset}{\mathrel}{symbols}{"1A}
338 \DeclareMathSymbol{\supseteq}{\mathrel}{symbols}{"13}
339 \DeclareMathSymbol{\subseteq}{\mathrel}{symbols}{"12}
340 \DeclareMathSymbol{\in}{\mathrel}{symbols}{"32}
341 \DeclareMathSymbol{\ni}{\mathrel}{symbols}{"33}
342 \let\owns=\ni
343 \DeclareMathSymbol{\gg}{\mathrel}{symbols}{"1D}
344 \DeclareMathSymbol{\ll}{\mathrel}{symbols}{"1C}
345 \DeclareMathSymbol{\not}{\mathrel}{symbols}{"36}
346 \DeclareMathSymbol{\leftrightharpoonup}{\mathrel}{symbols}{"24}
347 \DeclareMathSymbol{\leftarrow}{\mathrel}{symbols}{"20}
348 \let\gets=\leftarrow
349 \DeclareMathSymbol{\rightarrow}{\mathrel}{symbols}{"21}
350 \let\to=\rightarrow
351 \DeclareMathSymbol{\mapstochar}{\mathrel}{symbols}{"37}
352 \def\mapsto{\mapstochar\rightarrow}
353 \DeclareMathSymbol{\sim}{\mathrel}{symbols}{"18}
354 \DeclareMathSymbol{\simeq}{\mathrel}{symbols}{"27}
355 \DeclareMathSymbol{\perp}{\mathrel}{symbols}{"3F}
356 \DeclareMathSymbol{\equiv}{\mathrel}{symbols}{"11}
357 \DeclareMathSymbol{\asymp}{\mathrel}{symbols}{"10}
358 \DeclareMathSymbol{\smile}{\mathrel}{letters}{"5E}
359 \DeclareMathSymbol{\frown}{\mathrel}{letters}{"5F}
360 \DeclareMathSymbol{\leftharpoonup}{\mathrel}{letters}{"28}
361 \DeclareMathSymbol{\leftharpoondown}{\mathrel}{letters}{"29}
362 \DeclareMathSymbol{\rightharpoonup}{\mathrel}{letters}{"2A}
363 \DeclareMathSymbol{\rightharpoondown}{\mathrel}{letters}{"2B}

```

Here cometh much profligate robustification of math constructs. Warning: some of these commands may become non-robust if an AMS package is loaded.

Further potential problems: some math font packages may make unfortunate assumptions about some of these definitions that are not true of the robust versions we need.

```

364 \DeclareRobustCommand
365 \cong{\mathrel{\mathpalette\@vereq\sim}} % congruence sign
366 \def\@vereq#1#2{\lower.5\p@\vbox{\lineskiplimit\maxdimen\lineskip-.5\p@
367 \ialign{$\m@th#1\hfil##\hfil$\crrc#2\crrc=\crrc}}
368 \DeclareRobustCommand
369 \notin{\mathrel{\m@th\mathpalette\c@ncel\in}}
370 \def\c@ncel#1#2{\m@th\oalign{$\hfil#1\mkern1mu\hfil$\crrc$#1#2$}}
371 \DeclareRobustCommand
372 \rightleftharpoons{\mathrel{\mathpalette\rlh@{}}}
373 \def\rlh@#1{\vcenter{\m@th\hbox{\oalign{\raise2pt
374 \hbox{$#1\rightharpoonup$}\crrc
375 $#1\leftharpoondown$}}}}
376 \DeclareRobustCommand
377 \doteq{\buildrel\textstyle.\over=}

```

42.4.6 Arrows

```

378 \DeclareRobustCommand
379 \joinrel{\mathrel{\mkern-3mu}}
380 \DeclareRobustCommand
381 \relbar{\mathrel{\smash-}} % \smash, because -
382 % has the same height as +

```

In contrast to `plain.tex` `\Relbar` got braces around the equal sign to guard against it being “math active” expanding to `\futurelet...`. This might be the case when packages are implementing shorthands for math, e.g. `=>` meaning `\Rightarrow` etc. It would actually be better not to use `=` in such definitions but instead define something like `\mathequalsign` and use this. However we can’t do this now as it would break other math layouts where characters are in different

places (since those wouldn't know about the need for a new command name).

```

383 \DeclareRobustCommand
384   \Relbar{\mathrel{=}}
385 \DeclareMathSymbol{\lhook}{\mathrel}{letters}{"2C}
386   \def\hookrightarrow{\lhook\joinrel\rightarrow}
387 \DeclareMathSymbol{\rhook}{\mathrel}{letters}{"2D}
388   \def\hookleftarrow{\leftarrow\joinrel\rhook}
389 \DeclareRobustCommand
390   \bowtie{\mathrel{\triangleright\joinrel\mathrel{\triangleleft}}}
391 \DeclareRobustCommand
392   \models{\mathrel{||}\joinrel\Relbar}
393 \DeclareRobustCommand
394   \Longrightarrow{\Relbar\joinrel\rightarrow}

```

LaTeX Change: `\longrightarrow` and `\longleftarrow` redefined to make then robust.

```

395 \DeclareRobustCommand\longrightarrow
396   {\relbar\joinrel\rightarrow}
397 \DeclareRobustCommand\longleftarrow
398   {\leftarrow\joinrel\relbar}
399 \DeclareRobustCommand
400   \Longleftarrow{\Leftarrow\joinrel\Relbar}
401 \DeclareRobustCommand
402   \longmapsto{\mapstochar\longrightarrow}
403 \DeclareRobustCommand
404   \longleftrightharrow{\leftarrow\joinrel\rightarrow}
405 \DeclareRobustCommand
406   \Longleftrightharrow{\Leftarrow\joinrel\rightarrow}
407 \DeclareRobustCommand
408   \iff{\;\Longleftrightharrow\;}

```

42.4.7 Punctuation symbols

```

409 \DeclareMathSymbol{\ldotp}{\mathpunct}{letters}{"3A}
410 \DeclareMathSymbol{\cdotp}{\mathpunct}{symbols}{"01}
411 \DeclareMathSymbol{\colon}{\mathpunct}{operators}{"3A}

```

This is commented out, since `\ldots` is now defined in `ltoutenc.dtx`.

```

412 %\def\@ldots{\mathinner{\ldotp\ldotp\ldotp}}
413 %\DeclareRobustCommand\ldots
414 %   {\relax\ifmmode\@ldots\else\mbox{$\m@th\@ldots\,$}\fi}
415 \DeclareRobustCommand
416   \cdots{\mathinner{\cdotp\cdotp\cdotp}}
417 \DeclareRobustCommand
418   \vdots{\vbox{\baselineskip4\p@ \lineskiplimit\z@
419     \kern6\p@\hbox{.}\hbox{.}\hbox{.}}}
420 \DeclareRobustCommand
421   \ddots{\mathinner{\mkern1mu\raise7\p@
422     \vbox{\kern7\p@\hbox{.}}\mkern2mu
423     \raise4\p@\hbox{.}\mkern2mu\raise\p@\hbox{.}\mkern1mu}}

```

42.4.8 Math accents

```

424 \DeclareMathAccent{\acute}{\mathalpha}{operators}{"13}
425 \DeclareMathAccent{\grave}{\mathalpha}{operators}{"12}
426 \DeclareMathAccent{\ddot}{\mathalpha}{operators}{"7F}
427 \DeclareMathAccent{\tilde}{\mathalpha}{operators}{"7E}
428 \DeclareMathAccent{\bar}{\mathalpha}{operators}{"16}
429 \DeclareMathAccent{\breve}{\mathalpha}{operators}{"15}
430 \DeclareMathAccent{\check}{\mathalpha}{operators}{"14}
431 \DeclareMathAccent{\hat}{\mathalpha}{operators}{"5E}
432 \DeclareMathAccent{\vec}{\mathord}{letters}{"7E}
433 \DeclareMathAccent{\dot}{\mathalpha}{operators}{"5F}
434 \DeclareMathAccent{\widetilde}{\mathord}{largesymbols}{"65}
435 \DeclareMathAccent{\widehat}{\mathord}{largesymbols}{"62}

```


For some reason plain T_EX never bothered to provide a ring accent in math (although it is available in the fonts), but since we got a request for it here we go:

```
436 \DeclareMathAccent{\mathring}{\mathalpha}{operators}{"17}
```

42.4.9 Radicals

```
437 \DeclareMathRadical{\sqrtsign}{symbols}{"70}{largesymbols}{"70}
```

42.4.10 Over and under something, etc

```
438 \def\overrightarrow#1{\vbox{\m@th\ialign{##\crrc
439     \rightarrowfill\crrc\noalign{\kern-\p@\nointerlineskip}
440     $\hfil\displaystyle{#1}\hfil$\crrc}}
441 \def\overleftarrow#1{\vbox{\m@th\ialign{##\crrc
442     \leftarrowfill\crrc\noalign{\kern-\p@\nointerlineskip}%
443     $\hfil\displaystyle{#1}\hfil$\crrc}}
444 \def\overbrace#1{\mathop{\vbox{\m@th\ialign{##\crrc\noalign{\kern3\p@}%
445     \downbracefill\crrc\noalign{\kern3\p@\nointerlineskip}%
446     $\hfil\displaystyle{#1}\hfil$\crrc}}}\limits}
447 \def\underbrace#1{\mathop{\vtop{\m@th\ialign{##\crrc
448     $\hfil\displaystyle{#1}\hfil$\crrc
449     \noalign{\kern3\p@\nointerlineskip}%
450     \upbracefill\crrc\noalign{\kern3\p@}}}\}\limits}
```

(quite a waste of tokens, IMHO — Frank)

```
451 \def\skew#1#2#3{\muskip\z@#1mu\divide\muskip\z@ \tw@ \mkern\muskip\z@
452     #2{\mkern-\muskip\z@#3}\mkern\muskip\z@}\mkern-\muskip\z@}{}}
453 \def\rightarrowfill{$\m@th\smash-\mkern-7mu%
454     \cleaders\hbox{$\mkern-2mu\smash-\mkern-2mu$}\hfill
455     \mkern-7mu\mathord\rightarrow$}
456 \def\leftarrowfill{$\m@th\mathord\leftarrow\mkern-7mu%
457     \cleaders\hbox{$\mkern-2mu\smash-\mkern-2mu$}\hfill
458     \mkern-7mu\smash-$}
459 \DeclareMathSymbol{\braceld}{\mathord}{largesymbols}{"7A}
460 \DeclareMathSymbol{\bracerd}{\mathord}{largesymbols}{"7B}
461 \DeclareMathSymbol{\bracelu}{\mathord}{largesymbols}{"7C}
462 \DeclareMathSymbol{\braceru}{\mathord}{largesymbols}{"7D}
463 \def\downbracefill{$\m@th \setbox\z@\hbox{$\braceld$}%
464     \braceld\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\braceru
465     \bracelu\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\bracerd$}
466 \def\upbracefill{$\m@th \setbox\z@\hbox{$\braceld$}%
467     \bracelu\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\bracerd
468     \braceld\leaders\vrule \@height\ht\z@ \@depth\z@\hfill\braceru$}
```

42.4.11 Delimiters

```
469 \DeclareMathDelimiter{\lmoustache} % top from (, bottom from )
470     {\mathopen}{largesymbols}{"7A}{largesymbols}{"40}
471 \DeclareMathDelimiter{\rmoustache} % top from ), bottom from (
472     {\mathclose}{largesymbols}{"7B}{largesymbols}{"41}
473 \DeclareMathDelimiter{\arrowvert} % arrow without arrowheads
474     {\mathord}{symbols}{"6A}{largesymbols}{"3C}
475 \DeclareMathDelimiter{\Arrowvert} % double arrow without arrowheads
476     {\mathord}{symbols}{"6B}{largesymbols}{"3D}
477 \DeclareMathDelimiter{\Vert}
478     {\mathord}{symbols}{"6B}{largesymbols}{"0D}
479 \let\|=\Vert
480 \DeclareMathDelimiter{\vert}
481     {\mathord}{symbols}{"6A}{largesymbols}{"0C}
482 \DeclareMathDelimiter{\uparrow}
483     {\mathrel}{symbols}{"22}{largesymbols}{"78}
484 \DeclareMathDelimiter{\downarrow}
485     {\mathrel}{symbols}{"23}{largesymbols}{"79}
486 \DeclareMathDelimiter{\updownarrow}
487     {\mathrel}{symbols}{"6C}{largesymbols}{"3F}
```

```

488 \DeclareMathDelimiter{\Uparrow}
489   {\mathrel}{symbols}{"2A}{largesymbols}{"7E}
490 \DeclareMathDelimiter{\Downarrow}
491   {\mathrel}{symbols}{"2B}{largesymbols}{"7F}
492 \DeclareMathDelimiter{\Updownarrow}
493   {\mathrel}{symbols}{"6D}{largesymbols}{"77}
494 \DeclareMathDelimiter{\backslash} % for double coset G\backslash H
495   {\mathord}{symbols}{"6E}{largesymbols}{"0F}
496 \DeclareMathDelimiter{\rangle}
497   {\mathclose}{symbols}{"69}{largesymbols}{"0B}
498 \DeclareMathDelimiter{\langle}
499   {\mathopen}{symbols}{"68}{largesymbols}{"0A}
500 \DeclareMathDelimiter{\rbrace}
501   {\mathclose}{symbols}{"67}{largesymbols}{"09}
502 \DeclareMathDelimiter{\lbrace}
503   {\mathopen}{symbols}{"66}{largesymbols}{"08}
504 \DeclareMathDelimiter{\rceil}
505   {\mathclose}{symbols}{"65}{largesymbols}{"07}
506 \DeclareMathDelimiter{\lceil}
507   {\mathopen}{symbols}{"64}{largesymbols}{"06}
508 \DeclareMathDelimiter{\rfloor}
509   {\mathclose}{symbols}{"63}{largesymbols}{"05}
510 \DeclareMathDelimiter{\lfloor}
511   {\mathopen}{symbols}{"62}{largesymbols}{"04}

```

`\lgroup` There are three plain T_EX delimiters which are not fully supported by NFSS, since they partly point into a bold cmr font. Allocating a full symbol font, just to have three delimiters seems a bit too much given the limited space available. For this reason only the extensible sizes are supported. If this is not desired one can use, without losing portability, define `\mathbf` and `\mathtt` as font symbol alphabet (setting up `cmr/bx/n` and `cmtt/m/n` as symbol fonts first) and modify the delimiter declarations to point with their small variant to those symbol fonts. (This is done in `oldlfont.dtx` so look there for examples.)

```

512 \DeclareMathDelimiter{\lgroup} % extensible ( with sharper tips
513   {\mathopen}{largesymbols}{"3A}{largesymbols}{"3A}
514 \DeclareMathDelimiter{\rgroup} % extensible ) with sharper tips
515   {\mathclose}{largesymbols}{"3B}{largesymbols}{"3B}
516 \DeclareMathDelimiter{\bracevert} % the vertical bar that extends braces
517   {\mathord}{largesymbols}{"3E}{largesymbols}{"3E}

```

42.5 Math versions of text commands

The `\mathunderscore` here is really a text definition, so it has been put back into `loutenc.dtx` (by Chris, 30/04/97) and should be removed from here.

These symbols are the math versions of text commands such as `\P`, `\$`, etc.

```

\mathparagraph These math symbols are not in plain TEX.
\mathsection 518 \DeclareMathSymbol{\mathparagraph}{\mathord}{symbols}{"7B}
\mathdollar 519 \DeclareMathSymbol{\mathsection}{\mathord}{symbols}{"78}
\mathsterling 520 \DeclareMathSymbol{\mathdollar}{\mathord}{operators}{"24}
\mathunderscore 521 \def\mathsterling{\mathit{\mathchar"7024}}
522 \def\mathunderscore{\kern.06em\vbox{\hrule\@width.3em}}

\mathellipsis This is plain TEX's \ldots.
523 \def\mathellipsis{\mathinner{\ldotp\ldotp\ldotp}}%

```

42.6 Other special functions and parameters

42.6.1 Biggggg

```

524 \def\big#1{{\hbox{$\left#1\hbox to8.5\p@{\right.\n@space$}}}

```

```

525 \def\Big#1{{\hbox{$\left#1\ vbox to11.5\p@{}\right.\n@space$}}}
526 \def\bigg#1{{\hbox{$\left#1\ vbox to14.5\p@{}\right.\n@space$}}}
527 \def\Bigg#1{{\hbox{$\left#1\ vbox to17.5\p@{}\right.\n@space$}}}
528 \def\nospace{\null\delimiterspace\z@ \m@th}

```

42.6.2 The log-like functions

`\operator@font` The `\operator@font` determines the symbol font used for log-like functions.

```

529 \def\operator@font{\mathgroup\symoperators}

```

42.6.3 Parameters

```

530 \thinmuskip=3mu
531 \medmuskip=4mu plus 2mu minus 4mu
532 \thickmuskip=5mu plus 5mu

```

This finishes the low-level setup in `fontmath.ltx`.

```

533 \</math>

```

43 Default cfg files

We provide default `cfg` files here to ensure that on installations that search large file trees we do not pick up some strange customisation files from somewhere.

```

534 \<*cfgtext | cfgmath | cfgprel>
535 %%
536 %%
537 %%
538 %% Load the standard setup:
539 %%
540 \<+cfgtext>\input{fonttext.ltx}
541 \<+cfgmath>\input{fontmath.ltx}
542 \<+cfgprel>\input{preload.ltx}
543 %%
544 %% Small changes could go here; see documentation in cfgguide.tex for
545 %% allowed modifications.
546 %%
547 %% In particular it is not allowed to misuse this configuration file
548 %% to modify internal LaTeX commands!
549 %%
550 %% If you use this file as the basis for configuration please change
551 %% the \ProvidesFile lines to clearly identify your modification, e.g.,
552 %%
553 \<+cfgtext>%% \ProvidesFile{fonttext.cfg}[2001/06/01
554 \<+cfgmath>%% \ProvidesFile{fonttext.cfg}[2001/06/01
555 \<+cfgprel>%% \ProvidesFile{preload.cfg}[2001/06/01
556 %% Customised local font setup]
557 %%
558 %%
559 \</cfgtext | cfgmath | cfgprel>

```

File u

preload.dtx

44 Overview

This file contains an number of possible settings for preloading fonts during installation of NFSS2 (which is used by $\text{\LaTeX 2}_{\epsilon}$). It will be used to generate the following files:

preload.min	minimal subset of fonts necessary to run NFSS2
preload.ori	preload of CM fonts similar to the old <code>lfonts.tex</code>
preload.ltx	The standard selection of preloads
cmpreloa.xpt	preload of CM fonts for 10pt document size
cmpreloa.xip	preload of CM fonts for 11pt document size
cmpreloa.xii	preload of CM fonts for 12pt document size
dcpreloa.xpt	preload of DC fonts for 10pt size
dcpreloa.xip	preload of DC fonts for 11pt size
dcpreloa.xii	preload of DC fonts for 12pt size

These files are for installations that make use of Computer Modern fonts either old encoding (OT1) or Cork encoding (T1). The Computer Modern fonts with Cork encoding are known as DC-fonts.

Most important is `preload.ltx` which is used during format generation. You are *not* allowed to change this file.

45 Customization

You can customize the preloaded fonts in your $\text{\LaTeX 2}_{\epsilon}$ system by installing a file with the name `preload.cfg`. If this file exists it will be used in place of the system file `preload.ltx`. You can, for example, copy one of the files mentioned above (that can be generated from this source) to `preload.cfg`.

Or you can define completely other preloads. In that case start from `preload.min` since that contains the fonts that have to be preloaded by `*all*` $\text{\LaTeX 2}_{\epsilon}$ sytems.

Avoid using `preload.ori`, it will load so many fonts that on most installations it is nearly impossible to load other font families afterwards. This file is only generated to show what fonts have been preloaded by \LaTeX 2.09 .

If you normally use other fonts than Computer Modern `preload.min` might be best.

Warning: If you preload fonts with encodings other than the normally supported encodings you have to declare that encoding in a `fontdef.cfg` configuration file (see the documentation in the file `fontdef.dtx`). Adding an extra encoding to the format might produce non-portable documents, thus this should be avoided if possible.

46 Module switches for the DOCSTRIP program

The DOCSTRIP will generate the above file from this source using the following module directives:

driver	produce a documentation driver file
preload	produce a preload... file
cm	for OT1 encoded Computer Modern
dc	for T1 encoded Computer Modern
min	produce minimal subset
xpt	produce 10pt preloads
xipt	produce 11pt preloads
xiipt	produce 12pt preloads
ori	produce preloads similar to old <code>lfonts.tex</code>
tex	produce <code>preload.ltx</code>

A typical DOCSTRIP command file would then have entries like:

```
\generateFile{preload.min}{t}{\from{preload.dtx}{preload,min}}
```

for generating preload files.

47 A driver for this document

The next bit of code contains the documentation driver file for \TeX , i.e., the file that will produce the documentation you are currently reading. It will be extracted from this file by the DOCSTRIP program.

```
1 <*driver>
2 \documentclass{ltxdoc}
3 %\OnlyDescription % comment out for implementation details
4 \begin{document}
5   \DocInput{preload.dtx}
6 \end{document}
7 </driver>
```

48 The code

We begin by loading the math extension font (`cmex10`) and the \LaTeX line and circle fonts. It is necessary to do this explicitly since these are used by `lplain.tex` and `latex.tex`. Since the internal font name contains / characters and digits we construct the name via `\csname`. These are the only fonts (!) that must be loaded in this file.

All `\DeclarePreloadSizes` can be removed or others can be added, they only influence the processing speed.

```
8 \expandafter\font\csname OMX/cmex/m/n/10\endcsname=cmex10\relax
9 \font\tenln =line10 \font\tenlnw =line10\relax
10 \font\tencirc=lcircle10 \font\tencircw=lcirclew10\relax
```

The above fonts should not be touched but anything below this point here in the preload suggestions can be modified without any problems.

```
11 <-tex>%*****
12 <-tex>% Start any modification below this point **
13 <-tex>%*****
14 <-tex>
15 %%
16 %% Computer Modern Roman:
17 %%-----
18 <*ori>
19 \DeclarePreloadSizes{OT1}{cmr}{m}{n}
20   {5,6,7,8,9,10,10.95,12,14.4,17.28,20.74,24.88}
21 \DeclarePreloadSizes{OT1}{cmr}{bx}{n}{9,10,10.95,12,14.4,17.28}
22 \DeclarePreloadSizes{OT1}{cmr}{m}{sl}{10,10.95,12}
23 \DeclarePreloadSizes{OT1}{cmr}{m}{it}{7,8,9,10,10.95,12}
24 </ori>
25 <+xpt & cm> \DeclarePreloadSizes{OT1}{cmr}{m}{n}{5,7,10}
```

```

26 <+xpt & dc> \DeclarePreloadSizes{T1}{cmr}{m}{n}{5,7,10}
27 <+xipt & cm> \DeclarePreloadSizes{OT1}{cmr}{m}{n}{6,8,10.95}
28 <+xipt & dc> \DeclarePreloadSizes{T1}{cmr}{m}{n}{6,8,10.95}
29 <+xipt & cm> \DeclarePreloadSizes{OT1}{cmr}{m}{n}{6,8,12}
30 <+xipt & dc> \DeclarePreloadSizes{T1}{cmr}{m}{n}{6,8,12}
31 %%
32 %% Computer Modern Sans:
33 %%-----
34 <+ori> \DeclarePreloadSizes{OT1}{cmss}{m}{n}{10,10.95,12}
35 %%
36 %% Computer Modern Typewriter:
37 %%-----
38 <+ori> \DeclarePreloadSizes{OT1}{cmtt}{m}{n}{9,10,10.95,12}
39 %%
40 %% Computer Modern Math:
41 %%-----
42 <*ori>
43 \DeclarePreloadSizes{OML}{cmm}{m}{it}
44 {5,6,7,8,9,10,10.95,12,14.4,17.28,20.74}
45 \DeclarePreloadSizes{OMS}{cmsy}{m}{n}
46 {5,6,7,8,9,10,10.95,12,14.4,17.28,20.74}
47 </ori>

The math fonts are the same for both DC and CM fonts. So far there isn't an
agreed on standard.

48 <*xpt>
49 \DeclarePreloadSizes{OML}{cmm}{m}{it}{5,7,10}
50 \DeclarePreloadSizes{OMS}{cmsy}{m}{n}{5,7,10}
51 </xpt>
52 <*xipt>
53 \DeclarePreloadSizes{OML}{cmm}{m}{it}{6,8,10.95}
54 \DeclarePreloadSizes{OMS}{cmsy}{m}{n}{6,8,10.95}
55 </xipt>
56 <*xipt>
57 \DeclarePreloadSizes{OML}{cmm}{m}{it}{6,8,12}
58 \DeclarePreloadSizes{OMS}{cmsy}{m}{n}{6,8,12}
59 </xipt>
60 %%
61 %% LaTeX symbol fonts:
62 %%-----
63 <*ori>
64 \DeclarePreloadSizes{U}{lasy}{m}{n}
65 {5,6,7,8,9,10,10.95,12,14.4,17.28,20.74}
66 </ori>
67 </preload>

```

<i>Command</i>	<i>Corresponds to</i>	<i>Action</i>
<code>\textrm{..}</code>	<code>\rmfamily</code>	Typeset argument in roman family
<code>\textsf{..}</code>	<code>\sffamily</code>	Typeset argument in sans serif family
<code>\texttt{..}</code>	<code>\ttfamily</code>	Typeset argument in typewriter family
<code>\textmd{..}</code>	<code>\mdseries</code>	Typeset argument in medium series
<code>\textbf{..}</code>	<code>\bfseries</code>	Typeset argument in bold series
<code>\textup{..}</code>	<code>\upshape</code>	Typeset argument in normal shape
<code>\textit{..}</code>	<code>\itshape</code>	Typeset argument in <i>italic</i> shape
<code>\textsl{..}</code>	<code>\slshape</code>	Typeset argument in <i>slanted</i> shape
<code>\textsc{..}</code>	<code>\scshape</code>	Typeset argument in SMALL CAPS shape
<code>\emph{..}</code>	<code>\em</code>	Typeset argument <i>emphasized</i>

Table 1: Font-change commands with arguments

The font change commands provided here all start with `\text..` to emphasize that they are for use in normal text and to be easily memorable. They automatically take care of any necessary italic correction on either side of the argument.

File v

lftntcmd.dtx

Abstract

The commands defined in this file `lftntcmd` are part of the kernel code for $\text{\LaTeX 2}_{\epsilon}$ /NFSS2.

It is also meant to serve as documentation for package writers since it demonstrates how to define high-level font changing commands using a small number of creator functions.

49 Introduction

Font changes such as `\bfseries`, `\sffamily`, etc. are declarations; this means that their scope is delimited by the grouping structure, either by the next `\end` of some environment or by explicitly using a group, e.g., writing something like `{\bfseries...}` in the source. If you make the mistake of writing `\bfseries{...}` (thinking of `\bfseries` as a command with one argument) then the result is rather striking.

Font declarations are an artifact of the \TeX system and for several reasons it is better to avoid them on the user level whenever possible. In \LaTeX 3 they will probably all be replaced by environments and by font commands taking one argument.

This file defines a creator function for such declarative font switches. This function creates commands which can be used in both math and text.

This file also defines a number of high-level commands (all starting with `\text..`) that have one argument and typeset this argument in the requested way. Thus these commands are for typesetting short pieces of text in a specific family, series or shape. These are all produced as examples of the use of a creator function which is itself also defined in this file.

Table 1 shows all these high-level commands in action. A further advantage of using these commands is that they automatically take care of any necessary italic correction on either side of their argument.

Thus, when using such commands, one does not have to worry about forgetting the italic correction when changing fonts. Only in very few situations is this

additional space wrong but, for example, most typographers recommend omitting the italic correction if a small punctuation character, like a comma, directly follows the font change. Since the amount of correction required is partly a matter of taste, you can define in what situations the italic correction should be suppressed. This is done by putting the characters that should cancel a preceding italic correction in the list `\nocorrlist`.⁷ The default definition for this list is produced by the following.

```
\newcommand \nocorrlist {,.}
```

It is best to declare the most often used characters first, because this will make the processing slightly faster. For example,

```
\emph{When using the \NFSS{} high-level commands,
the \emph{proper} use of italic corrections is
automatically taken care of}. Only
\emph{sometimes} one has to help \LaTeX{} by
adding a \verb=\nocorr= command.
```

which results in:

When using the NFSS high-level commands, the proper use of italic corrections is automatically taken care of. Only sometimes one has to help L^AT_EX by adding a \nocorr command.

In contrast, the use of the declaration forms is often more appropriate when you define your own commands or environments.

```
\newenvironment{bfitemize}{\begin{itemize}\normalfont\bfseries}
                          {\end{itemize}}
\begin{bfitemize}
\item This environment produces boldface items.
\item It is defined in terms of \LaTeX's
      \texttt{itemize} environment and NFSS
      declarations.
\end{bfitemize}
```

This gives:

- **This environment produces boldface items.**
- **It is defined in terms of L^AT_EX's itemize environment and NFSS declarations.**

In addition to global customization of when to insert the italic correction, it is of course sometimes necessary to explicitly insert one with `\/`.

It is also possible to suppress the italic correction in individual instances. For this, the command `\nocorr` is provided.

The `\nocorr` must appear as the first or last token inside the braces of the argument of the `\text...` commands, at that end of the text where you wish to suppress the italic correction.

It is worth pointing out here that inserting a `\/` in places where it can have no function (i.e. anywhere except immediately after a slanted letter) is not an error—it will just be silently ignored. Unfortunately this is not true if the redefinition of `\/` in `amstex.sty` is used as this version can cause space to be removed immediately before the `\/`.

⁷Any package that changes the `\catcode` of a character inside `\nocorrlist` must then explicitly reset the list. Otherwise the changed character will no longer be recognized by the suppression algorithm.

50 The implementation

`\DeclareTextFontCommand` This is the creator function for `\text..` commands. It gives a warning if `\foo` or `\fragfoo` is already defined.

In math mode it simply puts the font declaration and text into a box (possibly an automagically sized one).

Otherwise it first scans the text to see where `\nocorr` occurs within it. This sets the `\check@ic` commands to do what is necessary concerning the italic correction at both ends.

The algorithm for deciding whether to put in an italic correction is not very subtle: one is added whenever the newly current font is not itself positively sloped, unless the next token is a character in the ‘nocorr’ list. At the end of the text this is done after closing the group so as to check the ‘outer font’. Note that this will often result in adding an italic correction token after a character in an unsloped font; we believe (in early 2003) that this is perhaps inefficient but not dangerous.

It also now checks for empty contents of the text command and optimises this case. Some care is also taken to check that doing dangerous things in vertical mode is avoided.

The italic correction token is added to the horizontal list before (in the list) an immediately preceding non-zero glob of glue (skip) and any non-zero penalty preceding that since, in the typical case, this puts it immediately after the last character in the preceding word.

Note that it is necessary to put in the `\aftergroup\maybe@ic` at the end of the group so that it comes after any other aftergroup tokens and immediately before the following tokens. It is also necessary to remove the `\fi` from the token list before the group ends; this is done by adding an `\expandafter` just before the closing brace.

```

1 \<*2ekernel>
2 \def \DeclareTextFontCommand #1#2{%
3   \DeclareRobustCommand#1[1]{%
4     \ifmmode
5       \nfss@text{#2##1}%
6     \else
7       \hmode@bgroup
8       \text@command{##1}%
9       #2\check@ic1 ##1\check@icr
10      \expandafter
11      \egroup
12      \fi
13      }%
14 }
```

```

\textrm Now we define the \text<family> commands in terms of the above; \texttt does
\textsf not look very nice!
\texttt 15 \DeclareTextFontCommand{\textrm}{\rmfamily}
\textnormal 16 \DeclareTextFontCommand{\textsf}{\sffamily}
17 \DeclareTextFontCommand{\texttt}{\ttfamily}
18 \DeclareTextFontCommand{\textnormal}{\normalfont}
```

`\textbf` For the series attribute:

```

\textmd 19 \DeclareTextFontCommand{\textbf}{\bfseries}
20 \DeclareTextFontCommand{\textmd}{\mdseries}
```

`\textit` And for the shapes:

```

\textsl 21 \DeclareTextFontCommand{\textit}{\itshape}
\textsc 22 \DeclareTextFontCommand{\textsl}{\slshape}
\textup 23 \DeclareTextFontCommand{\textsc}{\scshape}
24 \DeclareTextFontCommand{\textup}{\upshape}
```

`\emph` Finally we have the `\em` font change declaration of L^AT_EX. The corresponding definition with argument is

```
25 \DeclareTextFontCommand{\emph}{\em}
```

`\nocorr` This is just a label, so it does nothing; it should also be unexpandable.

```
26 \let \nocorr \relax
```

`\check@icl` We define these defaults in case some error causes them to be expanded at the wrong time.

```
27 \let \check@icl \@empty
28 \let \check@icr \@empty
```

`\text@command` This checks for a `\nocorr` as the first token in its argument and also for one in any other position not protected within braces (the latter is treated as if it were at the end of the argument).

`\check@nocorr@` Is this the correct action in the ‘empty’ case? It is efficient but typographically it is, strictly, incorrect!

```
29 \def \text@command #1{%
30   \def \reserved@a {#1}%
31   \ifx \reserved@a \@empty
32     \let \check@icl \@empty
33     \let \check@icr \@empty
34   \else
35 %     \def \reserved@b { }%
36 %     \ifx \reserved@a \reserved@b
37 %       \ifx \reserved@a \space
38 %         \let \check@icl \@empty
39 %         \let \check@icr \@empty
40 %       \else
41 %         \check@nocorr@ #1\nocorr\@nil
42 %       \fi
43 %     \fi
44 % }
45 \def \check@nocorr@ #1#2\nocorr#3\@nil {%
```

The two checks are initialised here to their values in the normal case.

```
46 \let \check@icl \maybe@ic
47 \def \check@icr {\ifvmode \else \aftergroup \maybe@ic \fi}%
48 \def \reserved@a {\nocorr}%
49 \def \reserved@b {#1}%
50 \def \reserved@c {#3}%
51 \ifx \reserved@a \reserved@b
52   \ifx \reserved@c \@empty
```

In this case there is a `\nocorr` at the start but not at the end, so `\check@icl` should be empty.

```
53   \let \check@icl \@empty
54   \else
```

Otherwise there is a `\nocorr` both at the start and elsewhere, so no italic corrections should be added.

```
55   \let \check@icl \@empty
56   \let \check@icr \@empty
57   \fi
58   \else
59     \ifx \reserved@c \@empty
```

In this case there is no `\nocorr` anywhere, so we need to check for an italic correction at both the beginning and the end. This has been set up as the default so no code is needed here.

```
60 \else
```

In this case there is no `\nocorr` at the start but there is one elsewhere, so no `\aftergroup` is needed.

```
61 \let \check@icr \empty
62 \fi
63 \fi
64 }
```

`\maybe@ic` These macros implement the italic correction.

```
\maybe@ic@ 65 \def \maybe@ic {\futurelet \@let@token \maybe@ic@}
66 \def \maybe@ic@ {%
```

We first check to see if the current font is positively sloped. (But do not forget the message Rainer sent about an upright font with non-zero slope! Or is this an urban myth?) It has been suggested that this should test against a small positive value, but what?

```
67 \ifdim \fontdimen\@ne\font>\z@
68 \else
69 \@tempswatrue
```

It would be possible, but probably not worthwhile, to continue the forward scan beyond any closing braces.

```
70 \expandafter \@tfor \expandafter \reserved@a \expandafter : \expandafter =%
71 \nocorrlist
```

We have to hide the `\@let@token` in the macro `\t@st@ic` rather than testing it directly in the loop since it might be `\let` to a `\fi` or `\else`, which would result in chaos.

```
72 \do \t@st@ic
```

Frank thinks that the next bit it is inefficient if done after the second change. Chris thinks that most all of this is inefficient for the commonest cases: but that is the price of a cleverer algorithm. It is certainly needed to deal with the use of `\nolinebreak`.

```
73 \if@tempswa \sw@slant \fi
74 \fi
75 }
```

`\t@st@ic` The next token in the input stream is stored in `\@let@token` via a `\let`, the current token from `\nocorrlist` is stored via `\def` in `\reserved@a`. To compare them we have to fiddle around a bit.

If the only things to check were characters then this could be done via an `\if` thus their catcodes would not matter; but this will not work whilst `\futurelet` is used above.

```
76 \def \t@st@ic {%
77 \expandafter \let \expandafter \reserved@b \expandafter = \reserved@a \relax
78 \ifx \reserved@b \@let@token
```

If they are the same we record the fact and jump out of the loop.

```
79 \@tempswafalse
80 \@break@tfor
81 \fi
82 }
```

`\sw@slant` The definition of the mysterious `\sw@slant` command is as follows.
`\fix@penalty` 83 \def \sw@slant {%

It is surely correct to put in an italic correction when there is no skip. If the last thing on the list is actually a zero skip (including things whose dimension part is zero, such as `\hfill`), or anything other than a character, then the italic correction will have no effect.

In order to work correctly with unbreakable spaces from `~` (and other common forms of line-breaking control) we also move back across a penalty before the glue.

```

84 \ifdim \lastskip=\z@
85   \fix@penalty
86 \else
87   \skip@ \lastskip
88   \unskip
89   \fix@penalty
90   \hskip \skip@
91 \fi
92 }
```

The above code means: “If there is a non-zero space just before the current position (`\ifdim...`) save the amount of that space (`\skip@ \lastskip`), remove it (`\unskip`), then do a similar thing if there is a penalty just before the skip, and finally put the space back in.”

Since zero glue cannot be distinguished in this context from no glue, we dare not put in an `\hskip` in this case as this may produce an unwanted breakpoint. This is not satisfactory.

The penalty before the glue is handled similarly, with the same caveats concerning the zero case. Is this the first recorded use of `\unpenalty` in standard L^AT_EX code?

```

93 \def \fix@penalty {%
94   \ifnum \lastpenalty=\z@
95     \@@italiccorr
96   \else
97     \count@ \lastpenalty
98     \unpenalty
99     \@@italiccorr
100    \penalty \count@
101 \fi
102 }
```

`\nocorrlist` This holds the list of characters that should prevent italic correction. They should be ordered by decreasing frequency of use. If any such character is made active later on one needs to redefine the list so that the active character becomes part of it.

```
103 \def \nocorrlist {,.
```

`\nfss@text` This command will by default behave like a L^AT_EX `\mbox` but may be redefined by packages such as `amstext.sty` to be a bit cleverer.

```

104 \ifx \nfss@text\@undefined
105   \def \nfss@text {\leavevmode\hbox}
106 \fi
```

`\DeclareOldFontCommand` This is the function used to create declarative font-changing commands that can also be used to change alphabets in math-mode.

Usage: `\DeclareOldFontCommand \fn{<font-change decls>} <math-alphabet>`

Here `\fn` is the font-declaration command being defined, `<font-change decls>` is the declaration it will expand to in text-mode, and `<math-alphabet>` is the (single) math alphabet specifier which is to be used in math-mode.

It does not care whether the command being defined already exists but it does give a warning if it redefines anything.

Here are some typical examples of its use in conjunction with more basic NFSS2 font commands.

```
\DeclareOldFontCommand{\rm}{\normalfont\rmfamily}{\mathrm}
```

```

\DeclareOldFontCommand{\sf}{\normalfont\sffamily}{\mathsf}
\DeclareOldFontCommand{\tt}{\normalfont\ttfamily}{\mathtt}

```

```

107 \def \DeclareOldFontCommand #1#2#3{%
108   \DeclareRobustCommand #1{\@fontswitch {#2}{#3}}%
109 }

```

`\@fontswitch` These two commands actually do the necessary tests and declarative font- or alphabet-changing.

```

\@@math@egroup
\@@math@egroup 110 \def \@fontswitch #1#2{%
111   \ifmmode
112     \let \math@bgroup \relax
113     \def \math@egroup {\let \math@bgroup \@@math@bgroup
114                      \let \math@egroup \@@math@egroup}%

```

We need to have a `\relax` in the following line in case the `#2` is something like `\mathsf` grabbing the next token as an argument. For this reason the code also uses explicit arguments again (see pr/1275).

```

115     #2\relax
116   \else
117     #1%
118   \fi
119 }
120 \let \@@math@bgroup \math@bgroup
121 \let \@@math@egroup \math@egroup

```

These commands are available only in the preamble.

```

122 \onlypreamble \DeclareTextFontCommand
123 \onlypreamble \DeclareOldFontCommand

```

51 Initialization

`\normalsize` This is defined to produce an error.

```

124 \def\normalsize{%
125   \@latexerror {The font size command \protect\normalsize\space
126               is not defined:\MessageBreak
127               there is probably something wrong with
128               the class file}\@eha
129 }
130 \</2ekernel>

```

File w ltpageno.dtx

52 Page Numbering

Page numbers are produced by a page counter, used just like any other counter. The only difference is that `\c@page` contains the number of the next page to be output (the one currently being produced), rather than one minus it. Thus, it is normally initialized to 1 rather than 0. `\c@page` is defined to be `\count0`, rather than a count assigned by `\newcount`.

`\pagenumbering` The user sets the pagenumber style with the `\pagenumbering{<foo>}` command, which sets the page counter to 1 and defines `\thepage` to be `\foo`. For example, `\pagenumbering{roman}` causes pages to be numbered i, ii, etc.

```
1 <*2kernel>
2 \message{page nos.,}

3 \countdef\c@page=0 \c@page=1
4 \def\cl@page{}
5 \def\pagenumbering#1{%
6   \global\c@page \@ne \gdef\thepage{\csname @#1\endcsname
7     \c@page}}
8 </2kernel>
```

File x

ltxref.dtx

53 Cross Referencing

The user writes `\label{foo}` to define the following cross-references:

`\ref{foo}`: value of most recently incremented referencable counter. in the current environment. (Chapter, section, theorem and enumeration counters counters are referencable, footnote counters are not.)

`\pageref{foo}`: page number at which `\label{foo}` command appeared. where foo can be any string of characters not containing ‘\’, ‘{’ or ‘}’.

Note: The scope of the `\label` command is delimited by environments, so `\begin{theorem} \label{foo} ... \end{theorem} \label{bar}` defines `\ref{foo}` to be the theorem number and `\ref{bar}` to be the current section number.

Note: `\label` does the right thing in terms of spacing – i.e., leaving a space on both sides of it is equivalent to leaving a space on either side.

53.1 Cross Referencing

```
1 \<*2kernel>
2 \message{x-ref,}
```

This is implemented as follows. A referencable counter CNT is incremented by the command `\refstepcounter{CNT}`, which sets `\@currentlabel == {CNT}{eval(\p@cnt\theCNT)}`. The command `\label{FOO}` then writes the following on file `\@auxout`:

```
\newlabel{FOO}{{eval(\@currentlabel)}{eval(\thepage)}}
```

```
\ref{FOO} ==
BEGIN
  if \r@foo undefined
  then @refundundefined := G T
    ??
    Warning: 'reference foo on page ... undefined'
  else \@car \eval(\r@FOO)\@nil
  fi
END
```

```
\pageref{foo} =
BEGIN
  if \r@foo undefined
  then @refundundefined := G T
    ??
    Warning: 'reference foo on page ... undefined'
  else \@cdr \eval(\r@FOO)\@nil
  fi
END
```

`\G@refundundefinedtrue` This does not save on name-space (since `\G@refundundefinedfalse` was never needed) but it does make the implementation of such one-way switches more consistent. The extra macro to make the change is used since this change appears several times.

Note despite its name, `\G@refundundefinedtrue` does *not* correspond to an `\if` command, and there is no matching `...false`. It would be more natural to call the command `\G@refundundefined` (as inspection of the change log will reveal) but unfortunately such a change would break any package that had defined a `\ref`-like

command that mimicked the definition of `\ref`, calling `\G@refundefinedtrue`. Inspection of the T_EX archives revealed several such packages, and so this command has been named `...true` so that the definition of `\ref` need not be changed, and the packages will work without change.

```

3 % \newif\ifG@refundefined
4 % \def\G@refundefinedtrue{\global\let\ifG@refundefined\iftrue}
5 % \def\G@refundefinedfalse{\global\let\ifG@refundefined\iffalse}
6 \def\G@refundefinedtrue{%
7   \gdef\@refundefined{%
8     \@latex@warning@no@line{There were undefined references}}
9 \let\@refundefined\relax

```

`\ref` Referencing a `\label`. RmS 91/10/25: added a few extra `\reset@font`, as suggested by Bernd Raichle
`\pageref` RmS 92/08/14: made `\ref` and `\pageref` robust
`\@setref` RmS 93/09/08: Added setting of `refundefined` switch.

```

10 \def\@setref#1#2#3{%
11   \ifx#1\relax
12     \protect\G@refundefinedtrue
13     \nfss@text{\reset@font\bfseries ??}%
14     \@latex@warning{Reference ‘#3’ on page \thepage \space
15       undefined}%
16   \else
17     \expandafter#2#1\null
18   \fi}
19 \def\ref#1{\expandafter\@setref\csname r@#1\endcsname\@firstoftwo{#1}}
20 \def\pageref#1{\expandafter\@setref\csname r@#1\endcsname
21   \@secondoftwo{#1}}

```

`\newlabel` This command will be written to the `.aux` file to pass label information from one run to another.

`\@newl@bel` The internal form of `\newlabel` and `\bibcite`. Note that this macro does its work inside a group. That way the local assignments it needs to do don't clutter the save stack. This prevents large documents with many labels to run out of save stack.

```

22 \def\@newl@bel#1#2#3{%
23   \ifundefined{#1#2}%
24     \relax
25     {\gdef \@multiplelabels {%
26       \@latex@warning@no@line{There were multiply-defined labels}}%
27       \@latex@warning@no@line{Label ‘#2’ multiply defined}}%
28     \global\@namedef{#1#2}{#3}}
29 \def\newlabel{\@newl@bel r}
30 \@onlypreamble\@newl@bel

```

`\ifmultiplelabels` This is redefined to produce a warning if at least one label is defined more than once. It is executed by the `\enddocument` command.

```

\@multiplelabels
31 \let \@multiplelabels \relax

```

`\label` The commands `\label` and `\refstepcounter` have been changed to allow `\protect`'ed commands to work properly. For example,

```

\def\thechapter{\protect\foo{\arabic{chapter}.\roman{section}}}

```

will cause a `\label{bar}` command to define `\ref{bar}` to expand to something like `\foo{4.d}`. Change made 20 Jul 88.

```

32 \def\label#1{\@bsphack
33   \protected@write\@auxout{%
34     {\string\newlabel{#1}{\@currentlabel}\thepage}}%
35   \@esphack}

```



```

36 \def\refstepcounter#1{\stepcounter{#1}%
37   \protected@edef\@currentlabel
38     {\csname p@#1\endcsname\csname the#1\endcsname}%
39 }

```

\@currentlabel For \label commands that come before any environment

```

40 \def\@currentlabel{}
41 \</2ekernel>

```

53.2 An extension of counter referencing

At the moment a reference to a counter `foo` will generate the equivalent of `\p@foo\thefoo` although not quite in this form. For some applications it would be nice if one could have `\thefoo` being an argument to `\p@foo` to be able to put material before and after the number generated by `\thefoo`. This can be easily achieved with a small change to one of the kernel commands as follows:

```

\def\refstepcounter#1{\stepcounter{#1}%
  \protected@edef\@currentlabel
    {\csname p@#1\expandafter\endcsname\csname the#1\endcsname}%
}

```

The trick is to ensure that `\csname the#1\endcsname` is turned into a single token before `\p@...` is expanded further. This way, if the `\p@...` command is a macro with one argument it will receive `\the...`. With the kernel code (i.e., without the `\expandafter`) it will instead pick up `\csname` which would be disastrous.

Using `\expandafter` instead of braces delimiting the argument is better because, assuming that the `\p@...` command is not defined as a macro with one argument, the braces will stay and prohibit kerning that might otherwise happen between the glyphs generated by `\the...` and surrounding glyphs.

We have refrained from making this change in the kernel code although for existing documents it would be 100% backward compatible. The reason being that any class or package making use of this functionality would then horribly fail with older L^AT_EX installations.

Instead we suggest that people who are interested in using this functionality in a document class or package add the redefinition to the class file. To ensure that this redefinition is properly applied they might want to test for the original definition first, e.g.

```

\CheckCommand*\refstepcounter[1]{\stepcounter{#1}%
  \protected@edef\@currentlabel
    {\csname p@#1\endcsname\csname the#1\endcsname}%
}
\renewcommand*\refstepcounter[1]{\stepcounter{#1}%
  \protected@edef\@currentlabel
    {\csname p@#1\expandafter\endcsname\csname the#1\endcsname}%
}

```

File y

ltmiscen.dtx

54 Miscellaneous Environments

This section implements the basic environment mechanism, and also a few specific environments including `document`, The math environments and related commands, the ‘flushing’ environments, (`center`, `flushleft`, `flushright`), and `verbatim`.

```
1 \<*2kernel>
2 \message{environments,}
```

54.1 Environments

`\begin{foo}` and `\end{foo}` are used to delimit environment `foo`.

`\begin{foo}` starts a group and calls `\foo` if it is defined, otherwise it does nothing.

`\end{foo}` checks to see that it matches the corresponding `\begin` and if so, it calls `\endfoo` and does an `\endgroup`. Otherwise, `\end{foo}` does nothing.

If `\end{foo}` needs to ignore blanks after it, then `\endfoo` should globally set the `@ignore` switch true with `\@ignoretrue` (this will automatically be global).

NOTE: `\@@end` is defined to be the `\end` command of T_EX82.

`\enddocument` is the user’s command for ending the manuscript file.

`\stop` is a panic button — to end T_EX in the middle.

```
\enddocument ==
BEGIN
  \@checkend{document}    %% checks for unmatched \begin
  \clearpage
  \begingroup
    if @filesw = true
    then close file @mainaux
    if G@refundefined = true
    then LaTeX Warning: 'There are undefined references.' fi
    if @multiplelabels = true
    then LaTeX Warning:
      'One or more label(s) multiply defined.'
    else
      \@setckpt {ARG1}{ARG2} == null
      \newlabel{LABEL}{VAL} ==
      BEGIN
        \reserved@a == VAL
        if def(\reserved@a) = def(\r@LABEL)
        else @tempswa := true          fi
      END
      \bibcite{LABEL}{VAL} == null
      BEGIN
        \reserved@a == VAL
        if def(\reserved@a) = def(\g@LABEL)
        else @tempswa := true          fi
      END
      @tempswa := false
      make @ a letter
      \input \jobname.AUX
      if @tempswa = true
      then LaTeX Warning: 'Label may have changed.
        Rerun to get cross-references right.'
      fi
    fi
  fi
```

```

\endgroup
finish up
END

\@writefile{EXT}{ENTRY} ==
  if tf@EXT undefined
    else \write\tf@EXT{ENTRY}
  fi

\@currentvir The name of the current environment. Initialized to document to so that
\end{document} works correctly.
3 \def\@currentvir{document}

\if@ignore
\@ignoretrue 4 \def\@ignorefalse{\global\let\if@ignore\iffalse}
\@ignorefalse 5 \def\@ignoretrue {\global\let\if@ignore\iftrue}
6 \@ignorefalse

\ignorespacesafterend

7 \let\ignorespacesafterend\@ignoretrue

\enddocument

8 \def\enddocument{%
The \end{document} hook is executed first. If necessary it can contain a
\clearpage to output dangling floats first. In this position it can also contain
something like \end{foo} so that the whole document effectively starts and ends
with some special environment. However, this must be used with care, eg if two
applications would use this without knowledge of each other the order of the en-
vironments will be wrong after all. \AtEndDocument is redefined at this point so
that and such commands that get into the hook do not chase their tail...

9 \let\AtEndDocument\@firstofone
10 \enddocumenthook
11 \@checkend{document}%
12 \clearpage
13 \begingroup
14 \if@filesw
15 \immediate\closeout\@mainaux
16 \let\@setckpt\@gobbletwo
17 \let\@newl@bel\@testdef

The previous line is equiv to setting

\def\newlabel{\@testdef r}%
\def\bibcite{\@testdef b}%

18 \@tempwafalse
19 \makeatletter \input\jobname.aux
20 \fi

21 \@dofilelist

First we check for font size substitution bigger than \fontsubfuzz. The \relax
is necessary because this is a macro not a register.

22 \ifdim \font@submax >\fontsubfuzz\relax

In case you wonder about the \@gobbletwo inside the message below, this is a
horrible hack to remove the tokens \on@line. that are added by \@font@warning
at the end.

23 \@font@warning{Size substitutions with differences\MessageBreak
24 up to \font@submax\space have occurred.\@gobbletwo}%
25 \fi

```

The macro `\@defaultsubs` is initially `\relax` but gets redefined to produce a warning if there have been some default font substitutions.

```
26 \@defaultsubs
```

The macro `\@refundefined` is initially `\relax` but gets redefined to produce a warning if there are undefined refs.

```
27 \@refundefined
```

If a label is defined more than once, `\@tempswa` will always be true and thus produce a “Label(s) may ...” warning. But since a rerun will not solve that problem (unless one uses a package like `varioref` that generates labels on the fly), we suppress this message.

```
28 \if@filesw
29 \ifx \@multiplelabels \relax
30 \if@tempswa
31 \latex@warning@no@line{Label(s) may have changed.
32 Rerun to get cross-references right}%
33 \fi
34 \else
35 \@multiplelabels
36 \fi
37 \fi
38 \endgroup
39 \deadcycles\z@\@end}
```

```
\@testdef
```

```
40 \def\@testdef #1#2#3{%
41 \def\reserved@a{#3}\expandafter \ifx \csname #1@#2\endcsname
42 \reserved@a \else \@tempwattrue \fi}
```

```
\@writefile
```

```
43 \long\def\@writefile#1#2{%
44 \ifundefined{tf@#1}\relax
45 {\@temptokena{#2}%
46 \immediate\write\csname tf@#1\endcsname{\the\@temptokena}%
47 }%
48 }
```

```
\stop
```

```
49 \def\stop{\clearpage\deadcycles\z@\let\par\@par\@end}
```

```
50 \everypar{\@nodocument} %% To get an error if text appears before the
51 \nullfont %% \begin{document}
```

`\begin`, `\end`, and `\@checkend` changed so `\end{document}` will catch an unmatched `\begin`. Changed 24 May 89 as suggested by Frank Mittelbach and Rainer Sch\"opf.

```
\begin{NAME} ==
BEGIN
  IF \NAME undefined THEN \reserved@a == BEGIN report error
END
                                ELSE \reserved@a ==
                                (\@currenvir :=L NAME) \NAME
FI
@ignore :=G F %% Added 30 Nov 88
\begin{group
\@endpe := F
\@currenvir :=L NAME
\NAME
```

```

END

\end{NAME} ==
BEGIN
  \endNAME
  \@checkend{NAME}
  \endgroup
  IF @endpe = T                %% @endpe set True by \@endparenv
    THEN \@doendpe             %% \@doendpe redefines \par and
\everypar                      %% to suppress paragraph indentation in
                               %% immediately following text
  FI
  IF @ignore = T
    THEN @ignore :=G F
      \ignorespaces
  FI
END

\@checkend{NAME} ==
BEGIN
  IF \@currentvir = NAME
    ELSE \@badend{NAME}
  FI
END

\begin
52 \def\begin#1{%
53   \@ifundefined{#1}%
54   {\def\reserved@a{\@latex@error{Environment #1 undefined}\@eha}}%
55   {\def\reserved@a{\def\@currentvir{#1}%
56     \edef\@currentvline{\on@line}%
57     \csname #1\endcsname}}%
58   \@ignorefalse
59   \begingroup\@endpefalse\reserved@a}

\end
60 \def\end#1{%
61   \csname end#1\endcsname\@checkend{#1}%
62   \expandafter\endgroup\if@endpe\@doendpe\fi
63   \if@ignore\@ignorefalse\ignorespaces\fi}

\@checkend
64 \def\@checkend#1{\def\reserved@a{#1}\ifx
65   \reserved@a\@currentvir \else\@badend{#1}\fi}

\@currentvline We do need a default value for \@currentvline on top-level since the document
environment cancels the brace group. This means that a mismatch with \begin
{document} will not produce a line number. Thus the outer default must be
\@empty or we will end up with two spaces.
66 \let\@currentvline\@empty

```

54.2 Center, Flushright, Flushleft

```

67 \message{center,}

\center, \flushright and \flushleft set
  \rightskip = 0pt or \@flushglue (as appropriate)

```

```

\leftskip = 0pt or \@flushglue (as appropriate)
\parindent = 0pt
\parfillskip = 0pt. (except \@flushleft)
\\          == \par \vskip -\parskip
\\[LENGTH] == \\ \vskip LENGTH
\\*         == \par \penalty 10000 \vskip -\parskip
\\*[LEN]    == \\* \vskip LENGTH

```

They invoke the `trivlist` environment to handle vertical spacing before and after them.

`\centering`, `\raggedright` and `\raggedleft` are the declaration analogs of the above.

`\raggedright` has a more universal effect, however. It sets `\@rightskip := flushglue`. Every environment, like the list environments, that set `\rightskip` to its 'normal' value set it to `\@rightskip`

```

\@centercr
68 \def\@centercr{\ifhmode \unskip\else \@nolnerr\fi
69      \par\@ifstar{\nobreak\@xcentercr}\@xcentercr}

\@xcentercr
70 \def\@xcentercr{\addvspace{-\parskip}\@ifnextchar
71      [\@icentercr\ignorespaces]}

\@icentercr
72 \def\@icentercr[#1]{\vskip #1\ignorespaces}

center We use \relax to prevent \item scanning too far.
73 \def\center{\trivlist \centering\item\relax}
74 \def\endcenter{\endtrivlist}

\centering
75 \def\centering{%
76   \let\\\@centercr
77   \rightskip\@flushglue\leftskip\@flushglue
78   \parindent\z@\parfillskip\z@skip}

\@rightskip
79 \newskip\@rightskip \@rightskip \z@skip

flushleft We use \relax to prevent \item scanning too far.
80 \def\flushleft{\trivlist \raggedright\item\relax}
81 \def\endflushleft{\endtrivlist}

\raggedright
82 \def\raggedright{%
83   \let\\\@centercr\@rightskip\@flushglue \rightskip\@rightskip
84   \leftskip\z@skip
85   \parindent\z@}

flushright We use \relax to prevent \item scanning too far.
86 \def\flushright{\trivlist \raggedleft\item\relax}
87 \def\endflushright{\endtrivlist}

```

`\raggedleft`

```

88 \def\raggedleft{%
89   \let\\ \@centercr
90   \rightskip\z@skip\leftskip\@flushglue
91   \parindent\z@\parfillskip\z@skip}

92 \message{verbatim,}

```

54.3 Verbatim

The verbatim environment uses the fixed-width `\ttfamily` font, turns blanks into spaces, starts a new line for each carriage return (or sequence of consecutive carriage returns), and interprets *every* character literally. I.e., all special characters `\`, `{`, `$`, etc. are `\catcode`'d to 'other'.

The command `\verb` produces in-line verbatim text, where the argument is delimited by any pair of characters. E.g., `\verb #...#` takes '...' as its argument, and sets it verbatim in `\ttfamily` font.

The *-variants of these commands are the same, except that spaces print as the T_EXbook's space character instead of as blank spaces.

`\@vobeyspaces`

```

93 {\catcode'\ =\active%
94 \gdef\@vobeyspaces{\catcode'\ \active\let \@xobeysp}}

```

`\@xobeysp`

`\@xverbatim`

```

\@sxverbatim 95 \begingroup \catcode '='0 \catcode '['= 1
96 \catcode']'=2 \catcode '{'=12 \catcode '\}=12
97 \catcode'\}=12 \gdef\@xverbatim#1\end{verbatim}[#1\end[verbatim]]
98 \gdef\@sxverbatim#1\end{verbatim*}[#1\end[verbatim*]]
99 \endgroup

```

`\@verbatim` Real start of verbatim environment We use `\relax` to prevent `\item` scanning too far.

```

100 \def\@verbatim{\trivlist \item\relax
101   \if@minipage\else\vskip\parskip\fi
102   \leftskip\@totalleftmargin\rightskip\z@skip
103   \parindent\z@\parfillskip\@flushglue\parskip\z@skip

```

Added `\@@par` to clear possible `\parshape` definition from a surrounding list (the verbatim guru says).

```

104   \@@par
105   \@tempswafalse
106   \def\par{%
107     \if@tempswa

```

A `\leavevmode` added: needed if, for example, a blank verbatim line is the first thing in a list item (wow!).

```

108     \leavevmode \null \@@par\penalty\interlinepenalty
109   \else
110     \@tempswatrue
111     \ifhmode\@@par\penalty\interlinepenalty\fi
112   \fi}%

```

To allow customization we hide the font used in a separate macro.

```

113   \let\do\@makeother \dospecials
114   \obeylines \verbatim@font \@noligs
115   \hyphenchar\font\m@ne

```

To avoid a breakpoint after the labels box, we remove the penalty put there by the list macros: another use of `\unpenalty`!

```
116 \everypar \expandafter{\the\everypar \unpenalty}%
117 }
```

`\verbatim` (RmS 93/09/19) Protected against ‘missing item’ error message triggered by empty verbatim environment.

```
118 \def\verbatim{\@verbatim \frenchspacing\@vobeyspaces \@xverbatim}
119 \def\endverbatim{\if@newlist \leavevmode\fi\endtrivlist}
```

`\verbatim@font` Macro to select the font used for verbatim typesetting. It also does other work if necessary for the font used.

```
120 \def\verbatim@font{\normalfont\ttfamily}
```

`verbatim*`

```
121 \@namedef{verbatim*}{\@verbatim\@sxverbatim}
122 \expandafter\let\csname endverbatim*\endcsname =\endverbatim
```

`\@makeother`

```
123 \def\@makeother#1{\catcode'#112\relax}
```

`\verb@balance@group`

```
124 \let\verb@balance@group\@empty
```

`\verb@egroup`

```
125 \def\verb@egroup{\global\let\verb@balance@group\@empty\egroup}
```

`\verb@eol@error`

```
126 \begingroup
127 \obeylines%
128 \gdef\verb@eol@error{\obeylines%
129 \def^^M{\verb@egroup\@latex@error{%
130 \noexpand\verb ended by end of line}\@ehc}}%
131 \endgroup
```

`\verb` Typesetting a small piece verbatim.

```
132 \def\verb{\relax\ifmmode\hbox\else\leavevmode\null\fi
133 \bgroup
134 \verb@eol@error \let\do\@makeother \dospecials
135 \verbatim@font\@noligs
136 \@ifstar\@sverb\@verb}
```

`\@sverb` Definitions of `\@sverb` and `\@verb` changed so `\verb+ foo+` does not lose leading blanks when it comes at the beginning of a line. Change made 24 May 89. Suggested by Frank Mittelbach and Rainer Schöpf.

```
137 \def\@sverb#1{%
138 \catcode'#1\active
139 \lccode'\~'#1%
140 \gdef\verb@balance@group{\verb@egroup
141 \@latex@error{\noexpand\verb illegal in command argument}\@ehc}%
142 \aftergroup\verb@balance@group
143 \lowercase{\let~\verb@egroup}}%
```

`\@verb`

```
144 \def\@verb{\@vobeyspaces \frenchspacing \@sverb}
```

`\verbatim@nolig@list`

```
145 \def\verbatim@nolig@list{\do\~\do\<\do\>\do\,\do\'~\do\~}
```



```

\do@noligs
146 \def\do@noligs#1{%
147   \catcode'#1\active
148   \begingroup
149     \lccode'\~'#1\relax
150     \lowercase{\endgroup\def~{\leavevmode\kern\z@\char'#1}}

\@noligs  To stay compatible with packages that use \@noligs we keep it.
151 \def\@noligs{\let\do\do@noligs \verbatim@nolig@list}

152 \</2kernel>

```

File z

ltmath.dtx

55 Math setup

This file contains a lot of the original plain T_EX code, as well as the L^AT_EX environments for math. It still needs sorting out.

```
1 \<*2ekernel>
2 \message{math definitions,}
```

55.1 Math commands based on plain T_EX

55.1.1 The log-like functions

```
\log The standard operators:
3 \def\log{\mathop{\operator@font log}\nolimits}
4 \def\lg{\mathop{\operator@font lg}\nolimits}
5 \def\ln{\mathop{\operator@font ln}\nolimits}
6 \def\lim{\mathop{\operator@font lim}}
7 \def\limsup{\mathop{\operator@font lim}\sup}
8 \def\liminf{\mathop{\operator@font lim}\inf}
9 \def\sin{\mathop{\operator@font sin}\nolimits}
10 \def\arcsin{\mathop{\operator@font arcsin}\nolimits}
11 \def\sinh{\mathop{\operator@font sinh}\nolimits}
12 \def\cos{\mathop{\operator@font cos}\nolimits}
13 \def\arccos{\mathop{\operator@font arccos}\nolimits}
14 \def\cosh{\mathop{\operator@font cosh}\nolimits}
15 \def\tan{\mathop{\operator@font tan}\nolimits}
16 \def\arctan{\mathop{\operator@font arctan}\nolimits}
17 \def\tanh{\mathop{\operator@font tanh}\nolimits}
18 \def\cot{\mathop{\operator@font cot}\nolimits}
19 \def\coth{\mathop{\operator@font coth}\nolimits}
20 \def\sec{\mathop{\operator@font sec}\nolimits}
21 \def\csc{\mathop{\operator@font csc}\nolimits}
22 \def\max{\mathop{\operator@font max}}
23 \def\min{\mathop{\operator@font min}}
24 \def\sup{\mathop{\operator@font sup}}
25 \def\inf{\mathop{\operator@font inf}}
26 \def\arg{\mathop{\operator@font arg}\nolimits}
27 \def\ker{\mathop{\operator@font ker}\nolimits}
28 \def\dim{\mathop{\operator@font dim}\nolimits}
29 \def\hom{\mathop{\operator@font hom}\nolimits}
30 \def\det{\mathop{\operator@font det}}
31 \def\exp{\mathop{\operator@font exp}\nolimits}
32 \def\Pr{\mathop{\operator@font Pr}}
33 \def\gcd{\mathop{\operator@font gcd}}
34 \def\deg{\mathop{\operator@font deg}\nolimits}

\bmod And some operators have to be done by hand:
35 \def\bmod{%
36   \nonscript\mskip-\medmuskip\mkern5mu%
37   \mathbin{\operator@font mod}\penalty900\mkern5mu%
38   \nonscript\mskip-\medmuskip}

\pmod
39 \def\pmod#1{%
40   \allowbreak\mkern18mu({\operator@font mod}\,,\,#1)}
```

55.1.2 Biggggg

`\big` Variants on `\big` and friends for use with delimiters:

```
41 \def\bigl{\mathopen\big}
42 \def\bigm{\mathrel\big}
43 \def\bigr{\mathclose\big}
44 \def\Bigl{\mathopen\Big}
45 \def\Bigm{\mathrel\Big}
46 \def\Bigr{\mathclose\Big}
47 \def\biggl{\mathopen\bigg}
48 \def\biggm{\mathrel\bigg}
49 \def\biggr{\mathclose\bigg}
50 \def\Biggl{\mathopen\Bigg}
51 \def\Biggm{\mathrel\Bigg}
52 \def\Biggr{\mathclose\Bigg}
```

55.1.3 The UNSORTED Rest

The other math commands are lifted from plain T_EX.

`\jot`

```
53 \newdimen\jot
54 \jot=3pt
```

`\interdisplaylinepenalty`

```
55 \newcount\interdisplaylinepenalty
56 \interdisplaylinepenalty=100
```

`\choose`

```
57 \def\choose{\atopwithdelims{}}
```

`\brack`

```
58 \def\brack{\atopwithdelims[]}
```

`\brace`

```
59 \def\brace{\atopwithdelims{\}}
```

`\mathpalette`

```
60 \def\mathpalette#1#2{%
61   \mathchoice
62     {#1\displaystyle{#2}}%
63     {#1\textstyle{#2}}%
64     {#1\scriptstyle{#2}}%
65     {#1\scriptscriptstyle{#2}}}
```

`\root`

`\rootbox` 66 `\newbox\rootbox`

`\r@@t`

```
67 \def\root#1\of{%
68   \setbox\rootbox\hbox{$\m@th\scriptscriptstyle{#1}$}%
69   \mathpalette\r@@t}
70 \def\r@@t#1#2{%
71   \setbox\z@\hbox{$\m@th#1\sqrt{#2}$}%
72   \dimen@=\ht\z@ \advance\dimen@-\dp\z@
73   \mkern5mu\raise.6\dimen@\copy\rootbox
74   \mkern-10mu\box\z@}
```

`\phantom`

`\hphantom` 75 `\newif\ifv@`

`\vphantom` 76 `\newif\ifh@`

```

77 \def\vphantom{\v@true\h@false\ph@nt}
78 \def\hphantom{\v@false\h@true\ph@nt}
79 \def\phantom{\v@true\h@true\ph@nt}
80 \def\ph@nt{%
81   \ifmmode
82     \expandafter\mathpalette\expandafter\mathph@nt
83   \else
84     \expandafter\makeph@nt
85   \fi}
86 \def\makeph@nt#1{%
87   \setbox\z@\hbox{\color@begingroup#1\color@endgroup}\finph@nt}
88 \def\mathph@nt#1#2{%
89   \setbox\z@\hbox{$\m@th#1{#2}$}\finph@nt}
90 \def\finph@nt{%
91   \setbox\zw@null
92   \ifv@ \ht\zw@\ht\z@ \dp\zw@\dp\z@\fi
93   \ifh@ \wd\zw@\wd\z@\fi \box\zw@}

\mathstrut
94 \def\mathstrut{\vphantom{}}

\smash
95 \def\smash{%
96   \relax % \relax, in case this comes first in \halign
97   \ifmmode
98     \expandafter\mathpalette\expandafter\mathsm@sh
99   \else
100    \expandafter\makesm@sh
101   \fi}
102 \def\makesm@sh#1{%
103   \setbox\z@\hbox{\color@begingroup#1\color@endgroup}\finsm@sh}
104 \def\mathsm@sh#1#2{%
105   \setbox\z@\hbox{$\m@th#1{#2}$}\finsm@sh}
106 \def\finsm@sh{\ht\z@\z@ \dp\z@\z@ \box\z@}

\buildrel
107 \def\buildrel#1\over#2{\mathrel{\mathop{\kern\z@#2}\limits^{#1}}}

\cases
108 \def\cases#1{\left\{\,\,\vcenter{\normalbaselines\m@th
109   \ialign{\hfil$##$\hfil&\quad{##}\hfil\crrcr#1\crrcr}}\right.}

\matrix
110 \def\matrix#1{\null\,\vcenter{\normalbaselines\m@th
111   \ialign{\hfil$##$\hfil&\quad\hfil$##$\hfil\crrcr
112     \mathstrut\crrcr\noalign{\kern-\baselineskip}
113     #1\crrcr\mathstrut\crrcr\noalign{\kern-\baselineskip}}}\,,}

\pmatrix
114 \def\pmatrix#1{\left(\matrix{#1}\right)}

\bordermatrix
115 \def\bordermatrix#1{\begingroup \m@th
116   \@tempdima 8.75\p@
117   \setbox\z@\vbox{%
118     \def\cr{\crrcr\noalign{\kern2\p@\global\let\cr\endline}}%
119     \ialign{$##$\hfil\kern2\p@\kern\@tempdima&\thinspace\hfil$##$\hfil
120       &\quad\hfil$##$\hfil\crrcr

```

```

121 \omit\strut\hfil\crr\noalign{\kern-\baselineskip}%
122 #1\crr\omit\strut\cr}}%
123 \setbox\tw@\vbox{\unvcopy\z@\global\setbox\@ne\lastbox}%
124 \setbox\tw@\hbox{\unhbox\@ne\unskip\global\setbox\@ne\lastbox}%
125 \setbox\tw@\hbox{\$ \kern\wd\@ne\kern-\@tempdima\left(\kern-\wd\@ne
126 \global\setbox\@ne\vbox{\box\@ne\kern2\p@}%
127 \vcenter{\kern-\ht\@ne\unvbox\z@\kern-\baselineskip}\,,\right)$}%
128 \null\;\vbox{\kern\ht\@ne\box\tw@}\endgroup}

\openup
129 \def\openup{\afterassignment\@openup\dimen@}
130 \def\@openup{\advance\lineskip\dimen@
131 \advance\baselineskip\dimen@
132 \advance\lineskiplimit\dimen@}

\displaylines
133 \newif\ifdt@p
134 \def\displ@y{\global\dt@ptrue\openup\jot\m@th
135 \everycr{\noalign{\ifdt@p \global\dt@pfalse \ifdim\prevdepth>-1000\p@
136 \vskip-\lineskiplimit \vskip\normallineskiplimit \fi
137 \else \penalty\interdisplaylinepenalty \fi}}}
138 \def\@align{\tabskip\z@skip\everycr{}} % restore inside \displ@y
139 \def\displaylines#1{\displ@y \tabskip\z@skip
140 \halign{\hb@xt@\displaywidth{\$ \@align\hfil\displaystyle##\hfil$}\crr
141 #1\crr}}

\sp
\sb 142 \let\sp=^
143 \let\sb=_

\>
\; 144 %\def\,{\mskip\thinmuskip} % already defined in ltspac
\! 145 \def\>{\mskip\medmuskip}
146 \def\;{\mskip\thickmuskip}
147 \def\!{\mskip-\thinmuskip}

\*
148 \def\*{\discretionary{\thinspace\the\textfont2\char2}{-}{-}}

\; Nickname for the medium space since \> is not available inside tabbing.
149 \let\;=\>

\active@math@prime This is the definition of the active math prime.
150 \def\active@math@prime{\bgroup\prim@s}

\prim@s
151 {\catcode'\'= \active \global\let'\active@math@prime}
152 \def\prim@s{%
153 \prim@\futurelet\@let@token\pr@m@s}
154 \def\pr@m@s{%
155 \ifx'\@let@token
156 \expandafter\pr@@@s
157 \else
158 \ifx^\@let@token
159 \expandafter\expandafter\expandafter\pr@@@t
160 \else
161 \egroup
162 \fi
163 \fi}

```

```

164 \def\pr@@s#1{\prim@s}
165 \def\pr@@t#1#2{#2\egroup}

166 {\catcode'\_=\active \gdef_{\_}} % _ in math is
167                                     % either subscript or \_

```

55.2 Math Environments

`\(` Produces \dots with checks that `\(` isn't used in math mode, and that `\)` is only used in math mode begun with `\(`.

```

168 \def\({\relax\ifmmode\@badmath\else$\fi}
169 \def\){\relax\ifmmode\ifinner$\else\@badmath\fi\else \@badmath\fi}

```

`\[` Produces \dots with checks that `\[` isn't used in math mode, and that `\]` is only used in math mode begun with `\[`.

```

170 \def\[%
171     \relax\ifmmode
172         \@badmath
173     \else
174         \ifvmode
175             \nointerlineskip
176             \makebox[.6\linewidth]{}%
177         \fi
178         $$$%$$ BRACE MATCH HACK
179     \fi
180 }

181 \def\]{%
182     \relax\ifmmode
183         \ifinner
184             \@badmath
185         \else
186             $$$%$$ BRACE MATCH HACK
187         \fi
188     \else
189         \@badmath
190     \fi
191     \ignorespaces
192 }

```

`math` Disguises for `\(...\)` and `\[...\]`.

```

displaymath 193 \let\math=\(
194 \let\endmath=\)

195 \def\displaymath{\[}
196 \def\enddisplaymath{\]\@ignoretrue}

```

`equation` Numbered equations, using the counter `\c@equation`. *Note:* The document style must define `\theequation` etc., and do the appropriate `\@addtoreset`. It should also redefine `\@eqnnum` if another format for the equation number is desired other than the standard (...), or to move the equation numbers to the flushleft. (See comment on the `\def` of `\@eqnnum`.)

```

197 \@definecounter{equation}
198 \def\equation{$$\refstepcounter{equation}}
199 \def\endequation{\eqno \hbox{\@eqnnum}$$\@ignoretrue}

```

`\@eqnnum` Produces the equation number for equation and eqnarray environments. The following definition is for flushright numbers; for flushleft numbers, see `leqno.clo`. The equation number is set in black roman type even if an eqnarray environment appears in an italic environment.

```

200 \def\@eqnnum{\normalfont \normalcolor (\theequation)}

```

```

\stackrel A disguise for plain TEX's buildrel.
201 \def\stackrel#1#2{\mathrel{\mathop{#2}\limits^{#1}}}

\frac A disguise for plain TEX's \over.
202 \def\frac#1#2{{\begingroup#1\endgroup\over#2}}

\sqrt Add an optional argument to plain's \sqrt to give the nth root of an expression
\@sqrt  $\sqrt[n]{e}$ .
203 \DeclareRobustCommand\sqrt{\@ifnextchar[\@sqrt\sqrtsign}
204 \def\@sqrt[#1]{\root #1\of}

eqnarray Here's the eqnarray environment: Default is for left-hand side of equations to be
\@eqcnt flushright. To make them flushleft, \let\@eqnrel = \hfil.
\@eqpen 205 \newcount\@eqcnt
\if@eqnsw 206 \newcount\@eqpen
\@eqnrel 207 \newif\if@eqnsw\@eqnswtrue
208 \newskip\@centering
209 \@centering = 0pt plus 1000pt

To get a proper \@currentlabel we have to redefine it for the whole display. Note
that we can't use \refstepcounter as this results in \@currentlabel getting
restored at the wrong and thus always writing the first label to the .aux file.

210 \def\eqnarray{%
211   \stepcounter{equation}%
212   \def\@currentlabel{\p@equation\theequation}%
213   \global\@eqnswtrue
214   \m@th
215   \global\@eqcnt\z@
216   \tabskip\@centering
217   \let\\\@eqnrcr
218   $$$\everycr{}\halign to\displaywidth\bgroup
219     \hskip\@centering$\displaystyle\tabskip\z@skip{##}$\@eqnrel
220     &\global\@eqcnt\@ne\hskip \tw@\arraycolsep \hfil${##}$\hfil
221     &\global\@eqcnt\tw@ \hskip \tw@ \arraycolsep
222     $\displaystyle{##}$\hfil\tabskip\@centering
223     &\global\@eqcnt\thr@@ \hb@xt@\z@\bgroup\hss##\egroup
224     \tabskip\z@skip
225   \cr
226 }

227 \def\endeqnarray{%
228   \@eqnrcr
229   \egroup
230   \global\advance\c@equation\m@ne
231   $$$\ignoretrue
232 }

233 \let\@eqnrel=\relax

\nonumber Switches off equation numbering.
234 \def\nonumber{\global\@eqnswfalse}

\@eqnrcr
\@xeqnrcr 235 \def\@eqnrcr{%
\@yeqnrcr 236   {\ifnum0='}\fi
237   \@ifstar{%
238     \global\@eqpen\@M\@yeqnrcr
239   }{%
240     \global\@eqpen\interdisplaylinepenalty \@yeqnrcr
241   }%
242 }

```

```

243 \def\@yeqncr{\@testopt\@xeqncr\z@skip}
244 \def\@xeqncr[#1]{%
245   \ifnum0='{ \fi}%
246   \@eqncr
247   \noalign{\penalty\@eqpen\vskip\jot\vskip #1\relax}%
248 }

\@eqncr
249 \def\@eqncr{\let\reserved@a\relax
250   \ifcase\@eqcnt \def\reserved@a{& & }\or \def\reserved@a{& & }%
251   \or \def\reserved@a{\&}\else
252     \let\reserved@a\empty
253     \@latex@error{Too many columns in eqnarray environment}\@ehc\fi
254   \reserved@a \if@eqnsw\@eqnnum\stepcounter{equation}\fi
255   \global\@eqnswtrue\global\@eqcnt\z@\cr}

eqnarray* Here's the eqnarray* environment:
\@seqncr 256 \let\@seqncr=\@eqncr
257 \@namedef{eqnarray*}{\def\@eqncr{\nonumber\@seqncr}\eqnarray}
258 \@namedef{endeqnarray*}{\nonumber\endeqnarray}

\lefteqn \lefteqn{FORMULA} typesets FORMULA in display math style flushleft in a box of
width zero.
259 \def\lefteqn#1{\rlap{$\displaystyle #1$}}

\ensuremath In math mode, \ensuremath{text} is equivalent to text; in LR or paragraph
mode, it is equivalent to $text$. \relax is not needed in front of the \ifmmode as
\protect will be \let to \relax. This version (due to Donald Arseneau) avoids
duplicating its argument in the 'then' and 'else' part of the \ifmath which is
necessary in nested 'tabular' like environments. See amslatex/2104.
260 \DeclareRobustCommand{\ensuremath}{%
261   \ifmmode
262     \expandafter\@firstofone
263   \else
264     \expandafter\@ensuredmath
265   \fi}

\@ensuredmath The \relax stops \ensuremath{} starting display math.
266 \long\def\@ensuredmath#1{$\relax#1$}
267 </2ekernel>

```

55.3 External options to the standard document classes

55.3.1 Left equation numbering

\@eqnnum To put the equation number on the left side of an equation we have to use a little trick. The number is shifted `\displaywidth` to the left inside a box of (approximately) zero width. This fails when the equation is too wide, the equation number than may overprint the equation itself.

```

268 <*\eqno>
269 \renewcommand\@eqnnum{\hb@xt@.01\p@{}%
270   \rlap{\normalfont\normalcolor
271     \hskip -\displaywidth(\theequation)}}
272 </\eqno>

```


55.3.2 Flush left equations

To get the displayed math environments to print the contents flush left (with an indentation) we have to redefine all of L^AT_EX 2_ε's displayed math environments.

```
\mathindent The amount of indentation of the equations is stored in a register.
273 \langle *fleqn\rangle
274 \newdimen\mathindent

The setting of \mathindent has to be deferred until the class file has been pro-
cessed, because \leftmargini is still 0pt wide at the moment fleqn.clo is read
in.
275 \AtEndOfClass{\mathindent\leftmargini}

\l Begin display math;
276 \renewcommand\l{\relax
277     \ifmmode\@badmath
278     \else
279         \begin{trivlist}%
280             \@beginparpenalty\predisplaypenalty
281             \@endparpenalty\postdisplaypenalty
282             \item[]\leavevmode
283             \hb@xt@\linewidth\bgroup $\m@th\displaystyle %$
284             \hskip\mathindent\bgroup
285             \fi}

\l end display math;
286 \renewcommand\l{\relax
287     \ifmmode
288         \egroup $\hfil% $
289         \egroup
290         \end{trivlist}%
291     \else \@badmath
292     \fi}

equation The equation environment
293 \renewenvironment{equation}%
294     {\@beginparpenalty\predisplaypenalty
295     \@endparpenalty\postdisplaypenalty
296     \refstepcounter{equation}%
297     \trivlist \item[]\leavevmode
298     \hb@xt@\linewidth\bgroup $\m@th% $
299     \displaystyle
300     \hskip\mathindent}%
301     {$\hfil % $
302     \displaywidth\linewidth\hbox{\@eqnnum}%
303     \egroup
304     \endtrivlist}

eqnarray The eqnarray environment
305 \renewenvironment{eqnarray}{%
306     \stepcounter{equation}%
307     \def\@currentlabel{\p@equation\theequation}%
308     \global\@eqnswtrue\m@th
309     \global\@eqcnt\z@
310     \tabskip\mathindent
311     \let\@=\@eqnocr
312     \setlength\abovedisplayskip{\topsep}%
313     \ifvmode
314         \addtolength\abovedisplayskip{\partopsep}%
315     \fi
```

When the documentclass uses a non-zero `\parskip` setting the `\topsep` might have a negative value to compensate for that. Therefore we add `\parskip` to `\abovedisplayskip`.

```

316 \addtolength\abovedisplayskip{\parskip}%
317 \setlength\belowdisplayskip{\abovedisplayskip}%
318 \setlength\belowdisplayshortskip{\abovedisplayskip}%
319 \setlength\abovedisplayshortskip{\abovedisplayskip}%
320 $$\everycr{}\halign to\linewidth% $$
321 \bgroup
322 \hskip\@centering
323 $\displaystyle\tabskip\z@skip{##}$\@eqnsele%
324 \global\@eqcnt\@ne \hskip \tw@\arraycolsep \hfil${##}$\hfil%
325 \global\@eqcnt\tw@ \hskip \tw@\arraycolsep
326 $\displaystyle{##}$\hfil \tabskip\@centering%
327 \global\@eqcnt\thr@@
328 \hb@xt@\z@\bgroup\hss#\egroup\tabskip\z@skip\cr}%
329 {\@eqnocr
330 \egroup
331 \global\advance\c@equation\m@ne$$% $$
332 \@ignoretrue
333 }
334 \fleqn

```

File A

ltlists.dtx

56 List, and related environments

The generic commands for creating an indented environment – `enumerate`, `itemize`, `quote`, etc – are:

```
\list{<LABEL>}{<COMMANDS>} ... \endlist
```

which can be invoked by the user as the list environment. The LABEL argument specifies item labeling. COMMANDS contains commands for changing the horizontal and vertical spacing parameters.

Each item of the environment is begun by the command `\item[ITEMLABEL]` which produces an item labeled by ITEMLABEL. If the argument is missing, then the LABEL argument of the `\list` command is used as the item label.

The label is formed by putting `\makelabel{<ITEMLABEL>}` in an hbox whose width is either its natural width or else `\labelwidth`, whichever is larger. The `\list` command defines `\makelabel` to have the default definition:

```
\makelabel{<ARG>} == BEGIN \hfil ARG END
```

which, for a label of width less than `\labelwidth`, puts the label flushright, `\labelsep` to the left of the item's text. However, `\makelabel` can be `\let` to another command by the `\list`'s COMMANDS argument.

A `\usecounter{<foo>}` command in the second argument causes the counter `foo` to be initialized to zero, and stepped by every `\item` command without an argument. (`\label` commands within the list refer to this counter.)

When you leave a list environment, returning either to an enclosing list or normal text mode, LaTeX begins a new paragraph if and only if you leave a blank line after the `\end` command. This is accomplished by the `\@endparenv` command.

Blank lines are ignored every other reasonable place—i.e.:

- Between the `\begin{list}` and the first `\item`,
- Between the `\item` and the text of that item.
- Between the end of the last item and the `\end{list}`.

For an environment like quotation, in which items are not labeled, the entire environment is a single item. It is defined by letting `\quotation == \list{}{...}\item\relax`. (Note the `\relax`, there in case the first character in the environment is a '['.) The spacing parameters provide a great deal of flexibility in designing the format, including the ability to let the indentation of the first paragraph be different from that of the subsequent ones.

The trivlist environment is equivalent to a list environment whose second argument sets the following parameter values:

`\leftmargin = 0`: causes no indentation of left margin

`\labelwidth = 0`: see below for precise effect this has.

`\itemindent = 0`: with a null label, makes first paragraph have no indentation.

Succeeding paragraphs have `\parindent` indentation. To give first paragraph same indentation, set `\itemindent = \parindent` before the `\item[]`.

Every `\item` in a trivlist environment must have an argument—in many cases, this will be the null argument (`\item[]`). The trivlist environment is mainly used for paragraphing environments, like verbatim, in which there is no margin change. It provides the same vertical spacing as the list environment, and works reasonably well when it occurs immediately after an `\item` command in an enclosing list.

56.1 List and Trivlist

The following variables are used inside a list environment:

`\@totalleftmargin` The distance that the prevailing left margin is indented from the outermost left margin,

`\linewidth` The width of the current line. Must be initialized to `\hsize`.

`\@listdepth` A count for holding current list nesting depth.

`\makelabel` A macro with a single argument, used to generate the label from the argument (given or implied) of the `\item` command. Initialized to `\@mklab` by the `\list` command. This command must produce some stretch—i.e., an `\hfil`.

`\@inlabel` A switch that is false except between the time an `\item` is encountered and the time that `TEX` actually enters horizontal mode. Should be tested by commands that can be messed up by the list environment's use of `\everypar`.

`\box\@labels` When `@inlabel = true`, it holds the labels to be put out by `\everypar`.

`@noparitem` A switch set by `\list` when `@inlabel = true`. Handles the case of a `\list` being the first thing in an item.

`@nopalist` A switch set true for a list that begins an item. No `\topsep` space is added before or after `\item`'s such a list.

`@newlist` Set true by `\list`, set false by the first text (by `\everypar`).

`@noitemarg` Set true when executing an `\item` with no explicit argument. Used to save space. To save time, make two separate `\@item` commands.

`@nbrlist` Set true by `\usecounter` command, causes list to be numbered.

`\@listctr` `\def`'ed by `\usecounter` to name of counter.

`\@noskipsec` A switch set true by a sectioning command when it is creating an in-text heading with `\everypar`.

Throughout a list environment, `\hsize` is the width of the current line, measured from the outermost left margin to the outermost right margin. Environments like tabbing should use `\linewidth` instead of `\hsize`.

Here are the parameters of a list that can be set by commands in the `\list`'s COMMANDS argument. These parameters are all TeX skips or dimensions (defined by `\newskip` or `\newdimen`), so the usual `TEX` or `LATEX` commands can be used to set them. The commands will be executed in vmode if and only if the `\list` was preceded by a `\par` (or something like an `\end{list}`), so the spacing parameters can be set according to whether the list is inside a paragraph or is its own paragraph.

56.2 Vertical Spacing (skips)

`\topsep`: Space between first item and preceding paragraph.

`\partopsep`: Extra space added to `\topsep` when environment starts a new paragraph (is called in vmode).

`\itemsep`: Space between successive items.

`\parsep`: Space between paragraphs within an item – the `\parskip` for this environment.

56.3 Penalties

`\@beginparpenalty`: put at the beginning of a list

`\@endparpenalty`: put at end of list

`\@itempenalty`: put between items.

56.4 Horizontal Spacing (dimens)

`\leftmargin`: space between left margin of enclosing environment (or of page if top level list) and left margin of this list. Must be nonnegative.

`\rightmargin`: analogous.

`\listparindent`: extra indentation at beginning of every paragraph of a list except the one started by the `\item` command. May be negative! Usually, labeled lists have `\listparindent` equal to zero.

`\itemindent`: extra indentation added right BEFORE an item label.

`\labelwidth`: nominal width of box that contains the label. If the natural width of the label \leq `\labelwidth`, then the label is flushed right inside a box of width `\labelwidth` (with an `\hfil`). Otherwise, a box of the natural width is employed, which causes an indentation of the text on that line.

`\labelsep`: space between end of label box and text of first item.

56.5 Default Values

Defaults for the list environment are set as follows. First, `\rightmargin`, `\listparindent` and `\itemindent` are set to 0pt. Then, one of the commands `\@listi`, `\@listii`, ... , `\@listvi` is called, depending upon the current level of the list. The `\@list ...` commands should be defined by the document style. A convention that the document style should follow is to set `\leftmargini` to `\leftmargini`, ..., `\leftmarginvi` for the appropriate level. Items that aren't changed may be left alone, but everything that could possibly be changed must be reset.

```
\list{LABEL}{COMMANDS} ==
BEGIN
  if \@listdepth > 5
    then LaTeX error: 'Too deeply nested'
    else \@listdepth :=G \@listdepth + 1
  fi
  \rightmargin      := 0pt
  \listparindent    := 0pt
  \itemindent       := 0pt
  \eval{@list \romannumeral\the\@listdepth} %% Set default values:
  \@itemlabel       :=L LABEL
  \makelabel        == \@mklab
  @nmbrlist         :=L false
  COMMANDS

  \@trivlist        % commands common to \list and
\trivlist

  \parskip          :=L \parsep
  \parindent        :=L \listparindent
  \linewidth        :=L \linewidth - \rightmargin - \leftmargin
  \@totalleftmargin :=L \@totalleftmargin + \leftmargin
  \parshape 1 \@totalleftmargin \linewidth
```

```

\ignorespaces                                % gobble space up to \item
END

\endlist == BEGIN \@listdepth :=G \@listdepth -1
\endtrivlist
END

\@trivlist ==
BEGIN
  if @newlist = T then \@noitemerr fi
  %% This command removed for some forgotten
reason.
  \@topsepadd :=L \@topsep
  if @noskipsec then leave vertical mode fi %% Added 11 Jun 85
  if vertical mode
  then \@topsepadd :=L \@topsepadd + \@partopsep
  else \unskip \par % remove glue from end of last line
  fi
  if @inlabel = true
  then @noparitem :=L true
  @noparlist :=L true
  else @noparlist :=L false
  \@topsep :=L \@topsepadd
  fi
  \@topsep :=L \@topsep + \parskip %% Change 4 Sep 85
  \leftskip :=L 0pt % Restore paragraphing
parameters
  \rightskip :=L \@rightskip
  \parfillskip :=L 0pt + 1fil

  NOTE: \@setpar called on every \list in case \par has been
temporarily munged before the \list command.
  \@setpar{if @newlist = false then {\@@par} fi}
  \@newlist :=G T
  \@outerparskip :=L \parskip
END

\trivlist ==
BEGIN
  \parsep := \parskip
  @nmbrlist := F
  \@trivlist
  \labelwidth := 0
  \leftmargin := 0
  \itemindent := \parindent
  \@itemlabel :=L "empty" %% added 93/12/13
  \makelabel{LABEL} == LABEL
END

\endtrivlist ==
BEGIN
  if @inlabel = T then \indent fi
  if horizontal mode then \unskip \par fi
  if @noparlist = true
  else if \lastskip > 0
  then \@tempkipa := \lastskip
  \vskip - \lastskip

```

```

\skip \@tempskipa -\@outerparskip + \parskip
fi
\@endparenv
fi
END

\@endparenv ==
BEGIN
\addpenalty{\@endparpenalty}
\addvspace{\@topsepadd}
\endgroup %% ends the \begin command's \begingroup
\par == BEGIN
\@restorepar
\everypar{}
\par
END
\everypar == BEGIN remove \lastbox \everypar{} END
\begingroup %% to match the \end commands \endgroup
END

\item == BEGIN if math mode then WARNING fi
if next char = [
then \@item
else @noitemarg := true
\item[@itemlabel]
END

\@item[LAB] ==
BEGIN
if @noperitem = true
then @noperitem := false
% NOTE: then clause hardly every taken,
% so made a macro \@donoperitem
\box\@labels :=G \hbox{\hskip -\leftmargin
\box\@labels
\hskip \leftmargin }
if @minipage = false then
\@tempskipa := \lastskip
\vskip -\lastskip
\vskip \@tempskipa + \@outerparskip - \parskip
fi
else if @inlabel = true
then \indent \par % previous item empty.
fi
if hmode then 2 \unskip's
% To remove any space at end of prev.
% paragraph that could cause a blank line.
\par
fi
if @newlist = T
then if @nobreak = T % Kludge if list follows \section
then \addvspace{\@outerparskip - \parskip}
else \addpenalty{\@beginparpenalty}
\addvspace{\@topsep}
\addvspace{-\parskip} %% added 4 Sep 85
fi
else \addpenalty{\@itempenalty}

```

```

\addvspace{\itemsep}
fi
@inlabel :=G true
fi

\everypar{ @minipage :=G F
@newlist :=G F
if @inlabel = true
then @inlabel :=G false
\hskip -\parindent
\box\@labels
\penalty 0
%% 3 Oct 85 - allow line break here
\box\@labels :=G null
fi
\everypar{} }

@nobreak :=G false
if @noitemarg = true
then @noitemarg := false
if @nmbrlist
then \refstepcounter{\@listctr}
fi
fi
\@tempboxa :=L \hbox{\makelabel{LAB}}
\box\@labels :=G \@labels \hskip \itemindent
\hskip - (\labelwidth + \labelsep)
if \wd \@tempboxa > \labelwidth
then \box\@tempboxa
else \hbox to \labelwidth
{\unhbox\@tempboxa}
fi
\hskip\labelsep

\ignorespaces %gobble space up to text
END

\makelabel{LABEL} == ERROR %% default to catch lonely \item

\usecounter{CTR} == BEGIN @nmbrlist :=L true
\@listctr == CTR
\setcounter{CTR}{0}
END

DEFINE \dimen's and \count

\topskip
\partopsep 1 \*2ekernel
\itemsep 2 \newskip\topsep
\parsep 3 \newskip\partopsep
\@topsep 4 \newskip\itemsep
\@topsepadd 5 \newskip\parsep
\outerparskip 6 \newskip\@topsep
7 \newskip\@topsepadd
8 \newskip\@outerparskip

\leftmargin
\rightmargin 9 \newdimen\leftmargin
\listparindent 10 \newdimen\rightmargin
\itemindent 11 \newdimen\listparindent
\labelwidth
\labelsep
\@totalleftmargin File A: ltlists.dtx Date: 2002/10/28 Version v1.0s

```



```

12 \newdimen\itemindent
13 \newdimen\labelwidth
14 \newdimen\labelsep
15 \newdimen\linewidth
16 \newdimen\@totalleftmargin \@totalleftmargin=\z@

\leftmargini
\leftmarginii 17 \newdimen\leftmargini
\leftmarginiii 18 \newdimen\leftmarginii
\leftmarginiv 19 \newdimen\leftmarginiii
\leftmarginv 20 \newdimen\leftmarginiv
\leftmarginvi 21 \newdimen\leftmarginv
22 \newdimen\leftmarginvi

\@listdepth
\@itempenalty 23 \newcount\@listdepth \@listdepth=0
\@beginparpenalty 24 \newcount\@itempenalty
\@endparpenalty 25 \newcount\@beginparpenalty
26 \newcount\@endparpenalty

\@labels
27 \newbox\@labels

\if@inlabel
\@inlabelfalse 28 \newif\if@inlabel \@inlabelfalse
\@inlabeltrue
\if@newlist
\@newlistfalse 29 \newif\if@newlist \@newlistfalse
\@newlisttrue
\if@noparitem
\@noparitemfalse 30 \newif\if@noparitem \@noparitemfalse
\@noparitemtrue
\if@nopalrlist
\@nopalrlistfalse 31 \newif\if@nopalrlist \@nopalrlistfalse
\@nopalrlisttrue
\if@noitemarg
\@noitemargfalse 32 \newif\if@noitemarg \@noitemargfalse
\@noitemargtrue
\if@newlist
\@newlistfalse 33 \newif\if@nmbrlist \@nmbrlistfalse
\@newlisttrue
\list
34 \def\list#1#2{%
35   \ifnum \@listdepth >5\relax
36     \@toodeep
37   \else
38     \global\advance\@listdepth\@ne
39   \fi
40   \rightmargin\z@
41   \listparindent\z@
42   \itemindent\z@
43   \csname @list\romannumeral\the\@listdepth\endcsname
44   \def\@itemlabel{#1}%
45   \let\makelabel\@mklab
46   \@nmbrlistfalse
47   #2\relax
48   \@trivlist
49   \parskip\parsep
50   \parindent\listparindent
51   \advance\linewidth -\rightmargin

```

```

52 \advance\linewidth -\leftmargin
53 \advance\@totalleftmargin \leftmargin
54 \parshape \@ne \@totalleftmargin \linewidth
55 \ignorespaces}

\par@deathcycles

56 \newcount\par@deathcycles

\@trivlist Because \par is sometimes made a no-op it is possible for a missing \item to
produce a loop that does not fill memory and so never gets trapped by TEX.
We thus need to trap this here by setting \par to count the number of times a
paragraph is called with no progress being made started.
57 \def\@trivlist{%
58 \if@noskipsec \leavevmode \fi
59 \@topsepadd \topsep
60 \ifvmode
61 \advance\@topsepadd \partopsep
62 \else
63 \unskip \par
64 \fi
65 \if@inlabel
66 \@nparitemtrue
67 \@nparlisttrue
68 \else
69 \if@newlist \@noitemerr \fi
70 \@nparlistfalse
71 \@topsep \@topsepadd
72 \fi
73 \advance\@topsep \parskip
74 \leftskip \z@skip
75 \rightskip \@rightskip
76 \parfillskip \@flushglue
77 \par@deathcycles \z@
78 \setpar{\if@newlist
79 \advance\par@deathcycles \@ne
80 \ifnum \par@deathcycles >\@m
81 \@noitemerr
82 {\@par}%
83 \fi
84 \else
85 {\@par}%
86 \fi}%
87 \global \@newlisttrue
88 \@outerparskip \parskip}

\trivlist

89 \def\trivlist{%
90 \parsep\parskip
91 \@nmbrlistfalse
92 \@trivlist
93 \labelwidth\z@
94 \leftmargin\z@
95 \itemindent\z@

We initialise \@itemlabel so that a trivlist with an \item not having an
optional argument doesn't produce an error message.
96 \let\@itemlabel\@empty
97 \def\makelabel##1{##1}}

\endlist

98 \def\endlist{%

```

```

99   \global\advance\@listdepth\m@ne
100   \endtrivlist}

```

The definition of `\trivlist` used to be in `ltspace.dtx` so that other commands could be ‘let to it’. They now use `\def`.

`\endtrivlist`

```

101 \def\endtrivlist{%
102   \if@inlabel
103     \leavevmode
104     \global \@inlabelfalse
105   \fi
106   \if@newlist
107     \@noitemerr
108     \global \@newlistfalse
109   \fi
110   \ifhmode\unskip \par

```

We also check if we are in math mode and issue an error message if so (hoping that `\@currentenv` resolves suitably). Otherwise the usual “perhaps a missing item” error will get triggered later which is confusing.

```

111   \else
112     \inmatherr{\end{\@currentenv}}}%
113   \fi
114   \if@nolist \else
115     \ifdim\lastskip >\z@
116       \@tempskipa\lastskip \vskip -\lastskip
117       \advance\@tempskipa\parskip \advance\@tempskipa -\@outerparskip
118       \vskip\@tempskipa
119     \fi
120     \@endparenv
121   \fi
122 }

```

`\@endparenv` To suppress the paragraph indentation in text immediately following a paragraph-making environment, `\everypar` is changed to remove the space, and `\par` is redefined to restore `\everypar`. Instead of redefining `\par` and `\everypar`, `\@endparenv` was changed to set the `@endpe` switch, letting `\end` redefine `\par` and `\everypar`.

This allows paragraph-making environments to work right when called by other environments. (Changed 27 Oct 86)

```

123 \def\@endparenv{%
124   \addpenalty\@endparpenalty\addvspace\@topsepadd\@endpetrue}
125 \def\@doendpe{\@endpetrue
126   \def\par{\@restorepar\everypar{}\par\@endpefalse}\everypar

```

Use `\setbox0=\lastbox` instead of `\hskip -\parindent` so that a `\noindent` becomes a no-op when used before a line immediately following a list environment(23 Oct 86).

```

127       {\setbox\z@\lastbox}\everypar{}\@endpefalse}}

```

```

\if@endpe
\@endpefalse 128 \newif\if@endpe
\@endpetrue 129 \@endpefalse

```

`\@mklab`

```

130 \def\@mklab#1{\hfil #1}

```

`\item`

```

131 \def\item{%
132   \inmatherr\item
133   \ifnextchar [\@item{\@noitemargtrue \@item[\@itemlabel]}}

```

\@donoparitem

```

134 \def\@donoparitem{%
135   \@noparitemfalse
136   \global\setbox\@labels\hbox{\hskip -\leftmargin
137                                   \unhbox\@labels
138                                   \hskip \leftmargin}%
139   \if@minipage\else
140     \@tempskipa\lastskip
141     \vskip -\lastskip
142     \advance\@tempskipa\@outerparskip
143     \advance\@tempskipa -\parskip
144     \vskip\@tempskipa
145   \fi}

```

\@item

```

146 \def\@item[#1]{%
147   \if@noparitem
148     \@donoparitem
149   \else
150     \if@inlabel
151       \indent \par
152     \fi
153     \ifhmode
154       \unskip\unskip \par
155     \fi
156     \if@newlist
157       \if@nobreak
158         \@nbitem
159       \else
160         \addpenalty\@beginparpenalty
161         \addvspace\@topsep
162         \addvspace{-\parskip}%
163       \fi
164     \else
165       \addpenalty\@itempenalty
166       \addvspace\itemsep
167     \fi
168     \global\@inlabeltrue
169   \fi
170   \everypar{%
171     \@minipagefalse
172     \global\@newlistfalse

```

This \if@inlabel check is needed in case an item starts of inside a group so that \everypar does not become empty outside that group. nobreakfalse, etc etc.

```

173   \if@inlabel
174     \global\@inlabelfalse

```

The paragraph indent is now removed by using \setbox... since this makes \noindent a no-op here, as it should be. Thus the following comment is redundant but is left here for the sake of future historians: this next command was changed from an hskip to a kern to avoid a break point after the parindent box: the skip could cause a line-break if a very long label occurs in raggedright setting.

If \noindent was used after \item want to cancel the \itemindent skip. This case can be detected as the indentation box will be void.

```

175   {\setbox\z@\lastbox
176    \ifvoid\z@
177      \kern-\itemindent
178    \fi}%
179   \box\@labels
180   \penalty\z@
181 \fi

```

This code is intended to prevent a page break after the first line of an item that comes immediately after a section title. It may be sensible to always forbid a page break after one line of an item? As with all such settings of `\clubpenalty` it is local so will have no effect if the item starts in a group.

Only resetting `\@nbreak` when it is true is now essential since now it is sometimes set locally.

```

182   \if@nbreak
183     \@nbreakfalse
184     \clubpenalty \@M
185   \else
186     \clubpenalty \@clubpenalty
187     \everypar{}%
188   \fi}%

189   \if@noitemarg
190     \@noitemargfalse
191   \if@nmbrlist

192     \refstepcounter\@listctr
193   \fi
194 \fi

```

We use `\sbox` to support colour commands.

```

195   \sbox\@tempboxa{\makelabel{#1}}%
196   \global\setbox\@labels\hbox{%
197     \unhbox\@labels
198     \hskip \itemindent
199     \hskip -\labelwidth
200     \hskip -\labelsep
201     \ifdim \wd\@tempboxa >\labelwidth
202       \box\@tempboxa

203   \else
204     \hbox to\labelwidth {\unhbox\@tempboxa}%
205   \fi
206   \hskip \labelsep}%
207   \ignorespaces}

```

`\makelabel`

```

208 \def\makelabel#1{%
209   \@latex@error{Lonely \string\item--perhaps a missing
210     list environment}\@ehc}

```

`\@nbitem`

```

211 \def\@nbitem{%
212   \@tempskipa\@outerparskip
213   \advance\@tempskipa -\parskip
214   \addvspace\@tempskipa}

```

`\usecounter`

```

215 \def\usecounter#1{\@nmbrlisttrue\def\@listctr{#1}\setcounter{#1}\z@}

```

56.6 Itemize and Enumerate

Enumeration is done with four counters: `enumi`, `enumii`, `enumiii` and `enumiv`, where `enumN` controls the numbering of the Nth level enumeration. The label is generated by the commands `\labelenumi` ... `\labelenumiv`, which should be defined by the document style. Note that `\p@enumN\theenumN` defines the output of a `\ref` command. A typical definition might be:

```

\def\theenumii{\alph{enumii}}
\def\p@enumii{\theenumi}
\def\labelenumii{(\theenumii)}

```

which will print the labels as ‘(a)’, ‘(b)’, ... and print a \ref as ‘3a’.

The item numbers are moved to the right of the label box, so they are always a distance of \labelsep from the item.

\@enumdepth holds the current enumeration nesting depth.

Itemization is controlled by four commands: \labelitemi, \labelitemii, \labelitemiii, and \labelitemiv. To cause the second-level list to be bulleted, you just define \labelitemii to be •. \@itemspacing and \@itemdepth are the analogs of \@enumspacing and \@enumdepth.

```

\enumerate ==
  BEGIN
    if \@enumdepth > 3
      then errormessage: "Too deeply nested".
    else \@enumdepth :=L \@enumdepth + 1
      \@enumctr :=L eval(enum@\romannumeral\the\@enumdepth)
      \list{\label(\@enumctr)}
        {\usecounter{\@enumctr}
          \makelabel{LABEL} == \hss \llap{LABEL}}
    fi
  END

\endenumerate == \endlist

\@enumdepth
216 \newcount\@enumdepth \@enumdepth = 0

\c@enumi
\c@enumii 217 \@definecounter{enumi}
\c@enumii 218 \@definecounter{enumii}
\c@enumiv 219 \@definecounter{enumiii}
220 \@definecounter{enumiv}

enumerate
221 \def\enumerate{%
222   \ifnum \@enumdepth >\thr@@\toodeep\else
223     \advance\@enumdepth\@ne
224     \edef\@enumctr{enum\romannumeral\the\@enumdepth}%
225     \expandafter
226     \list
227       \csname label\@enumctr\endcsname
228       {\usecounter{\@enumctr}\def\makelabel##1{\hss\llap{##1}}}%
229   \fi}
230 \let\endenumerate =\endlist

\itemize ==
  BEGIN
    if \@itemdepth > 3
      then errormessage: 'Too deeply nested'.
    else \@itemdepth :=L \@itemdepth + 1
      \@itemitem ==
eval(labelitem\romannumeral\the\@itemdepth)
      \list{\@nameuse{\@itemitem}}
        {\makelabel{LABEL} == \hss \llap{LABEL}}
    fi
  END

\enditemize == \endlist

```

```

\@itemdepth
231 \newcount\@itemdepth \@itemdepth = 0

itemize
232 \def\itemize{%
233   \ifnum \@itemdepth >\thr@@\toodeep\else
234     \advance\@itemdepth\@ne
235     \edef\@itemitem{labelitem\romannumeral\the\@itemdepth}%

236     \expandafter
237     \list
238       \csname\@itemitem\endcsname
239       {\def\makelabel##1{\hss\llap{##1}}}%
240   \fi}

241 \let\enditemize =\endlist
242 \</2kernel>

```

File B

ltboxes.dtx

57 L^AT_EX Box commands

<code>\makebox</code>	<code>\makebox[⟨wid⟩][⟨pos⟩]{⟨obj⟩}</code> Puts <code>⟨obj⟩</code> in an <code>\hbox</code> of width <code>⟨wid⟩</code> , positioned by <code>⟨pos⟩</code> . The possible <code>⟨pos⟩</code> are: s stretched, l flushleft, r flushright, c (default) centred. If <code>⟨wid⟩</code> is missing, then <code>⟨pos⟩</code> is also missing and <code>⟨obj⟩</code> is put in an <code>\hbox</code> of its natural width. <code>\makebox(⟨x⟩,⟨y⟩)[⟨pos⟩]{⟨obj⟩}</code> Puts <code>⟨obj⟩</code> in an <code>\hbox</code> of width <code>x*\unitlength</code> and height <code>y*\unitlength</code> . <code>⟨pos⟩</code> arguments are s, l, r or c (default) for stretched, flushleft, flushright or centred, and t or b for top, bottom – or combinations like tr or rb. Default for horizontal and vertical are centered. Note that in this picture mode version of <code>\makebox</code> a [b] aligns on the <i>bottom</i> of the text as documented. If you want to align on the <i>baseline</i> use <code>\makebox(,) [b]{\raisebox{0pt}{\height}[0pt]{xyz}}</code> or <code>\makebox(,) [b]{\smash{xyz}}</code>
<code>\mbox</code>	<code>\mbox{⟨obj⟩}</code> The same as <code>\makebox{⟨obj⟩}</code> , but is more efficient as no checking for optional arguments is done.
<code>\newsavebox</code>	<code>\newsavebox{⟨cmd⟩}</code> : If <code>⟨cmd⟩</code> is undefined, then defines it to be a T _E X box register.
<code>\savebox</code>	<code>\savebox{⟨cmd⟩} ...</code> : <code>⟨cmd⟩</code> is defined to be a T _E X box register, and the '...' are any <code>\makebox</code> arguments. It is like <code>\makebox</code> , except it doesn't produce text but saves the value in <code>\box ⟨cmd⟩</code> .
<code>\sbox</code>	<code>\sbox{⟨cmd⟩}{⟨obj⟩}</code> is an efficient abbreviation for <code>\savebox{⟨cmd⟩}{⟨obj⟩}</code> .
<code>lrbox</code>	<code>\begin{lrbox}{⟨cmd⟩}⟨text⟩\end{lrbox}</code> is equivalent to <code>\sbox{⟨cmd⟩}{⟨text⟩}</code> except that any white space at the beginning and end of <code>⟨text⟩</code> is ignored.
<code>\framebox</code>	<code>\framebox ...</code> : like <code>\makebox</code> , except it puts a 'frame' around the box. The frame is made of lines of thickness <code>\fboxrule</code> , separated by space <code>\fboxsep</code> from the text – except for <code>\framebox(X,Y) ...</code> , where the thickness of the lines is as for the picture environment, and there is no separation added.
<code>\fbox</code>	<code>\fbox{⟨obj⟩}</code> is an abbreviation for <code>\framebox{⟨obj⟩}</code> .
<code>\parbox</code>	<code>\parbox[⟨pos⟩][⟨height⟩][⟨inner-pos⟩]{⟨width⟩}{⟨text⟩}</code> : Makes a box with <code>\hsize ⟨width⟩</code> , positioned by <code>⟨pos⟩</code> as follows: c : <code>\vcenter</code> (placed in <code>\$. . . \$</code> if not in math mode) b : <code>\vbox</code> t : <code>\vtop</code> default value is c. Sets <code>\hsize := ⟨width⟩</code> and calls <code>\@parboxrestore</code> , which does the following: Restores the original definitions of: <code>\par</code> <code>\</code> <code>\-</code> <code>\'</code> <code>\‘</code> <code>\=</code> Resets the following parameters:


```

\parindent      = 0pt
\parskip        = 0pt
\linewidth      = \hsize
\@totalleftmargin = 0pt
\leftskip       = 0pt
\rightskip      = 0pt
\@rightskip     = 0pt
\parfillskip    = 0pt plus 1fil
\lineskip       = \normallineskip
\baselineskip   = \normalbaselineskip
Calls \sloppy
Note: \arrayparboxrestore same as \@parboxrestore but it doesn't restore \.
minipage minipage : Similar to \parbox, except it also makes this look like a page by
setting
\textwidth == \columnwidth == box width
changes footnotes by redefining:
\@mpfn == mpfootnote
\thempfn == \thempfootnote
\@footnotetext == \@mpfootnotetext
resets the following list environment parameters:
\@listdepth == \@mplistdepth
where \@mplistdepth is initialized to zero,
and executes \@minipagerestore to allow the document style to reset any
other parameters it desires. It sets @minipage true, and resets \everypar to set it
false. This switch keeps \addvspace from putting space at the top of a minipage.
Change added 24 May 89: \minipage sets @minipage globally; \endminipage
resets it false.
\rule \rule[\langle raised \rangle]{\langle width \rangle}{\langle height \rangle} : Makes a \langle width \rangle * \langle height \rangle rule, raised
\langle raised \rangle.
\underline \underline{\langle text \rangle} : Makes an underlined hbox with \langle text \rangle in it.
\raisebox \raisebox{\langle distance \rangle}[\langle height \rangle][\langle depth \rangle]{\langle box \rangle} :
Raises \langle box \rangle up by \langle distance \rangle length (down if \langle distance \rangle negative). Makes TEX
think that the new box extends \langle height \rangle above the line and \langle depth \rangle below, for a
total vertical length of \langle height \rangle + \langle depth \rangle. Default values of \langle height \rangle & \langle depth \rangle =
actual height and depth of box in new position.
1 \langle *2kernel \rangle
2 \message{boxes,}

\makebox \makebox User level command just looks for optional [ or (.
3 \def\makebox{%
4 \leavevmode
5 \@ifnextchar(%)
6 \@makepicbox
7 {\@ifnextchar[\@makebox\mbox}}

\mbox The basic horizontal box command for LATEX.
8 \long\def\mbox#1{\leavevmode\hbox{#1}}

\@makebox Look for a possible second optional argument (defaults to c).
9 \def\@makebox[#1]{%
10 \@ifnextchar [{\@makebox[#1]}{\@makebox[#1][c]}}

\@begin@tempboxa Helper macro for supporting \height, \width etc. Grab #1 into \@tempboxa and
measure it.
11 \long\def\@begin@tempboxa#1#2{%
12 \begingroup
13 \setbox\@tempboxa#1\color@begingroup#2\color@endgroup}%

```

```

14      \def\width{\wd\@tempboxa}%
15      \def\height{\ht\@tempboxa}%
16      \def\depth{\dp\@tempboxa}%
17      \let\totalheight\@ovri
18      \totalheight\height
19      \advance\totalheight\depth}

\@end@tempboxa End the group started by \@begin@tempboxa, so that the scope of \height only
                includes the ‘length’ argument to the user-command.
20 \let\@end@tempboxa\endgroup

\bm@c Set up spacing.
\bm@l 21 \def\bm@c{\hss\unhbox\@tempboxa\hss}
\bm@r 22 \def\bm@l{\unhbox\@tempboxa\hss}\let\bm@t\bm@l
\bm@s 23 \def\bm@r{\hss\unhbox\@tempboxa}\let\bm@b\bm@r
\bm@t 24 \def\bm@s{\unhbox\@tempboxa}

\bm@b Internal form of \makebox.
\@makebox 25 \long\def\@makebox[#1][#2]#3{%
26   \@begin@tempboxa\hbox{#3}%
27   \setlength\@tempdima{#1}%          support calc
28   \hb@xt@\@tempdima{\csname bm@#2\endcsname}%
29   \@end@tempboxa}

\@makepicbox Picture mode form of \makebox.
30 \def\@makepicbox(#1,#2){%
31   \@ifnextchar[{\@imakepicbox(#1,#2)}{\@imakepicbox(#1,#2)[]}}

\@imakepicbox picture mode version
32 \long\def\@imakepicbox(#1,#2)[#3]#4{%
33   \vbox to#2\unitlength
34   {\let\mb@b\vss \let\mb@l\hss\let\mb@r\hss
35    \let\mb@t\vss
36    \@tfor\reserved@a :=#3\do{%
37      \if s\reserved@a
38        \let\mb@l\relax\let\mb@r\relax
39      \else
40        \expandafter\let\csname mb@\reserved@a\endcsname\relax
41      \fi}%
42   \mb@t
43   \hb@xt@ #1\unitlength{\mb@l #4\mb@r}%
44   \mb@b

This kern ensures that a b option aligns on the bottom of the text rather than
the baseline. this is the documented behaviour in the LATEXBook. The kern is
removed in compatibility mode.
45   \kern\z@}}

\set@color This macro is initially a no-op, but the colour package will redefine it to insert a
\special.
46 \let\set@color\relax

\color@begingroup These macros are initially a no-op, but the colour package will redefine them to be
\color@endgroup \begingroup, \endgroup, \begingroup\set@color,
\color@setgroup \hbox\bgroup\color@begingroup, \color@endgroup\egroup. and (set to main
\normalcolor document colour) respectively.
\color@hbox 47 \let\color@begingroup\relax
\color@vbox 48 \let\color@endgroup\relax
\color@endbox 49 \let\color@setgroup\relax
50 \let\normalcolor\relax
51 \let\color@hbox\relax
52 \let\color@vbox\relax
53 \let\color@endbox\relax

```

`\newsavebox` Allocate a new ‘savebox’.

```
54 \def\newsavebox#1{\ifdefinable{#1}{\newbox#1}}
```

`\savebox` Save #1 in a box register.

```
55 \def\savebox#1{%
56   \@ifnextchar(%)
57     {\@savepicbox#1}{\@ifnextchar[{\@savebox#1}{\sbox#1}}}
```

`\sbox` Save #1 in a box register.

```
58 \long\def\sbox#1#2{\setbox#1\hbox{%
59   \color@setgroup#2\color@endgroup}}
```

`\@savebox` Look for second optional argument.

```
60 \def\@savebox#1[#2]{%
61   \@ifnextchar [{\@isavebox#1[#2]}{\@isavebox#1[#2][c]}}
```

`\@isavebox`

```
62 \long\def\@isavebox#1[#2][#3]#4{%
63   \sbox#1{\@makebox[#2][#3]{#4}}}
```

`\@savepicbox` Picture mode version of `\savebox`.

```
64 \def\@savepicbox#1(#2,#3){%
65   \@ifnextchar[%]
66     {\@isavepicbox#1(#2,#3)}{\@isavepicbox#1(#2,#3)[ ]}}
```

`\@isavepicbox` Picture mode version of `\savebox`.

```
67 \long\def\@isavepicbox#1(#2,#3)[#4]#5{%
68   \sbox#1{\@makepicbox(#2,#3)[#4]{#5}}}
```

`\lrbox` `lrbox`: the new environment form of `\sbox`. Use `\aftergroup` tricks to enable a *local* assignment to be made to the box, in a way that it still has an effect *outside* the `lrbox` environment.

```
69 \def\lrbox#1{%
70   \edef\reserved@a{%
71     \endgroup
72     \setbox#1\hbox{%
73       \begingroup\aftergroup}%
74     \def\noexpand\@currenvir{\@currenvir}%
75     \def\noexpand\@currencline{\on@line}}%
76   \reserved@a
77   \@endpfalse
78   \color@setgroup
79   \ignorespaces}
```

`\endlrbox` End the `lrbox` environment.

```
80 \def\endlrbox{\unskip\color@endgroup}
```

`\usebox` unchanged

```
81 \def\usebox#1{\leavevmode\copy #1\relax}
```

`\frame` The following definition of `\frame` was written by Pavel Curtis (Extra space removed 14 Jan 88) RmS 92/08/24: Replaced occurrence of `\@halfwidth` by `\@wholewidth`

```
82 \long\def\frame#1{%
83   \leavevmode
84   \hbox{%
85     \hskip-\@wholewidth
86     \vbox{%
87       \vskip-\@wholewidth
88       \hrule \@height\@wholewidth
```

```

89      \hbox{%
90      \vrule\@width\@wholewidth
91      #1%
92      \vrule\@width\@wholewidth}%
93      \hrule\@height\@wholewidth
94      \vskip-\@wholewidth}%
95      \hskip-\@wholewidth}}

\fbboxrule user level parameters,
\fbboxsep 96 \newdimen\fbboxrule
          97 \newdimen\fbboxsep

\fbbox Abbreviated framed box command.
      98 \long\def\fbbox#1{%
      99 \leavevmode
     100 \setbox\@tempboxa\hbox{%
     101 \color@begingroup
     102 \kern\fbboxsep{#1}\kern\fbboxsep
     103 \color@endgroup}%
     104 \@frameb@x\relax}

\framebox Framed version of \makebox.
     105 \def\framebox{%
     106 \ifnextchar(%)
     107 \framepicbox{\ifnextchar[\@framebox\fbbox]}

\@framebox Deal with optional arguments.
     108 \def\@framebox[#1]{%
     109 \ifnextchar[%]
     110 {\@ifframebox[#1]}%
     111 {\@ifframebox[#1][c]}}

\@ifframebox The handling the optional arguments. In order to set the whole box, including
the frame to the specified dimension, we first determine that dimension from the
natural size of the text, #3. calculated width.
     112 \long\def\@ifframebox[#1][#2]#3{%
     113 \leavevmode
     114 \@begin@tempboxa\hbox{#3}%
     115 \setlength\@tempdima{#1}%
     116 \setbox\@tempboxa\hb@xt@\@tempdima
     117 {\kern\fbboxsep\csname bm@#2\endcsname\kern\fbboxsep}%
     118 \@frameb@x{\kern-\fbboxrule}%
     119 \@end@tempboxa}

\@frameb@x Common part of \framebox and \fbbox. #1 is a negative kern in the \framebox
case so that the vertical rules do not add to the width of the box.
     120 \def\@frameb@x#1{%
     121 \@tempdima\fbboxrule
     122 \advance\@tempdima\fbboxsep
     123 \advance\@tempdima\dp\@tempboxa
     124 \hbox{%
     125 \lower\@tempdima\hbox{%
     126 \vbox{%
     127 \hrule\@height\fbboxrule
     128 \hbox{%
     129 \vrule\@width\fbboxrule
     130 #1%
     131 \vbox{%
     132 \vskip\fbboxsep
     133 \box\@tempboxa
     134 \vskip\fbboxsep}%

```

```

135         #1%
136         \vrule\@width\fbboxrule}%
137         \hrule\@height\fbboxrule}%
138         }%
139     }%
140 }

\@framepicbox Picture mode version.
141 \def\@framepicbox(#1,#2){%
142     \ifnextchar[{\@ifframepicbox(#1,#2)}{\@ifframepicbox(#1,#2) []}}

\@ifframepicbox Picture mode version.
143 \long\def\@ifframepicbox(#1,#2)[#3]#4{%
144     \frame{\@imakepicbox(#1,#2)[#3]{#4}}

\parbox The main vertical-box command for LATEX.
145 \def\parbox{%
146     \ifnextchar[%
147         \@iparbox
148         {\@iiiparbox c\relax[s]}}

\@iparbox Optional argument handling.
149 \def\@iparbox[#1]{%
150     \ifnextchar[%
151         {\@iiiparbox{#1}}%
152         {\@iiiparbox{#1}\relax[s]}}

\@iiiparbox Optional argument handling.
153 \def\@iiiparbox#1[#2]{%
154     \ifnextchar[%
155         {\@iiiparbox{#1}{#2}}%
156         {\@iiiparbox{#1}{#2}[#1]}}

\@iiiparbox The internal version of \parbox.
\@parboxto 157 \let\@parboxto\@empty
158 \long\def\@iiiparbox#1#2[#3]#4#5{%
159     \leavevmode
160     \@pboxswfalse
161     \setlength\@tempdima{#4}%
162     \@begin@tempboxa\vbox{\hsize\@tempdima\@parboxrestore#5\@par}%
163     \ifx\relax#2\else
164         \setlength\@tempdimb{#2}%
165         \edef\@parboxto{to\the\@tempdimb}%
166         \fi
167         \if#1b\vbox
168         \else\if #1t\vtop
169         \else\ifmmode\vcenter
170         \else\@pboxswtrue $\vcenter
171         \fi\fi\fi
172         \@parboxto{\let\hss\vss\let\unhbox\unvbox
173             \csname bm@#3\endcsname}%
174         \if@pboxsw \m@th$\fi
175     \@end@tempboxa}

```

`\@arrayparboxrestore` Restore various paragraph parameters.

The rationale for allowing two normally global flags to be set locally here was stated originally by Donald Arseneau and extended by Chris Rowley. It is because these flags are only set globally to true by section commands, and these should never appear within boxes or, indeed, in any group; and they are only ever set globally to false when they are definitely true.

If anyone is unhappy with this argument then both flags should be treated as in `\set@nbreak`; otherwise this command will be redundant.

```
176 \def\@arrayparboxrestore{%
177   \let\if@nbreak\iffalse
178   \let\if@noskipsec\iffalse
179   \let\par\@par
180   \let\-\@dischyph
```

Redefined accents to allow changes in font encoding

```
181   \let'\@acci\let'\@accii\let\=\@acciii
182   \parindent\z@ \parskip\z@skip
183   \everypar{}%
184   \linewidth\hsize
185   \@totalleftmargin\z@
186   \leftskip\z@skip \rightskip\z@skip \@rightskip\z@skip
187   \parfillskip\@flushglue \lineskip\normallineskip
188   \baselineskip\normalbaselineskip
189   \sloppy}
```

`\parboxrestore` Restore various paragraph parameters, and also `\`.

```
190 \def\@parboxrestore{\@arrayparboxrestore\let\\\@normalcr}
```

`\if@minipage` Switch that is true at the start of a minipage.

```
191 \def\@minipagefalse{\global\let\if@minipage\iffalse}
192 \def\@minipagetrue {\global\let\if@minipage\iftrue}
193 \@minipagefalse
```

`\minipage` Essentially an environment form of `\parbox`.

```
194 \def\minipage{%
195   \@ifnextchar[%]
196     \@iminipage
197     {\@iiiminipage c\relax[s]}}
```

`\@iminipage` Optional argument handling.

```
198 \def\@iminipage[#1]{%
199   \@ifnextchar[%]
200     {\@iiiminipage{#1}}%
201     {\@iiiminipage{#1}\relax[s]}}
```

`\@iiiminipage` Optional argument handling.

```
202 \def\@iiiminipage#1[#2]{%
203   \@ifnextchar[%]
204     {\@iiiminipage{#1}{#2}}%
205     {\@iiiminipage{#1}{#2}[#1]}}
```

`\@iiiminipage` Internal form of minipage.

```
206 \def\@iiiminipage#1#2[#3]#4{%
207   \leavevmode
208   \@pboxswfalse
209   \setlength\@tempdima{#4}%
210   \def\@mpargs{{#1}{#2}[#3]{#4}}%
211   \setbox\@tempboxa\vbox\bgroup
212     \color@begingroup
213     \hsize\@tempdima
214     \textwidth\hsize \columnwidth\hsize
215     \@parboxrestore
216     \def\@mpfn{\mpfootnote}\def\thempfn{\thempfootnote}\c@mpfootnote\z@
217     \let\@footnotetext\@mpfootnotetext
218     \let\@listdepth\@mplistdepth \@mplistdepth\z@
219     \@minipagerestore
220     \@setminipage}
```

```

\@minipagerestore Hook so that other styles can reset other commands in a minipage.
221 \let\@minipagerestore=\relax

\endminipage
222 \def\endminipage{%
223   \par
224   \unskip
225   \ifvoid\@mpfootins\else
226     \vskip\skip\@mpfootins
227     \normalcolor
228     \footnoterule
229     \unvbox\@mpfootins
230   \fi
231   \@minipagefalse %% added 24 May 89
232   \color@endgroup
233   \egroup
234   \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}

\@mplistdepth Versions of \@listdepth and \footins local to minipage.
\@mpfootins 235 \newcount\@mplistdepth
236 \newinsert\@mpfootins

\@mpfootnotetext Minipage version of \@footnotetext.
Final \strut added 27 Mar 89, on suggestion by Don Hosek
237 \long\def\@mpfootnotetext#1{%
238   \global\setbox\@mpfootins\ vbox{%
239     \unvbox\@mpfootins
240     \reset@font\footnotesize
241     \hsize\columnwidth
242     \@parboxrestore
243     \protected@edef\@currentlabel
244       {\csname p@mpfootnote\endcsname\@thefnmark}%
245     \color@begingroup
246     \@makefntext{%
247       \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
248     \color@endgroup}}

249 \newif\if@pboxsw

\@rule Draw a rule of the specified size.
250 \def\@rule{\@ifnextchar[\@rule{\@rule[\z@]}}

\@rule Internal form of \@rule.
251 \def\@rule[#1]#2#3{%
252   \leavevmode
253   \hbox{%
254     \setlength\@tempdima{#1}%
255     \setlength\@tempdimb{#2}%
256     \setlength\@tempdimc{#3}%
257     \advance\@tempdimc\@tempdima
258     \vrule\@width\@tempdimb\@height\@tempdimc\@depth-\@tempdima}}

\@@underline Saved primitive \underline.
259 \let\@@underline\underline

\underline LATEX version works outside math.
260 \def\underline#1{%
261   \relax
262   \ifmmode\@@underline{#1}%
263   \else $\@@underline{\hbox{#1}}\m@th$\relax\fi}

```

`\raisebox` Raise a box, and change its vertical dimensions.

```

264 \def\raisebox#1{%
265   \leavevmode
266   \@ifnextchar[{\@rsbox{#1}}{\@irsbox{#1}[]}]

```

`\@rsbox` Optional argument handling.

```

267 \def\@rsbox#1[#2]{%
268   \@ifnextchar[{\@iirsbox{#1}[#2]}{\@irsbox{#1}[#2]}}

```

`\@argsbox` ...

`\@irsbox` Internal version of `\raisebox` (less than two optional args).

```

269 \long\def\@irsbox#1[#2]#3{%
270   \@begin@tempboxa\hbox{#3}%
271   \setlength\@tempdima{#1}%
272   \ifx\@#2\\\else\setlength\@tempdimb{#2}\fi
273   \setbox\@tempboxa\hbox{\raise\@tempdima\box\@tempboxa}%
274   \ifx\@#2\\\else\ht\@tempboxa\@tempdimb\fi
275   \box\@tempboxa
276   \@end@tempboxa}

```

`\@iirsbox` Internal version of `\raisebox` (two optional args).

```

277 \long\def\@iirsbox#1[#2][#3]#4{%
278   \@begin@tempboxa\hbox{#4}%
279   \setlength\@tempdima{#1}%
280   \setlength\@tempdimb{#2}%
281   \setlength\dimen@{#3}%
282   \setbox\@tempboxa\hbox{\raise\@tempdima\box\@tempboxa}%
283   \ht\@tempboxa\@tempdimb
284   \dp\@tempboxa\dimen@
285   \box\@tempboxa
286   \@end@tempboxa}

```

`\@finalstrut` This macro adds a special strut the *depth* of the box given as `#1`, and height and width 0pt. It is used for ensuring that the last line of a paragraph has the correct depth in ‘p’ columns of tables and in footnotes. In vertical mode nothing is done, as adding the strut (as done in 2.09) would start a new paragraph. It would be possible to inspect `\prevdepth` to check the depth of the just-completed paragraph, but we do not do that here. Actually we do even less now, skip the vmode test as it broke tabular ‘p’ columns. .

The `\nobreak` was added (1995/10/31) to allow hyphenation of the final word of the paragraph.

```

287 \def\@finalstrut#1{%
288   \unskip\ifhmode\nobreak\fi\vrule\@width\z@\@height\z@\@depth\dp#1}

```

57.1 Some low-level constructs

The following commands are basically inherited from plain $\mathrm{T}_{\mathrm{E}}\mathrm{X}$.

`\leftline` These macros place text on a full line either centred or left or right adjusted.

```

\rightline 289 \def\@@line{\hb@xt@\hsize}
\centerline 290 \def\leftline#1{\@@line{#1\hss}}
\@@line 291 \def\rightline#1{\@@line{\hss#1}}
292 \def\centerline#1{\@@line{\hss#1\hss}}

```

`\rlap` These macros place text to the left or right of the current reference point without taking up space.

```

293 \def\rlap#1{\hb@xt@\z@{#1\hss}}
294 \def\llap#1{\hb@xt@\z@{\hss#1}}
295 \</2kernel>

```


File C

lttab.dtx

58 Tabbing, Tabular and Array Environments

This section deals with ‘Lining It Up in Columns’. First the `tabbing` environment is defined, and then in second part, `tabular` together with its variants, `tabular*` and `array`.

Note that the `tabular` defined here is essentially the original L^AT_EX 2.09 version, not the extended version described in *The L^AT_EX Companion*. Use the `array` package to obtain the extended version.

58.1 tabbing

`\dimen\@firsttab + i` = distance of tab stop `i` from left margin
0 <= `i` <= 15 (?).

`\dimen\@firsttab` is initialized to `\@totalleftmargin`, so it starts at the prevailing left margin.

`\@maxtab` = number of highest defined tab register
probably = `\@firsttab + 12`

`\@nxttabmar` = tab stop number of next line’s left margin

`\@curtabmar` = tab stop number of current line’s left margin

`\@curtab` = number of the current tab. At start of line,
it equals `\@curtabmar`

`\@hightab` = largest tab number currently defined.

`\@tabpush` = depth of `\pushtab`’s

`\box\@curline` = contents of current line, excluding left margin
skip, and excluding contents of current field

`\box\@curfield` = contents of current field

`@rjfield` = switch: T iff the last field of the line should
be right-justified at the right margin.

`\tabbingsep` = distance left by the `\’` command between the
current position and the field that is
“left-shifted”.

UTILITY MACROS

`\@stopfield` : closes the current field

`\@addfield` : adds the current field to the current line.

`\@contfield` : continues the current field

`\@startfield` : begins the next field

`\@stopline` : closes the current line and outputs it

`\@startline` : starts the next line

`\@ifatmargin` : an `\if` that is true iff the current line.
has width zero

`\@startline ==`

BEGIN

`\@curtabmar :=G \@nxttabmar`

`\@curtab :=G \@curtabmar`

`\box\@curline :=G null`

`\@startfield`

```

\strut
END

\@stopline ==
BEGIN
\unskip
\@stopfield
if @rjfield = T
then @rjfield :=G F
\@tempdima := \@totalleftmargin + \linewidth
\hb@xt@ \@tempdima{\@itemfudge
\hskip \dimen\@curtabmar
\box\@curline
\hfil
\box\@curfield}

else \@addfield
\hbox {\@itemfudge
\hskip \dimen\@curtabmar
\box\@curline}

fi
END

\@startfield ==
BEGIN
\box\@curfield :=G \hbox {
END

\@stopfield ==
BEGIN
}
END

\@contfield ==
BEGIN
\box\@curfield :=G \hbox { \unhbox\@currfield %%} brace
matching
END
\@addfield ==
BEGIN
\box\@curline :=G \unbox\@curline * \unbox\@curfield
END

\@ifatmargin ==
BEGIN
if dim of box\@curline = 0pt then
END

\tabbing ==
BEGIN
\lineskip :=L 0pt
\> == \@rtab
\< == \@ltab
\= == \@settab
\+ == \@tabplus
\> == \@tabminus
\> == \@tabrj

```

```

\’ == \@tablab
\\ == BEGIN \@stopline \@startline END
\\[DIST] == BEGIN
                \@stopline \vskip DIST \@startline\ignorespaces
END
\\* == BEGIN \@stopline \penalty 10000 \@startline END
\\*[DIST] == BEGIN \@stopline \penalty 10000 \vskip DIST
                \@startline\ignorespaces                END
\@hightab := \@nxttabmar :=G \@firsttab
\@tabpush :=G 0
\dimen\@firsttab := \@totalleftmargin
@rjfield :=G F
\trivlist \item\relax
if @minipage = F then \vskip \parskip fi
\box\@tabfbox = \rlap{\indent\the\everypar}
                % note: \the\everypar sets @inlabel :=G F
\@itemfudge == BEGIN \box\@tabfbox END
\@startline
\ignorespaces
END

\@endtabbing ==
BEGIN
\@stopline
if \@tabpush > 0 then error message: "unmatched \poptabs" fi
\endtrivlist
END

\@rtab ==
BEGIN
\@stopfield
\@addfield
if \@curtab < \@hightab
then \@curtab :=G \@curtab + 1
else error message "Undefined Tab" fi
\@tempdima := \dimen\@curtab - \dimen\@curtabmar
            - width of box \@curline
\box\@curline :=G \hbox{\unhbox\@curline + \hskip\@tempdima}
\@startfield
END

\@settab ==
BEGIN
\@stopfield
\@addfield
if \@curtab < \@maxtab
then \@curtab :=G \@curtab+1
else error message: "Too many tabs" fi
if \@curtab > \@hightab
then \@hightab :=L \@curtab fi
\dimen\@curtab :=L \dimen\@curtabmar + width of \box\@curline
\@startfield
END

\@ltab ==
BEGIN
\@ifatmargin

```

```

        then if \@curtabmar > \@firsttab
            then \@curtab :=G \@curtab - 1
                \@curtabmar :=G \@curtabmar - 1
            else error message "Too many untabs"          fi
        else error message "Left tab in middle of line"
        fi
    END

\@tabplus ==
BEGIN
    if \@nxttabmar < \@hightab
        then \@nxttabmar :=G \@nxttabmar+1
        else error message "Undefined tab"
        fi
    END

\@tabminus ==
BEGIN
    if \@nxttabmar > \@firsttab
        then \@nxttabmar :=G \@nxttabmar-1
        else error message "Too many untabs"
        fi
    END

\@tabrj ==
BEGIN \@stopfield
    \@addfield
    @rjfield :=G T
    \@startfield
END

\@tablab ==
BEGIN \@stopfield
    \box\@curline G:= \hbox{\box\@curline %% 'G' added 17 Jun 86
                                \hskip - width of \box\@curfield
                                \hskip -\tabbingsep
                                \box\@curfield
                                \hskip \tabbingsep }
    \@startfield
END

\pushtabs ==
BEGIN
    \@stopfield
    \@tabpush :=G \@tabpush + 1
    \begingroup
    \@contfield
END

\poptabs ==
BEGIN
    \@stopfield
    if \@tabpush > 0
        then \endgroup
            \@tabpush :=G \@tabpush - 1
        else error message: "Too many \poptabs"
        fi

```

```

\@contfield
END

```

\a The accents \‘, \’ , and \= that have been redefined inside a tabbing environment can be called by typing \a‘, \a’ , and \a=. The macro \a is defined in ltoutenc.dtx.

The ‘2ekernel’ code ensures that a \usepackage{autotabg} is essentially ignored if a ‘full’ format is being used that has picture mode already in the format.

```

1 <2ekernel>\expandafter\let\csname ver@autotabg.sty\endcsname\fmtversion

\@firsttab
\@maxtab 2 <*2ekernel | autoload>
3 \newdimen\@gtempa
4 \chardef\@firsttab=\the\allocationnumber
5 \newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa
6 \newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa
7 \newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa\newdimen\@gtempa
8 \newdimen\@gtempa
9 \chardef\@maxtab=\the\allocationnumber
10 \dimen\@firsttab=0pt

\@nxttabmar
\@curtabmar 11 \newcount\@nxttabmar
\@curtab 12 \newcount\@curtabmar
\@hightab 13 \newcount\@curtab
\@tabpush 14 \newcount\@hightab
15 \newcount\@tabpush

\@curline
\@curfield 16 \newbox\@curline
\@tabfbox 17 \newbox\@curfield
18 \newbox\@tabfbox

19 </2ekernel | autoload>
20 <*2ekernel | def>

\if@rjfield
21 \newif\if@rjfield

\@startline It is, in some sense, an error if the current margin tab setting is higher than
the value of \@hightab (which is a local variable). That this is allowed is a
fundamental design flaw which is not going to be corrected now.
22 \gdef\@startline{%
23 \ifnum \@nxttabmar >\@hightab
24 \@badtab
25 \global\@nxttabmar \@hightab
26 \fi
27 \global\@curtabmar \@nxttabmar
28 \global\@curtab \@curtabmar
29 \global\setbox\@curline \hbox {}%
30 \@startfield
31 \strut}

\@stopline
32 \gdef\@stopline{%
33 \unskip
34 \@stopfield
35 \if@rjfield
36 \global\@rjfieldfalse

```

```

37 \tempdima\@totalleftmargin
38 \advance\tempdima\linewidth
39 \hbext\tempdima{%
40 \itemfudge\hskip\dimen\curtabmar
41 \box\curline
42 \hfil
43 \box\curfield}%
44 \else
45 \addfield
46 \hbox{\itemfudge\hskip\dimen\curtabmar\box\curline}%
47 \fi}

\startfield
48 \gdef\startfield{%
49 \global\setbox\curfield\hbox\bgroup\color@begingroup}

\stopfield
50 \gdef\stopfield{%
51 \color@endgroup\egroup}

\contfield
52 \gdef\contfield{%
53 \global\setbox\curfield\hbox\bgroup\color@begingroup
54 \unhbox\curfield}

\addfield
55 \gdef\addfield{\global\setbox\curline\hbox{\unhbox
56 \curline\unhbox\curfield}}

\ifatmargin
57 \gdef\ifatmargin{\ifdim \wd\curline =\z@}

\tabcr
58 \gdef\tabcr{\stopline \ifstar{\penalty \M \xtabcr}\xtabcr}

\xtabcr
59 \gdef\xtabcr{\ifnextchar[\itabcr{\startline\ignorespaces}}

\itabcr
60 \gdef\itabcr[#1]{\vskip #1\startline\ignorespaces}
61 \gdef\kill{\stopfield\startline\ignorespaces}

\tabbing We use \relax to prevent \item from scanning too far.
62 \gdef\tabbing{\lineskip \z@skip\let\>\rtab\let\<\ltab\let\=@\settab
63 \let\+ \@tabplus\let\-\@tabminus\let\' \@tabrj\let\' \@tablab
64 \let\=\@tabcr
65 \@hightab\firsttab
66 \global\@nxttabmar\firsttab
67 \dimen\firsttab\totalleftmargin
68 \global\@tabpush\z@ \global\@rjfieldfalse
69 \trivlist \item\relax
70 \if@minipage\else\vskip\parskip\fi
71 \setbox\@tabfbox\hbox{%
72 \rlap{\hskip\totalleftmargin\indent\the\everypar}}%
73 \def\itemfudge{\box\@tabfbox}%
74 \startline\ignorespaces}

\endtabbing
75 \gdef\endtabbing{%
76 \stopline\ifnum\@tabpush >\z@ \badpoptabs \fi\endtrivlist}

```

```

\@rtab Omitted \global added to \@rtab 17 Jun 86

77 \gdef\@rtab{\@stopfield\@addfield\ifnum \@curtab<\@hightab
78     \global\advance\@curtab \@ne \else\@badtab\fi
79     \@tempdima\dimen\@curtab
80     \advance\@tempdima -\dimen\@curtabmar
81     \advance\@tempdima -\wd\@curline
82     \global\setbox\@curline\hbox{\unhbox\@curline\hskip\@tempdima}%
83     \@startfield\ignorespaces}

\@settab

84 \gdef\@settab{\@stopfield\@addfield
85     \ifnum \@curtab <\@maxtab
86     \ifnum\@curtab =\@hightab
87     \advance\@hightab \@ne
88     \fi
89     \global\advance\@curtab \@ne
90     \else
91     \@latex@error{Tab overflow}\@ehd
92     \fi
93     \dimen\@curtab \dimen\@curtabmar
94     \advance\dimen\@curtab \wd\@curline
95     \@startfield
96     \ignorespaces}

\@ltab

97 \gdef\@ltab{\@ifmargin\ifnum\@curtabmar >\@firsttab
98     \global\advance\@curtab \m@ne \global\advance\@curtabmar\m@ne\else
99     \@badtab\fi\else
100     \@latex@error{\string\<\space in mid line}\@ehd\fi\ignorespaces}

\@tabplus

101 \gdef\@tabplus{%
102     \ifnum\@nxttabmar<\@hightab
103     \global\advance\@nxttabmar\@ne
104     \else
105     \@badtab
106     \fi
107     \ignorespaces}

\@tabminus

108 \gdef\@tabminus{%
109     \ifnum\@nxttabmar>\@firsttab
110     \global\advance\@nxttabmar\m@ne
111     \else
112     \@badtab
113     \fi
114     \ignorespaces}

\@tabrj

115 \gdef\@tabrj{%
116     \@stopfield\@addfield\global\@rjfieldtrue\@startfield\ignorespaces}

\@tablab \setbox\@curline made \global in \@tablab. 17 Jun 86

117 \gdef\@tablab{%
118     \@stopfield
119     \global\setbox\@curline\hbox{%
120     \box\@curline
121     \hskip-\wd\@curfield \hskip-\tabbingsep
122     \box\@curfield
123     \hskip\tabbingsep}%
124     \@startfield
125     \ignorespaces}

```

`\pushtabs`

```
126 \gdef\pushtabs{%
127   \@stopfield\@addfield\global\advance\@tabpush \@ne \begingroup
128     \@contfield}
```

`\poptabs` It is, in some sense, an error if, after the endgroup, the current tab setting is higher than the new value of `\@hightab` (which is a local variable). That this is allowed is a fundamental design flaw which is not going to be corrected now.

```
129 \gdef\poptabs{\@stopfield\@addfield
130   \ifnum \@tabpush >\z@
131     \endgroup
132     \global\advance\@tabpush \m@ne
133     \ifnum \@curtab >\@hightab
134       \global \@curtab \@hightab
135       \@badtab
136     \fi
137   \else
138     \@badpoptabs
139   \fi
140   \@contfield}

141 \</2ekernel | def>
```

`\tabbingsep`

```
142 \<*2ekernel | autoload>
143 \newdimen\tabbingsep
144 \</2ekernel | autoload>
```

`\tabbing`

```
145 \<*autoload>
146 \def\tabbing{\@autoload{tabg}\tabbing}
147 \</autoload>
```

58.2 array and tabular environments

ARRAY PARAMETERS:

`\arraycolsep`
: half the width separating columns in an array environment

`\tabcolsep`
: half the width separating columns in a tabular environment

`\arrayrulewidth`
: width of rules

`\doublerulesep`
: space between adjacent rules in array or tabular

`\arraystretch`
: line spacing in array and tabular environments is done by placing a strut in every row of height and depth `\arraystretch` times the height and depth of the strut produced by an ordinary `\strut` command.

PREAMBLE:

The PREAMBLE argument of an array or tabular environment can contain the following:

`l,r,c` : indicate where entry is to be placed.
`|` : for vertical rule
`@{EXP}` : inserts the text EXP in every column.
`\arraycolsep` or `\tabcolsep` spacing is suppressed.
`*{N}{PRE}` : equivalent to writing N copies of PRE in the preamble.
PRE may contain `*{N'}{EXP'}` expressions.

p{LEN} : makes entry in parbox of width LEN.

SPECIAL ARRAY COMMANDS:

`\multicolumn{N}{FORMAT}{ITEM}` : replaces the next N column items by ITEM, formatted according to FORMAT.

FORMAT should contain at most one l,r or c.

If it contains none, then ITEM is ignored.

`\vline` : draws a vertical line the height of the current row. May appear in an array element entry.

`\hline` : draws a horizontal line between rows. Must appear either before the first entry (to appear above the first row) or right after a `\\` command. If followed by another `\hline`, then adds a `\vskip` of `\doublerulesep`.

`\cline[i-j]` : draws horizontal lines between rows covering columns i through j, inclusive. Multiple commands may follow one another to provide lines covering several disjoint columns

`\extracolsep{WIDTH}` : for use inside an @ in the preamble. Causes a WIDTH space to be added between columns for the rest of the columns. This is in addition to the ordinary intercolumn space.

```
\array ==
BEGIN
  \@acol    == \@arrayacol
  \@classz  == \@arrayclassz
  \@classiv == \@arrayclassiv
  \\        == \@arraycr
  \@halignto == NULL
  \@tabarray
END

\endarray{NAME} == BEGIN \crrc }} END
```

```
\tabular ==
BEGIN
  \@halignto == NULL
  \@tabular
END
```

```
\tabular*{WIDTH} ==
BEGIN
  \@halignto == to WIDTH
  \@tabular
END
```

```
\@tabular ==
BEGIN
  \leavevmode
  \hbox { $
    \@acol    == \@tabacol
    \@classz  == \@tabclassz
    \@classiv == \@tabclassiv
    \\        == \@tabularcr
    \@tabarray
```

```

END

\endtabular == BEGIN \crrc}} $} END

\@tabarray == if next char = [ then \@array else \@array[c] fi

\@array[POS]{PREAMBLE} ==
BEGIN
  define \@arstrutbox to make \@arstrut produce strut of height
    and depth \arraystretch times the height and
    depth of a normal strut.
  \@mkpream{PREAMBLE}
  \@preamble == \halign \@halignto {\tabskip=0pt\@arstrut
    eval{\@preamble}\tabskip = 0pt\cr %%}
  \@startpbox == \@@startpbox
  \@endpbox == \@@endpbox
  if POS = t then \vtop
    else if POS = b then \vbox
      else \vcenter
    fi
  fi
  {
    \par ==L {} % changed 92/09/18
    \@sharp == #
    \protect == \relax
    \lineskip :=L 0pt
    \baselineskip :=L 0pt
    \@preamble
  }
END

\@arraycr ==
BEGIN
  $ %% Prevents extra space at end of row's last entry.
  if next char = [
    then \@argarraycr
    else $ \cr %% Needed to balance $
  }
END

\@argarraycr[LENGTH] ==
BEGIN
  $ %% Needed to balance $ of \@arraycr
  if LENGTH > 0
    then \@tempdima := depth of \@arstrutbox + LENGTH
      \vrule height 0pt width 0pt depth \@tempdima
      \cr
    else \cr \noalign{\vskip LENGTH}
  }
END

\@tabularcr and \@argtabularcr same as \@arraycr and
\@argarraycr
except without the extra $'s.

148 (*2ekernel | autoload)

\extracolsep

149 \def\extracolsep#1{\tabskip #1\relax}

```

```

\array
150 \def\array{\let\acol\@arrayacol \let\@classz\@arrayclassz
151 \let\@classiv\@arrayclassiv
152 \let\\ \@arraycr\let\@halignto\@empty\@tabarray}

\endarray
\endtabular 153 \def\endarray{\crr\egroup\egroup}
\endtabular* 154 \def\endtabular{\crr\egroup\egroup $\egroup}
155 \expandafter \let \csname endtabular*\endcsname = \endtabular

\tabular
156 \def\tabular{\let\@halignto\@empty\@tabular}

\tabular* Note that the change to use \setlength slightly alters the timing of the expansion
and use of the length in #1 but this is very unlikely to have any practical effect.
157 \@namedef{tabular*}#1{%
158 \setlength\dimen@{#1}%
159 \edef\@halignto{to\the\dimen@}\@tabular}

\@tabular
160 \def\@tabular{\leavevmode \hbox \bgroup $\let\@acol\@tabacol
161 \let\@classz\@tabclassz
162 \let\@classiv\@tabclassiv \let\\ \@tabularcr\@tabarray}

\@tabarray RmS 91/11/04 added \m@th.
163 \def\@tabarray{\m@th\@ifnextchar[\@array{\@array[c]}}

RmS 1993/11/03 changed \halign to \ialign and removed superfluous
\tabskip assignment

\@array
164 \def\@array[#1]#2{%
165 \if #1t\top \else \if#1b\ vbox \else \vcenter \fi\fi
166 \bgroup

This next bit of code sets up the strut and then builds the halign and its preamble
according to the specification in the second argument.

This code has been moved inside the box. A side effect of this has been to
expose what was a buglet in the previous version: since the \@arstrut below is
expanded and contains an \ifmmode then it could produce an unnecessary extra
box in every row, thus wasting ‘lots of’ main memory.

167 \setbox\@arstrutbox\hbox{%
168 \vrule \@height\arraystretch\ht\strutbox
169 \@depth\arraystretch \dp\strutbox
170 \@width\z@}%
171 \@mkpream{#2}%
172 \edef\@preamble{%
173 \ialign \noexpand\@halignto
174 \bgroup \@arstrut \@preamble \tabskip\z@skip \cr}%

That is the end of setting up the preamble; now we reset things before executing
the halign built-up in \@preamble. The restorations could be done by introducing
an extra group, thus saving tokens.

175 \let\@startpbox\@startpbox \let\@endpbox\@endpbox
176 \let\tabularnewline\\
177 \let\par\@empty
178 \let\@sharp##%
179 \set@typeset@protect
180 \lineskip\z@skip\baselineskip\z@skip

```

If the parsing of the preamble goes wrong there may be some characters left which \TeX then tries to typeset, i.e., we would be in horizontal mode. That would produce an endless loop because the `\halign` expects vertical mode thus issues a `\par` but that is a no-op at this point. So we better test this case issue some error message and make a crude recovery by ending that horizontal mode with force. A better fix would be to ensure that we never pick up more than a single character token (not done).

```

181 \ifhmode \@preamerr\z@ \@@par\fi
182 \@preamble}

\@arraycr Array version of \\.
183 \def\@arraycr{%
184   ${\ifnum0=}\fi\@ifstar\@xarraycr\@arraycr}

\@arraycr
185 \def\@xarraycr{\@ifnextchar[\@argarraycr{\ifnum0='{ \fi}$\}\cr}}

\@argarraycr
186 \def\@argarraycr[#1]{%
187   \ifnum0='{ \fi}$\}\ifdim #1>\z@ \@xargarraycr{#1}\else
188     \@yargarraycr{#1}\fi}

\tabularnewline Tabular version of \\.
189 \let\tabularnewline\relax

\@tabularcr
190 \def\@tabularcr{%
191   {\ifnum0=}\fi\@ifstar\@xtabularcr\@xtabularcr}

\@xtabularcr
192 \def\@xtabularcr{\@ifnextchar[\@argtabularcr{\ifnum0='{ \fi}\cr}}

\@argtabularcr
193 \def\@argtabularcr[#1]{%
194   \ifnum0='{ \fi}%
195   \ifdim #1>\z@
196     \unskip\@xargarraycr{#1}%
197   \else
198     \@yargarraycr{#1}%
199   \fi}

\@xargarraycr
200 \def\@xargarraycr#1{\@tempdima #1\advance\@tempdima \dp \@arstrutbox
201   \vrule \@height\z@ \@depth\@tempdima \@width\z@ \cr}

\@yargarraycr
202 \def\@yargarraycr#1{\cr\noalign{\vskip #1}}

\multicolumn \multicolumn{NUMBER}{FORMAT}{ITEM} ==
BEGIN
\multispan{NUMBER}
\begingroup
\@addamp == null
\@mkpream{FORMAT}
\@sharp == ITEM
\protect == \relax
\@startpbox == \@@startpbox
\@endpbox == \@@endpbox
\@arstrut

```

```

\@preamble
\endgroup
END

```

The command `\def\@addamp{}` was removed from `\multicolumn` on 6 Dec 86 because it caused embedded array environments not to work. I think that it was included originally to prevent an error message if the 2nd argument to the `\multicolumn` command had two column specifiers.

8 Feb 89 — `\hbox{}` added after `\@preamble` to correct bug that occurred if `\multicolumn` preceded `\\[D]` with $D > 0$, caused by `\\[]` command doing an `\unskip`, which removed `\tabcolsep` glue inserted by `\multicolumn`.

This has been made long so that, for example, a p-column can contain multiple paragraphs; maybe the arguments of @-expressions should also be able to contain multiple paragraphs.

```

203 \long\def\multicolumn#1#2#3{\multispan{#1}\begingroup
204   \mkpream{#2}%
205   \def\@sharp{#3}\set@typeset@protect
206   \let\@startpbox\@startpbox\let\@endpbox\@endpbox
207   \@arstrut \@preamble\hbox{}\endgroup\ignorespaces}

```

Codes for classes and character numbers of array, tabular and multicolumn arguments.

Character	Class	Number
c	0	0
l	0	1
r	0	2
l	1	-
@	2	-
p	3	-
{@-exp}	4	-
{p-arg}	5	-

`\@testpach \foo` : expands `\foo`, which should be an array parameter token, and sets `\@chclass` and `\@chnum` to its class and number. Uses `\@lastchclass` to distinguish 4 and 5

Preamble error codes

```

0: 'illegal character'
1: 'Missing @-exp'
2: 'Missing p-arg'

```

```

\@addamp ==
  BEGIN if \@firstamp = true then \@firstamp := false
        else &                                fi
  END

```

```

\@mkpream TOKENLIST ==
  BEGIN
    \@firstamp      := T
    \@lastchclass   := 6
    \@preamble      == null
    \@sharp         == \relax
    \@protect       == BEGIN \noexpand\protect\noexpand END
    \@startpbox     == \relax
    \@endpbox       == \relax
    \@expast{TOKENLIST}
  END

```

```

for \@nextchar := expand(\reserved@a)
do  \@testpach{\@nextchar}
    case of \@chclass
        0 -> \@classz
        1 -> \@classi
        ...
        5 -> \@classv
    end case
    \@lastchclass := \@chclass
od
case of \@lastchclass
    0 -> \hskip \arraycolsep                % lrc
    1 ->                                     % l
    2 -> \@preamerr1 % 'Missing @-exp'      % @
    3 -> \@preamerr2 % 'Missing p-arg'      % p
    4 ->                                     % @-exp
    5 -> \hskip \arraycolsep                % p-exp
end case
END

\@arrayclassz ==
BEGIN
    \@preamble := \@preamble *
    case of \@lastchclass
        0 -> \hskip \arraycolsep \@addamp \hskip
\arraycolsep
        1 -> \@addamp \hskip \arraycolsep
        2 -> % impossible
        3 -> % impossible
        4 -> \@addamp
        5 -> \hskip \arraycolsep \@addamp \hskip
\arraycolsep
        6 -> \@addamp \hskip \arraycolsep
    end case
    * case of \@chnum
        0 -> \hfil$\relax\@sharp$\hfil
        1 -> $\relax\@sharp$\hfil
        2 -> \hfil$\relax\@sharp$
    end case
END

\@tabclassz == similar to \@arrayclassz

\@classi ==
BEGIN
    \@preamble := \@preamble *
    case of \@lastchclass
        0 -> \hskip \arraycolsep \@arrayrule
        1 -> \hskip \doublerulesep \@arrayrule
        2 -> % impossible
        3 -> % impossible
        4 -> \@arrayrule
        5 -> \hskip \arraycolsep \@arrayrule
        6 -> \@arrayrule
    end case
END

```

```

\@classii ==
BEGIN
  \@preamble := \@preamble *
    case of \@lastchclass
      0    ->
      1    -> \hskip .5\arrayrulewidth
      2    -> % impossible
      else ->
    end case
END

\@classiii ==
BEGIN
  \@preamble := \@preamble *
    case of \@lastchclass
      0 -> \hskip \arraycolsep \@addamp \hskip
\arraycolsep
      1 -> \@addamp \hskip \arraycolsep
      2 -> % impossible
      3 -> % impossible
      4 -> \@addamp
      5 -> \hskip \arraycolsep \@addamp \hskip
\arraycolsep
      6 -> \@addamp \hskip \arraycolsep
    end case
END

\@arrayclassiv ==
  BEGIN \@preamble := \@preamble * $ \@nextchar$ END

\@tabclassiv == same as \@arrayclassv except without the $ ... $

\@classv ==
  BEGIN
    \@preamble :=
      \@preamble * \@startpbox{\@nextchar}\ignorespaces\@sharp
      \@endpbox
  END

\@expast{S}:
  Sets \reserved@a := S with all instances of *{N}{STRING}
  replaced by N copies of STRING, where N > 0. An *
  appearing inside braces is ignored, but *-expressions
  inside STRING are expanded, so nested *-expressions are
  handled properly.

\@expast{S} == BEGIN \@expast S *0x\@@ END

\@expast S1 *{N}{S2} S3 \@@ ==
  BEGIN
    \reserved@a := S1
    \@tempcnta := N
    if \@tempcnta > 0
      then while \@tempcnta > 0 do \reserved@a := \reserved@a S2
        \@tempcnta := \@tempcnta - 1 od
        \reserved@b == \@expast
      else \reserved@b == \exnoop
    end if
  END

```

```

        fi
        \expandafter \reserved@b \reserved@a S3 \@@
    END

\@exnoop
    208 \def\@exnoop #1\@@{}

\@expast
    209 \def\@expast#1{\@expast #1*0x\@@}

\@expast
    210 \def\@expast#1*#2#3#4\@@{%
    211   \edef\reserved@a{#1}%
    212   \@tempcnta#2\relax
    213   \ifnum\@tempcnta>\z@
    214     \@whilenum\@tempcnta>\z@\do
    215       {\edef\reserved@a{\reserved@a#3}\advance\@tempcnta \m@ne}%
    216     \let\reserved@b\@expast
    217   \else
    218     \let\reserved@b\@exnoop
    219   \fi
    220   \expandafter\reserved@b\reserved@a #4\@@}

\if@firstamp
  \@addamp 221 \newif\if@firstamp
    222 \def\@addamp{%
    223   \if@firstamp
    224     \@firstampfalse
    225   \else
    226     \edef\@preamble{\@preamble &}%
    227   \fi}

\@arrayacol
  \@tabacol 228 \def\@arrayacol{\edef\@preamble{\@preamble \hskip \arraycolsep}}
  \@ampacol 229 \def\@tabacol{\edef\@preamble{\@preamble \hskip \tabcolsep}}
\@acolampacol 230 \def\@ampacol{\@addamp \@acol}
    231 \def\@acolampacol{\@acol\@addamp\@acol}

\@mkpream
    232 \def\@mkpream#1{\@firstamptrue\@lastchclass6
    233   \let\@preamble\@empty
    234   \let\protect\@unexpandable@protect
    235   \let\@sharp\relax
    236   \let\@startpbox\relax\let\@endpbox\relax
    237   \@expast{#1}%
    238   \expandafter\@tfor \expandafter
    239     \@nextchar \expandafter:\expandafter=\reserved@a\do
    240     {\@testpach\@nextchar
    241       \ifcase \@chclass \@classz \or \@classi \or \@classii \or \@classiii
    242         \or \@classiv \or \@classv \fi\@lastchclass\@chclass}%
    243   \ifcase \@lastchclass \@acol
    244     \or \or \@preamerr \@ne\or \@preamerr \tw@\or \or \@acol \fi}

\@arrayclassz
    245 \def\@arrayclassz{\ifcase \@lastchclass \@acolampacol \or
    246   \or \or \@addamp \or
    247   \@acolampacol \or \@firstampfalse \@acol \fi
    248 \edef\@preamble{\@preamble
    249   \ifcase \@chnum
    250     \hfil$\relax\@sharp$\hfil \or $\relax\@sharp$\hfil
    251     \or \hfil$\relax\@sharp$\fi}}

```


\@tabclassz RmS 91/08/14 inserted extra braces around entry for NFSS

```
252 \def\@tabclassz{%
253   \ifcase\@lastchclass
254     \@acolampacol
255   \or
256     \@ampacol
257   \or
258   \or
259   \or
260     \@addamp
261   \or
262     \@acolampacol
263   \or
264     \@firstampfalse\@acol
265   \fi
266 \edef\@preamble{%
267   \@preamble{%
268     \ifcase\@chnum
269       \hfil\ignorespaces\@sharp\unskip\hfil
270     \or
271       \hskip1sp\ignorespaces\@sharp\unskip\hfil
272     \or
273       \hfil\hskip1sp\ignorespaces\@sharp\unskip
274     \fi}}}
```

\@classi

```
275 \def\@classi{%
276   \ifcase\@lastchclass
277     \@acol\@arrayrule
278   \or
279     \@addtopreamble{\hskip \doublerulesep}\@arrayrule
280   \or
281   \or
282   \or
283     \@arrayrule
284   \or
285     \@acol\@arrayrule
286   \or
287     \@arrayrule
288   \fi}
```

\@classii

```
289 \def\@classii{%
290   \ifcase\@lastchclass
291   \or
292     \@addtopreamble{\hskip .5\arrayrulewidth}%
293   \fi}
```

\@classiii

```
294 \def\@classiii{\ifcase \@lastchclass \@acolampacol \or
295   \@addamp\@acol \or
296   \or \or \@addamp \or
297   \@acolampacol \or \@ampacol \fi}
```

\@tabclassiv

```
298 \def\@tabclassiv{\@addtopreamble\@nextchar}
```

\@arrayclassiv

```
299 \def\@arrayclassiv{\@addtopreamble{$\@nextchar$}}
```

```

\@classv
300 \def\@classv{\@addtopreamble{\@startpbox{\@nextchar}\ignorespaces
301 \@sharp\@endpbox}}

\@addtopreamble
302 \def\@addtopreamble#1{\edef\@preamble{\@preamble #1}}

\@chclass
\@lastchclass 303 \newcount\@chclass
\@chnum 304 \newcount\@lastchclass
305 \newcount\@chnum

\arraycolsep
\tabcolsep 306 \newdimen\arraycolsep
\arrayrulewidth 307 \newdimen\tabcolsep
\doublerulesep 308 \newdimen\arrayrulewidth
309 \newdimen\doublerulesep

\arraystretch
310 \def\arraystretch{1} % Default value.

\@arstrutbox
\@arstrut 311 \newbox\@arstrutbox
312 \def\@arstrut{%
313 \relax\ifmmode\copy\@arstrutbox\else\unhcopy\@arstrutbox\fi}

\@arrayrule
314 \def\@arrayrule{\@addtopreamble{\hskip -.5\arrayrulewidth
315 \vrule \@width \arrayrulewidth\hskip -.5\arrayrulewidth}}

\@testpatch
316 \def\@testpach#1{\@chclass \ifnum \@lastchclass=\tw@ 4 \else
317 \ifnum \@lastchclass=3 5 \else
318 \z@ \if #1c\@chnum \z@ \else
319 \if #1l\@chnum \@ne \else
320 \if #1r\@chnum \tw@ \else
321 \@chclass \if #1|\@ne \else
322 \if #1@\tw@ \else
323 \if #1p3 \else \z@ \@preamerr 0\fi
324 \fi \fi \fi \fi \fi \fi
325 \fi}

\hline
326 \def\hline{%
327 \noalign{\ifnum0='}\fi\hrule \@height \arrayrulewidth \futurelet
328 \reserved@a\@xhline}

\@xhline
329 \def\@xhline{\ifx\reserved@a\hline
330 \vskip\doublerulesep
Measure from the middle of the rules.
331 \vskip-\arrayrulewidth
332 \fi
333 \ifnum0='{ \fi}}

\vline
334 \def\vline{\vrule \@width \arrayrulewidth}

```

`\cline` The old L^AT_EX 2.09 implementation of `\cline` used up quite a lot of memory and two precious count registers. This new (1995/09/14) implementation does not use any count registers. It is coded in a way that depends heavily on the definition of `\multispan` so that command has been moved here from the file `ltpmain.dtx`.

These counters are no longer declared.

```

\newcount\@cla
\newcount\@clb

335 \def\cline#1{\@cline#1\@nil}

336 \def\@cline#1-#2\@nil{%
337   \omit

Use the counter from \multispan.
338   \@multicnt#1%
339   \advance\@multispan\m@ne
340   \ifnum\@multicnt=\@ne\@firstofone{&\omit}\fi
341   \@multicnt#2%
342   \advance\@multicnt-#1%
343   \advance\@multispan\@ne

The original had \unskip at this point, but how could a skip get here ???
344   \leaders\hrule\@height\arrayrulewidth\hfill
345   \cr

This is back spacing is fairly horrible, but it is what happened in the old version...
An alternative would be to make \cline look ahead for a following \cline as does
\hline. This would alter the spacing in existing documents so keep the old version
in the kernel. Perhaps a package should do this differently.
346   \noalign{\vskip-\arrayrulewidth}}

\mscount The \mscount counter is no longer declared, saving a csname and a register. It is
declared in compatibility mode.

\multispan Modify \multispan slightly from its plain TEX definition to allow more efficient
\@multispan code sharing with \multicolumn. Also share a count register with \multipt.
\sp@n 347 \def\multispan{\omit\@multispan}

348 \def\@multispan#1{%
349   \@multicnt#1\relax
350   \loop\ifnum\@multicnt>\@ne \sp@n\repeat}
351 \def\sp@n{\span\omit\advance\@multicnt\m@ne}

\@startpbox Helper macros for ‘p’ columns.
\@endpbox   \@startpbox{\width} text \egroup is essentially \parbox{\width}{\text}
\@endpbox   \@endpbox is essentially \unskip \strut \par \egroup\hfil (Changed 14
Jan 89) (changed again 1994/05/13)

352 \def\@startpbox#1{\vtop\bgroup \setlength\hsize{#1}\@arrayparboxrestore}
353 \def\@endpbox{\@finalstrut\@arstrutbox\par\egroup\hfil}

14 Jan 89: Def of \@endpbox changed from
\def\@endpbox{\par\vskip\dp\@arstrutbox\egroup\hfil}
so vertical spacing works out right if the last line of a ‘p’ entry has a descender.

\@@startpbox
\@@endpbox 354 \let\@@startpbox=\@startpbox
355 \let\@@endpbox=\@endpbox

356 \</2ekernel | autoload)

```

File D

ltpictur.dtx

59 Picture Mode

Picture mode commands. In addition to the commands available in L^AT_EX2.09, This section adds the new `\qbezier` command for drawing curves.

`\qbezier` `\qbezier[$\langle N \rangle$]($\langle AX,AY \rangle$)($\langle BX,BY \rangle$)($\langle CX,CY \rangle$)` plots a quadratic Bezier curve from ($\langle AX,AY \rangle$) to ($\langle CX,CY \rangle$), with ($\langle BX,BY \rangle$) as the third Bezier point, using $N + 1$ points equally spaced parametrically. If $N = 0$ (the default value), then a sufficient number of points are used to draw a connected curve—except that at most `\qbeziermax` + 1 points are drawn. A “point” is a square of side `\@wholewidth`.

`\bezier` In addition, to be compatible with the old `bezier` package, a variant of this command, `\bezier`, is defined, in which the first argument is not optional.

`\unitlength` = value of dimension argument
`\@wholewidth` = current line width
`\@halfwidth` = half of current line width
`\@linefnt` = font for drawing lines
`\@circlefnt` = font for drawing circles

`\linethickness{DIM}` : Sets the width of horizontal and vertical lines in a picture to DIM. Does not change width of slanted lines or circles. Width of all lines reset by `\thinlines` and `\thicklines`

```
\picture(XSIZE,YSIZE)(XORG,YORG)
BEGIN
  \@picht :=L YSIZE * \unitlength
  box \@picbox :=
    \hb@xt@ XSIZE * \unitlength
    {\hskip -XORG * \unitlength
     \lower YORG * \unitlength
     \hbox{
       \ignorespaces      %% added 13 June 89
     }
  }
END
```

```
\endpicture ==
BEGIN
  } \hss }
  height of \@picbox := \@picht
  depth of \@picbox := 0
  \mbox{\box\@picbox}    %% change 26 Aug 91
END
```

```
\put(X, Y){OBJ} ==
BEGIN
  \@killglue
  \raise Y * \unitlength \hb@xt@ 0pt { \hskip X * \unitlength
                                         OBJ \hss
  }
  \ignorespaces
END
```

```
\multiput(X,Y)(DELX,DELY){N}{OBJ} ==
```

```

BEGIN
  \@killglue
  \@multicnt := N
  \@xdim := X * \unitlength
  \@ydim := Y * \unitlength
  while \@multicnt > 0
    do \raise \@ydim \hb@xt@ 0pt { \hskip \@xdim
                                   OBJ \hss   }
      \@multicnt := \@multicnt - 1
      \@xdim := \@xdim + DELX * \unitlength
      \@ydim := \@ydim + DELY * \unitlength
    od
  \ignorespaces
END

```

`\shortstack[POS]{TEXT}` : Makes a `\vbox` containing TEXT stacked as a one-column array, positioned l, r or c as indicated by POS.

The ‘2ekernel’ code ensures that a `\usepackage{autopict}` is essentially ignored if a ‘full’ format is being used that has picture mode already in the format.

```
1 (2ekernel)\expandafter\let\csname ver@autopict.sty\endcsname\fmtversion
```

```

\@wholewidth
\@halfwidth 2 (*2ekernel | autoloading)
              3 \newdimen\@wholewidth
              4 \newdimen\@halfwidth

\unitlength
              5 \newdimen\unitlength \unitlength =1pt

\@picbox
\@picht 6 \newbox\@picbox
          7 \newdimen\@picht
          8 (/2ekernel | autoloading)

\picture #1 should be white space.

\pictur@ #1 should be a ( (eating any white space before the bracket),
          9 (*2ekernel | def)
          10 \long\gdef\picture#1{\pictur@#1}
          11 \gdef\pictur@(#1){%
          12   \@ifnextchar({\@picture(#1)}{\@picture(#1)(0,0)})
          13 (/2ekernel | def)
          14 (*autoloading)
          15 \def\pictur@{\@autoloading{pict}}
          16 \def\picture{\pictur@\picture}
          17 (/autoloading)

\@picture
          18 (*2ekernel | def)
          19 \gdef\@picture(#1,#2)(#3,#4){%
          20   \@picht#2\unitlength
          21   \setbox\@picbox\hb@xt@#1\unitlength\bgroup
          22     \hskip -#3\unitlength
          23     \lower #4\unitlength\hbox\bgroup
          24     \ignorespaces}

```

`\endpicture`

```
25 \gdef\endpicture{%
26   \egroup\hss\egroup
27   \ht\@picbox\@picht\dp\@picbox\z@
28   \mbox{\box\@picbox}}
```

In the definitions of `\put` and `\multiput`, `\hskip` was replaced by `\kern` just in case arg #3 = “plus”. (Bug detected by Don Knuth. changed 20 Jul 87).

```
29 \long\gdef\put(#1,#2)#3{%
30   \@killglue\raise#2\unitlength
31   \hb@xt@\z@{\kern#1\unitlength #3\hss}%
32   \ignorespaces}
```

`\multiput` #3 had better be a (.

```
33 \gdef\multiput(#1,#2)#3{%
34   \@xdim #1\unitlength
35   \@ydim #2\unitlength
36   \@multiput{}
```

`\multiput`

```
37 \long\gdef\@multiput(#1,#2)#3#4{%
38   \@killglue\@multicnt #3\relax
39   \@whilenum \@multicnt >\z@\do
40     {\raise\@ydim\hb@xt@\z@{\kern\@xdim #4\hss}%
41      \advance\@multicnt@mOne
42      \advance\@xdim#1\unitlength\advance\@ydim#2\unitlength}%
43   \ignorespaces}
```

`\@killglue`

```
44 \gdef\@killglue{\unskip\@whiledim \lastskip >\z@\do{\unskip}}
45 \</2ekernel | def>
```

`\thinlines`

`\thicklines`

```
46 \<*2ekernel | def>
47 \gdef\thinlines{\let\@linefnt\tenln \let\@circlefnt\tencirc
48   \@wholewidth\fontdimen8\tenln \@halfwidth .5\@wholewidth}
49 \gdef\thicklines{\let\@linefnt\tenlnw \let\@circlefnt\tencircw
50   \@wholewidth\fontdimen8\tenlnw \@halfwidth .5\@wholewidth}
51 \</2ekernel | def>
52 \<*autoload>
53 \def\thinlines{\pictur@\thinlines}
54 \def\thicklines{\pictur@\thicklines}
55 \</autoload>
```

`\linethickness`

```
56 \<*2ekernel | def>
57 \gdef\linethickness#1{\@wholewidth #1\relax \@halfwidth .5\@wholewidth}
58 \</2ekernel | def>
59 \<*autoload>
60 \def\linethickness{\pictur@\linethickness}
61 \</autoload>
```

`\ishortstack`

```
62 \<*2ekernel | def>
63 \gdef\shortstack{\@ifnextchar[\@shortstack{\@shortstack[c]}}
```

`\@ishortstack`

```
64 \gdef\@shortstack[#1]{%
65   \leavevmode
66   \vbox\bgroup
```

```

67 \baselineskip-\p\lineskip 3\p@
68 \let\mb@l\hss\let\mb@r\hss
69 \expandafter\let\csname mb@#1\endcsname\relax
70 \let\\@stackcr
71 \@ishortstack}

```

\@ishortstack

```

72 \gdef\@ishortstack#1{\ialign{\mb@l {##}\unskip\mb@r\cr #1\cr}\egroup}

```

\@stackcr

\@ixstackcr

```

73 \gdef\@stackcr{\@ifstar\@ixstackcr\@ixstackcr}
74 \gdef\@ixstackcr{\@ifnextchar[\@istackcr{\cr\ignorespaces}}

```

\@istackcr

```

75 \gdef\@istackcr[#1]{\cr\noalign{\vskip #1}\ignorespaces}

\line(X,Y){LEN} ==
BEGIN
  \@xarg := X
  \@yarg := Y
  \@linelen := LEN * \unitlength
  if \@xarg = 0
    then \@vline
    else if \@yarg = 0
      then \@hline
      else \@sline
    if
  if
END

\@sline ==
BEGIN
  if \@xarg < 0
    then @negarg := T
      \@xarg := -\@xarg
      \@yyarg := -\@yarg
    else @negarg := F
      \@yyarg := \@yarg
  fi
  \@tempcnta := |\@yyarg|
  if \@tempcnta > 6
    then error: 'LATEX ERROR: Illegal \line or \vector argument.'
      \@tempcnta := 0
  fi
  \box\@linechar := \hbox{\@linefnt \@getlinechar(\@xarg,\@yyarg)}
}

  if \@yarg > 0 then \@upordown = \raise
    \@clnht := 0
  else \@upordown = \lower
    \@clnht := height of \box\@linechar
  fi
  \@clnwd := width of \box\@linechar
  if @negarg
    then \hskip - width of \box\@linechar
      \reserved@a == \hskip - 2* width of box \@linechar
    else \reserved@a == \relax
  fi

```

```

%% Put out integral number of line segments
while \@clnwd < \@linelen
  do \@upordown \@clnht \copy\@linechar
    \reserved@a
    \@clnht := \@clnht + ht of \box\@linechar
    \@clnwd := \@clnwd + width of \box\@linechar
  od

%% Put out last segment
\@clnht := \@clnht - height of \box\@linechar
\@clnwd := \@clnwd - width of \box\@linechar
\@tempdima := \@linelen - \@clnwd
\@tempdimb := \@tempdima - width of \box\@linechar
if @negarg then \hskip -\@tempdimb
  else \hskip \@tempdimb
fi
\@tempdima := 1000 * \@tempdima
\@tempcnta := \@tempdima / width of \box\@linechar
\@tempdima := (\@tempcnta * ht of \box\@linechar)/1000
\@clnht := \@clnht + \@tempdima
if \@linelen < width of \box\@linechar
  then \hskip width of \box\@linechar
  else \hbox{\@upordown \@clnht \copy\@linechar}
fi
END

\@hline ==
BEGIN
  if \@xarg < 0 then \hskip -\@linelen \fi
  \vrule height \@halfwidth depth \@halfwidth width \@linelen
  if \@xarg < 0 then \hskip -\@linelen \fi
END

\@vline == if \@yarg < 0 \@downline else \@upline fi

\@getlinechar(X,Y) ==
BEGIN
  \@tempcnta := 8*X - 9
  if Y > 0
    then \@tempcnta := \@tempcnta + Y
    else \@tempcnta := \@tempcnta - Y + 64
  fi
  \char\@tempcnta
END

\vector(X,Y){LEN} ==
BEGIN
  \@xarg := X
  \@yarg := Y
  \@linelen := LEN * \unitlength
  if \@xarg = 0
    then \@vvector
  else if \@yarg = 0
    then \@hvector
  else \@svector
  fi

```



```

if
END

\@hvector ==
BEGIN
  \@hline
  {\@linefmt if \@xarg < 0 then \@getlarrow(1,0)
                                else \@getrarrow(1,0)
                                fi}
END

\@vvector == if \@yarg < 0 \@downvector else \@upvector fi

\@svector ==
BEGIN
  \@sline
  \@tempcnta := |\@yarg|
  if \@tempcnta < 5
    then \hskip - width of \box\@linechar
         \@upordown \@clnht \hbox
         {\@linefmt
          if @negarg then \@getlarrow(\@xarg,\@yyarg)
                      else \@getrarrow(\@xarg,\@yyarg)
          fi }
    else error: 'LATEX ERROR: Illegal \line or \vector argument.'
  fi
END

\@getlarrow(X,Y) ==
BEGIN
  if Y = 0
    then \@tempcnta := '33
  else \@tempcnta := 16 * X - 9
       \@tempcntb := 2 * Y
       if \@tempcntb > 0
         then \@tempcnta := \@tempcnta + \@tempcntb
         else \@tempcnta := \@tempcnta - \@tempcntb + 64
       fi
  fi
  \char\@tempcnta
END

\@getrarrow(X,Y) ==
BEGIN
  \@tempcntb := |Y|
  case of \@tempcntb
    0 : \@tempcnta := '55
    1 : if X < 3
        then \@tempcnta := 24*X - 6
        else if X = 3
            then \@tempcnta := 49
            else \@tempcnta := 58 fi
        fi
    2 : if X < 3
        then \@tempcnta := 24*X - 3
        else \@tempcnta := 51      % X must = 3
        fi

```

```

3 : \@tempcnta := 16*X - 2
4 : \@tempcnta := 16*X + 7
endcase
if Y < 0
  then \@tempcnta := \@tempcnta + 64
fi
\char\@tempcnta
END

\if@negarg
76 \newif\if@negarg

\line
77 \gdef\line(#1,#2)#3{\@xarg #1\relax \@yarg #2\relax
78   \@linelen #3\unitlength
79   \ifdim\@linelen<\z@\@badlinearg\else
80     \ifnum\@xarg =\z@ \vline
81       \else \ifnum\@yarg =\z@ \hline \else \@sline\fi
82     \fi
83   \fi}

\@sline
84 \gdef\@sline{%
85   \ifnum\@xarg<\z@ \@negargtrue \@xarg -\@xarg \@yyarg -\@yarg
86   \else \@negargfalse \@yyarg \@yarg \fi
87   \ifnum \@yyarg >\z@ \@tempcnta\@yyarg \else \@tempcnta -\@yyarg \fi
88   \ifnum\@tempcnta>6 \@badlinearg\@tempcnta\z@ \fi
89   \ifnum\@xarg>6 \@badlinearg\@xarg \@ne \fi
90   \setbox\@linechar\hbox{\@linefnt\@getlinechar(\@xarg,\@yyarg)}%
91   \ifdim\wd\@linechar=\z@
92     \setbox\@linechar\hbox{.}%
93     \@badlinearg
94   \fi
95   \ifnum \@yarg >\z@ \let\@upordown\raise \@clnht\z@
96   \else\let\@upordown\lower \@clnht \ht\@linechar\fi
97   \@clnwd \wd\@linechar
98   \if@negarg
99     \hskip -\wd\@linechar \def\reserved@a{\hskip -2\wd\@linechar}%
100  \else
101    \let\reserved@a\relax
102  \fi
103  \@whiledim \@clnwd <\@linelen \do
104    {\@upordown\@clnht\copy\@linechar
105     \reserved@a
106     \advance\@clnht \ht\@linechar
107     \advance\@clnwd \wd\@linechar}%
108  \advance\@clnht -\ht\@linechar
109  \advance\@clnwd -\wd\@linechar
110  \@tempdima\@linelen\advance\@tempdima -\@clnwd
111  \@tempdimb\@tempdima\advance\@tempdimb -\wd\@linechar
112  \if@negarg \hskip -\@tempdimb \else \hskip \@tempdimb \fi
113  \multiply\@tempdima \@m
114  \@tempcnta \@tempdima
115  \@tempdima \wd\@linechar \divide\@tempcnta \@tempdima
116  \@tempdima \ht\@linechar \multiply\@tempdima \@tempcnta
117  \divide\@tempdima \@m
118  \advance\@clnht \@tempdima

```

```

119 \ifdim \@linelen <\wd\@linechar
120   \hskip \wd\@linechar
Warn if line gets so short that it can't be printed. But don't warn if it is exactly
zero since that was probably deliberate (e.g., to get a vector head only).
121   \ifdim \@linelen = \z@
122   \else
123     \picture@warn
124   \fi
125   \else\@upordown\@clnht\copy\@linechar\fi}

\@hline
126 \gdef\@hline{\ifnum \@xarg <\z@ \hskip -\@linelen \fi
127 \vrule \@height \@halfwidth \@depth \@halfwidth \@width \@linelen
128 \ifnum \@xarg <\z@ \hskip -\@linelen \fi}

\getlinechar
129 \gdef\getlinechar(#1,#2){\@tempcnta#1\relax\multiply\@tempcnta 8%
130 \advance\@tempcnta -9\ifnum #2>\z@ \advance\@tempcnta #2\relax\else
131 \advance\@tempcnta -#2\relax\advance\@tempcnta 64 \fi
132 \char\@tempcnta}

\vector
133 \gdef\vector(#1,#2)#3{\@xarg #1\relax \@yarg #2\relax
134 \@tempcnta \ifnum\@xarg<\z@ -\@xarg\else\@xarg\fi
135 \ifnum\@tempcnta<5\relax
136 \@linelen #3\unitlength
137 \ifdim\@linelen<\z@\@badlinearg\else
138 \ifnum\@xarg =\z@ \@vvector
139 \else \ifnum\@yarg =\z@ \@hvector \else \@svector\fi
140 \fi
141 \fi
142 \else\@badlinearg\fi}

\@hvector
143 \gdef\@hvector{\@hline\hb@xt@\z@{\@linefnt
144 \ifnum \@xarg <\z@ \@getlarrow(1,0)\hss\else
145 \hss\@getrarrow(1,0)\fi}}

\@vvector
146 \gdef\@vvector{\ifnum \@yarg <\z@ \@downvector \else \@upvector \fi}

\@svector
147 \gdef\@svector{\@sline
148 \@tempcnta\@yarg \ifnum\@tempcnta <\z@ \@tempcnta -\@tempcnta\fi
149 \ifnum\@tempcnta <5%
150 \hskip -\wd\@linechar
151 \@upordown\@clnht \hbox{\@linefnt \if@negarg
152 \@getlarrow(\@xarg,\@yyarg)\else \@getrarrow(\@xarg,\@yyarg)\fi}%
153 \else\@badlinearg\fi}

\@getlarrow
154 \gdef\@getlarrow(#1,#2){\ifnum #2=\z@ \@tempcnta 27 % '33
155 \else
156 \@tempcnta #1\relax\multiply\@tempcnta \sixt@@n
157 \advance\@tempcnta -9 \@tempcntb #2\relax\multiply\@tempcntb \tw@
158 \ifnum \@tempcntb >\z@ \advance\@tempcnta \@tempcntb
159 \else\advance\@tempcnta -\@tempcntb\advance\@tempcnta 64
160 \fi\fi\char\@tempcnta}

```

```

\@getrarrow
161 \gdef\@getrarrow(#1,#2){\@tempcntb #2\relax
162 \ifnum\@tempcntb <\z@ \@tempcntb -\@tempcntb\relax\fi
163 \ifcase \@tempcntb\relax \@tempcnta 45 % '55
164 \or
165 \ifnum #1<\thr@@ \@tempcnta #1\relax\multiply\@tempcnta
166 24\advance\@tempcnta -6 \else \ifnum #1=\thr@@ \@tempcnta 49
167 \else\@tempcnta 58 \fi\fi\or
168 \ifnum #1<\thr@@ \@tempcnta=#1\relax\multiply\@tempcnta
169 24\advance\@tempcnta -\thr@@ \else \@tempcnta 51 \fi\or
170 \@tempcnta #1\relax\multiply\@tempcnta
171 \sixt@@n \advance\@tempcnta -\tw@ \else
172 \@tempcnta #1\relax\multiply\@tempcnta
173 \sixt@@n \advance\@tempcnta 7 \fi\ifnum #2<\z@ \advance\@tempcnta 64 \fi
174 \char\@tempcnta}

\@vline
175 \gdef\@vline{\ifnum \@yarg <\z@ \@downline \else \@upline\fi}

\@upline
176 \gdef\@upline{%
177   \hb@xt@\z@{\hskip -\@halfwidth \vrule \@width \@wholewidth
178     \@height \@linelen \@depth \z@\hss}}

\@downline
179 \gdef\@downline{%
180   \hb@xt@\z@{\hskip -\@halfwidth \vrule \@width \@wholewidth
181     \@height \z@ \@depth \@linelen \hss}}

\@upvector
182 \gdef\@upvector{\@upline\setbox\@tempboxa\hbox{\@linefmt\char 54}% % '66
183   \raise \@linelen \hb@xt@\z@{\lower \ht\@tempboxa\box\@tempboxa\hss}}

\@downvector
184 \gdef\@downvector{\@downline\lower \@linelen
185   \hb@xt@\z@{\@linefmt\char 63 % '77
186   \hss}}

\dashbox{D}(X,Y) ==
BEGIN
leave vertical mode
\hb@xt@ 0pt {
  \baselineskip := 0pt
  \lineskip := 0pt
%% HORIZONTAL DASHES
  \@dashdim := X * \unitlength
  \@dashcnt := \@dashdim + 200 % to prevent roundoff error
  \@dashdim := D * \unitlength
  \@dashcnt := \@dashcnt / \@dashdim
  if \@dashcnt is odd
  then \@dashdim := 0pt
    \@dashcnt := (\@dashcnt + 1) / 2
  else \@dashdim := \@dashdim / 2
    \@dashcnt := \@dashcnt / 2 - 1
    \box\@dashbox := \hbox{\vrule height \@halfwidth
      depth \@halfwidth width \@dashdim}
    \put(0,0){\copy\@dashbox}
    \put(0,Y){\copy\@dashbox}

```

```

        \put(X,0){\hskip -\@dashdim\copy\@dashbox}
        \put(X,Y){\hskip -\@dashdim\box\@dashbox}
        \@dashdim := 3 * \@dashdim
    fi
    \box\@dashbox := \hbox{\vrule height \@halfwidth
        depth \@halfwidth width D * \unitlength
        \hskip D * \unitlength}

    \@tempcnta := 0
    \put(0,0){\hskip \@dashdim
        while \@tempcnta < \@dashcnt
        do \copy\@dashbox
            \@tempcnta := \@tempcnta + 1
        od
    }
    \@tempcnta := 0
    \put(0,Y){\hskip \@dashdim
        while \@tempcnta < \@dashcnt
        do \copy\@dashbox
            \@tempcnta := \@tempcnta + 1
        od
    }
}

%% vertical dashes
\@dashdim := Y * \unitlength
\@dashcnt := \@dashdim + 200 % to prevent roundoff error
\@dashdim := D * \unitlength
\@dashcnt := \@dashcnt / \@dashdim
if \@dashcnt is odd
then \@dashdim := 0pt
    \@dashcnt := (\@dashcnt + 1) / 2
else \@dashdim := \@dashdim / 2
    \@dashcnt := \@dashcnt / 2 - 1
    \box\@dashbox := \hbox{\hskip -\@halfwidth
        \vrule width \@wholewidth
        height \@dashdim }

    \put(0,0){\copy\@dashbox}
    \put(X,0){\copy\@dashbox}
    \put(0,Y){\lower\@dashdim\copy\@dashbox}
    \put(X,Y){\lower\@dashdim\copy\@dashbox}
    \@dashdim := 3 * \@dashdim
fi
\box\@dashbox := \hbox{\vrule width \@wholewidth
    height D * \unitlength }

\@tempcnta := 0
\put(0,0){\hskip -\halfwidth
    \vbox{while \@tempcnta < \@dashcnt
        do \vskip D*\unitlength
            \copy\@dashbox
            \@tempcnta := \@tempcnta + 1
        od
        \vskip \@dashdim
    } }
\@tempcnta := 0
\put(X,0){\hskip -\halfwidth
    \vbox{while \@tempcnta < \@dashcnt
        do \vskip D*\unitlength
            \copy\@dashbox

```

```

\@tempcnta := \@tempcnta + 1
od
\vskip \@dashdim
}
}
} % END DASHES

\@makepicbox(X,Y)
END

\dashbox
187 \gdef\dashbox#1(#2,#3){\leavevmode\hb@xt@\z@{\baselineskip \z@skip
188 \lineskip \z@skip
189 \@dashdim #2\unitlength
190 \@dashcnt \@dashdim \advance\@dashcnt 200
191 \@dashdim #1\unitlength\divide\@dashcnt \@dashdim
192 \ifodd\@dashcnt\@dashdim \z@
193 \advance\@dashcnt \@ne \divide\@dashcnt \tw@
194 \else \divide\@dashdim \tw@ \divide\@dashcnt \tw@
195 \advance\@dashcnt \m@ne
196 \setbox\@dashbox \hbox{\vrule \@height \@halfwidth \@depth \@halfwidth
197 \@width \@dashdim}\put(0,0){\copy\@dashbox}%
198 \put(0,#3){\copy\@dashbox}%
199 \put(#2,0){\hskip-\@dashdim\copy\@dashbox}%
200 \put(#2,#3){\hskip-\@dashdim\box\@dashbox}%
201 \multiply\@dashdim \thr@@
202 \fi
203 \setbox\@dashbox \hbox{\vrule \@height \@halfwidth \@depth \@halfwidth
204 \@width #1\unitlength\hskip #1\unitlength}\@tempcnta\z@
205 \put(0,0){\hskip\@dashdim \@whilenum \@tempcnta <\@dashcnt
206 \do{\copy\@dashbox\advance\@tempcnta \@ne }}\@tempcnta\z@
207 \put(0,#3){\hskip\@dashdim \@whilenum \@tempcnta <\@dashcnt
208 \do{\copy\@dashbox\advance\@tempcnta \@ne }}%
209 \@dashdim #3\unitlength
210 \@dashcnt \@dashdim \advance\@dashcnt 200
211 \@dashdim #1\unitlength\divide\@dashcnt \@dashdim
212 \ifodd\@dashcnt \@dashdim \z@
213 \advance\@dashcnt \@ne \divide\@dashcnt \tw@
214 \else
215 \divide\@dashdim \tw@ \divide\@dashcnt \tw@
216 \advance\@dashcnt \m@ne
217 \setbox\@dashbox\hbox{\hskip -\@halfwidth
218 \vrule \@width \@wholewidth
219 \@height \@dashdim}\put(0,0){\copy\@dashbox}%
220 \put(#2,0){\copy\@dashbox}%
221 \put(0,#3){\lower\@dashdim\copy\@dashbox}%
222 \put(#2,#3){\lower\@dashdim\copy\@dashbox}%
223 \multiply\@dashdim \thr@@
224 \fi
225 \setbox\@dashbox\hbox{\vrule \@width \@wholewidth
226 \@height #1\unitlength}\@tempcnta\z@
227 \put(0,0){\hskip -\@halfwidth \vbox{\@whilenum \@tempcnta <\@dashcnt
228 \do{\vskip #1\unitlength\copy\@dashbox\advance\@tempcnta \@ne }}%
229 \vskip\@dashdim}\@tempcnta\z@
230 \put(#2,0){\hskip -\@halfwidth \vbox{\@whilenum \@tempcnta<\@dashcnt
231 \do{\vskip #1\unitlength\copy\@dashbox\advance\@tempcnta \@ne }}%
232 \vskip\@dashdim}}\@makepicbox(#2,#3)}

```

CIRCLES AND OVALS

USER COMMANDS:

`\circle{D}` : Produces the circle with the diameter as close as possible to $D * \text{\unitlength}$. `\put(X,Y){\circle{D}}` puts the circle with its center at (X,Y).

`\oval(X,Y)` : Makes an oval as round as possible that fits in the rectangle of width $X * \text{\unitlength}$ and height $Y * \text{\unitlength}$. The reference point is the center.

`\oval(X,Y)[POS]` : Same as `\oval(X,Y)` except it draws only the half or quadrant of the oval indicated by POS. E.G., `\oval(X,Y)[t]` draws just the top half and `\oval(X,Y)[br]` draws just the bottom right quadrant. In all cases, the reference point is the same as the unqualified `\oval(X,Y)` command.

`\@ovvert {DELTA1} {DELTA2}` : Makes a vbox containing either the left side or the right side of the oval being constructed. The baseline will coincide with the outside bottom edge of the oval; the left side of the box will coincide with the left edge of the vertical rule. The width of the box will be `\@tempdima`. DELTA1 and DELTA2 are added to the character number in `\@tempcnta` to get the characters for the top and bottom quarter circle pieces.

`\@ovhorz` : Makes an hbox containing the straight rule for either the top or the bottom of the oval being constructed. The baseline will coincide with bottom edge of the rule; the left side of the box will coincide with the left side of the oval. The width of the box will be `\@ovvxx`.

`\@getcirc {DIAM}` : Sets `\@tempcnta` to the character number of the top-right quarter circle with the largest diameter less than or equal to DIAM. Sets `\@tempboxa` to an hbox containing that character. Sets `\@tempdima` to `\wd \@tempboxa`, which is the distance from the circle's left outside edge to its right inside edge. (These characters are like those described in the TeXbook, pp. 389-90.)

```

\@getcirc {DIAM} ==
  BEGIN
    \@tempcnta      := integer coercion of (DIAM + 2pt)
                                     + 2pt added 1 Nov 88
    \@tempcnta      := \@tempcnta / integer coercion of 4pt
    if \@tempcnta > 10
      then \@tempcnta := 10 fi
    if \@tempcnta > 0
      then \@tempcnta := \@tempcnta-1
      else LaTeX Warning: Oval too small.
    fi
    \@tempcnta      := 4 * \@tempcnta
    \@tempboxa      := \hbox{\@circlefnt \char \@tempcnta}
    \@tempdima      := \wd \@tempboxa
  END

```

`\@put{X}{Y}{OBJ}` ==

```

BEGIN
  \raise Y \hb@xt@ 0pt{\hskip X OBJ \hss}
END

\@oval(X,Y)[POS] ==
BEGIN
  \begingroup
    \boxmaxdepth := \maxdimen
    @ovt := @ovb := @ovl := @ovr := true
    for all E in POS
      do @ovE := false od
    \@ovxx      := X * \unitlength
    \@ovyy      := Y * \unitlength
    \@tempdimb := min(\@ovxx,\@ovyy)
    \@getcirc{\@tempdimb-2pt} %% "-2pt" added 7 Dec 89
    \@ovro      := \ht \@tempboxa
    \@ovri      := \dp \@tempboxa
    \@ovdx      := \@ovxx - \@tempdima
    \@ovdx      := \@ovdx/2
    \@ovdy      := \@ovyy - \@tempdima
    \@ovdy      := \@ovdy/2
    \@circlefnt
    \@tempboxa :=
      \hbox{
        if @ovr
          then \@ovvert{3}{2} \kern -\@tempdima
        fi
        if @ovl
          then \kern \@ovxx \@ovvert{0}{1} \kern
-@tempdima
          \kern -\@ovxx
        fi
        if @ovt
          then \@ovhorz \kern -\@ovxx
        fi
        if @ovb
          then \raise \@ovyy \@ovhorz
        fi
      }
    \@ovdx := \@ovdx + \@ovro
    \@ovdy := \@ovdy + \@ovro
    \ht\@tempboxa := \dp\@tempboxa := 0
    \@put{-\@ovdx}{-\@ovdy}{\box\@tempboxa}
  \endgroup
END

\@ovvert {DELTA1} {DELTA2} ==
BEGIN
  \vbox to \@ovyy {
    if @ovb
      then \@tempcntb := \@tempcnta + DELTA1
        \kern -\@ovro
        \hbox { \char \@tempcntb }
        \nointerlineskip
      else \kern \@ovri \kern \@ovdy
      fi
    \leaders \vrule width \@wholewidth \vfil
  }

```



```

\nointerlineskip
if @ovt
then \@tempcntb := \@tempcnta + DELTA2
\hbox { \char \@tempcntb }
else \kern \@ovdy \kern \@ovro
fi
}

END

\@ovhorz ==
BEGIN
\hb@xt@ \@ovxx{
\kern \@ovro
if @ovr
then
else \kern \@ovdx
fi
\leaders \hrule height \@wholewidth \hfil
if @ovl
then
else \kern \@ovdx
fi
\kern \@ovri
}

END

\circle{DIAM} ==
BEGIN
\begingroup
\boxmaxdepth := maxdimen
\@tempdimb := DIAM *\unitlength
if \@tempdimb > 15.5pt
then \@getcirc{\@tempdimb}
\@ovro := \ht \@tempboxa
\@tempboxa := \hbox{
\@circlefnt
\@tempcnta := \@tempcnta + 2
\char \@tempcnta
\@tempcnta := \@tempcnta - 1
\char \@tempcnta
\kern -2\@tempdima
\@tempcnta := \@tempcnta + 2
\raise \@tempdima \hbox { \char \@tempcnta }
\raise \@tempdima \box\@tempboxa
}
\ht\@tempboxa := \dp\@tempboxa := 0
\@put{-\@ovro}{-\@ovro}{\@tempboxa}
else
\@circ{\@tempdimb}{96}
fi
\endgroup
END

\circle*{DIAM} == \@dot{DIAM} ==
\@circ{DIAM*\unitlength}{112}

\@circ{DIAM}{CHAR} ==

```

```

BEGIN
  \@tempcnta := integer coercion of (DIAM + .5pt)/1pt.
  if \@tempcnta > 15 then \@tempcnta := 15 fi
  if \@tempcnta > 1 then \@tempcnta := \@tempcnta - 1 fi
  \@tempcnta := \@tempcnta + CHAR
  \@circlefnt
  \char \@tempcnta
END

\if@ovt If producing the Top Bottom Left or Right of an oval.
\if@ovb 233 \newif\if@ovt
\if@ovl 234 \newif\if@ovb
\if@ovr 235 \newif\if@ovl
        236 \newif\if@ovr

        237 </2kernel | def>
        238 <*2kernel | autoload>

\@ovxx
\@ovyy 239 \newdimen\@ovxx
\@ovdx 240 \newdimen\@ovyy
\@ovdy 241 \newdimen\@ovdx
\@ovro 242 \newdimen\@ovdy
\@ovri 243 \newdimen\@ovro
        244 \newdimen\@ovri

        245 </2kernel | autoload>

        \advance\@tempdima 2pt\relax added 1 Nov 88 to fix bug in which size of
        drawn circle not monotonic function of argument of \circle, caused by different
        rounding for dimensions of large and small circles.

        246 <*2kernel | def>

\@getcirc

        247 \gdef\@getcirc#1{\@tempdima #1\relax \advance\@tempdima 2\p@
        248   \@tempcnta\@tempdima
        249   \@tempdima 4\p@ \divide\@tempcnta\@tempdima
        250   \ifnum \@tempcnta >10\relax
        251     \@picture@warn
        252     \@tempcnta 10\relax
        253   \fi
        254   \ifnum \@tempcnta >\z@ \advance\@tempcnta\m@ne

        Warn if requirements for oval or circle can't be met.

        255   \else \@picture@warn \fi
        256   \multiply\@tempcnta 4\relax
        257   \setbox \@tempboxa \hbox{\@circlefnt
        258   \char \@tempcnta}\@tempdima \wd \@tempboxa}

\@picture@warn Generic warning for lines, vectors (used in \@sline) and oval or circle (used un
\@getcirc) are not available at right size.
        259 \def\@picture@warn{\@latex@warning{%
        260   \string\oval, \string\circle, or \string\line\space
        261   size unavailable}}

\@put
        262 \gdef\@put#1#2#3{\raise #2\hb@xt@\z@{\hskip #1#3\hss}}

\oval
        263 \gdef\oval(#1,#2){\@ifnextchar[{\@oval(#1,#2)}{\@oval(#1,#2) []}}

```

\@oval

```
264 \gdef\@oval(#1,#2)[#3]{\begingroup\boxmaxdepth \maxdimen
265 \@ovttrue \@ovbtrue \@ovltrue \@ovrtrue
266 \tfor\reserved@a :=#3\do{\csname @ov\reserved@a false\endcsname}%
267 \@ovxx
268 #1\unitlength \@ovyy #2\unitlength
269 \tempdimb \ifdim \@ovyy >\@ovxx \@ovxx\else \@ovyy \fi
270 \advance \tempdimb -2\p@
271 \@getcirc \tempdimb
272 \@ovro \ht\tempboxa \@ovri \dp\tempboxa
273 \ovdx\@ovxx \advance\ovdx -\tempdima \divide\ovdx \tw@
274 \ovdy\@ovyy \advance\ovdy -\tempdima \divide\ovdy \tw@
275 \circlefnt \setbox\tempboxa
276 \hbox{\if@ovr \@ovvert32\kern -\tempdima \fi
277 \if@ovl \kern \@ovxx \@ovvert01\kern -\tempdima \kern -\@ovxx \fi
278 \if@ovt \@ovhorz \kern -\@ovxx \fi
279 \if@ovb \raise \@ovyy \@ovhorz \fi}\advance\ovdx\@ovro
280 \advance\ovdy\@ovro \ht\tempboxa\z@ \dp\tempboxa\z@
281 \put{-\@ovdx}{-\@ovdy}{\box\tempboxa}%
282 \endgroup}
```

\@ovvert

```
283 \gdef\@ovvert#1#2{\vbox to\@ovyy{%
284 \if@ovb \@tempcntb \@tempcnta \advance \@tempcntb #1\relax
285 \kern -\@ovro \hbox{\char \@tempcntb}\nointerlineskip
286 \else \kern \@ovri \kern \ovdy \fi
287 \leaders\vrule \width \@wholewidth\vfil \nointerlineskip
288 \if@ovt \@tempcntb \@tempcnta \advance \@tempcntb #2\relax
289 \hbox{\char \@tempcntb}%
290 \else \kern \ovdy \kern \@ovro \fi}}
```

\@ovhorz

```
291 \gdef\@ovhorz{\hbext@\@ovxx{\kern \@ovro
292 \if@ovr \else \kern \ovdx \fi
293 \leaders\hrule \height \@wholewidth \hfil
294 \if@ovl \else \kern \ovdx \fi
295 \kern \@ovri}}
```

\@circle

```
296 \gdef\@circle{\@inmatherr\circle\@ifstar\@dot\@circle}
```

\@circle

```
297 \gdef\@circle#1{%
298 \begingroup \boxmaxdepth \maxdimen \tempdimb #1\unitlength
299 \ifdim \tempdimb >15.5\p@ \@getcirc\tempdimb
300 \@ovro\ht\tempboxa
301 \setbox\tempboxa\hbox{\@circlefnt
302 \advance\tempcnta\tw@ \char \tempcnta
303 \advance\tempcnta@m@ne \char \tempcnta \kern -2\tempdima
304 \advance\tempcnta\tw@
305 \raise \tempdima \hbox{\char\tempcnta}\raise \tempdima
306 \box\tempboxa}\ht\tempboxa\z@ \dp\tempboxa\z@
307 \put{-\@ovro}{-\@ovro}{\box\tempboxa}%
308 \else \@circ\tempdimb{96}\fi\endgroup}
```

\@dot Internal form of \circle*.

```
309 \gdef\@dot#1{\tempdimb #1\unitlength \@circ\tempdimb{112}}
```

\@circ

```
310 \gdef\@circ#1#2{\tempdima #1\relax \advance\tempdima .5\p@
311 \tempcnta\tempdima \tempdima \p@
```

```

312 \divide\@tempcnta\@tempdima
313 \ifnum\@tempcnta >15\relax \@tempcnta 15\relax \fi
314 \ifnum \@tempcnta >\z@ \advance\@tempcnta\m@ne\fi
315 \advance\@tempcnta #2\relax
316 \@circlefnt \char\@tempcnta}

317 </2ekernel | def>
318 <*2ekernel | autoload>

\@xarg Counters used for manipulating the ‘slope’ arguments.
\@yarg 319 \newcount\@xarg
\@yyarg 320 \newcount\@yarg
321 \newcount\@yyarg

\@multicnt Counter used in \multiput, and also \multicolumn.
322 \newcount\@multicnt

\@xdim Length registers.
\@ydim 323 \newdimen\@xdim
324 \newdimen\@ydim

\@linechar Box for holding a line segment character, for sloping lines.
325 \newbox\@linechar

\@linelen Length of the line currently being built.
326 \newdimen\@linelen

\@clnwd Height and width of current line segment.
\@clnht 327 \newdimen\@clnwd
328 \newdimen\@clnht

\@dashdim \dashbox internal registers.
\@dashbox 329 \newdimen\@dashdim
\@dashcnt 330 \newbox\@dashbox
331 \newcount\@dashcnt

Initialization: “\thinlines”
332 \let\@linefnt\tenln
333 \let\@circlefnt\tencirc
334 \@wholewidth\fontdimen8\tenln
335 \@halfwidth .5\@wholewidth
336 </2ekernel | autoload>

```

59.1 Curves

The new `\qbezier` command, based on the old `\bezier` defined in `bezier.sty`.

```

\qbezier[N] == \bezier{N}

\bezier{N}(AX,AY)(BX,BY)(CX,CY) ==
BEGIN
  IF N = 0
    THEN \@xdima := |BX - AX|
      \@xb := |CX - BX|
      \@xa := Max(\@xa, \@xb)
      \@ya := |BY - AY|
      \@yb := |CY - BY|
      \@ya := Max(\@ya, \@yb)
      @sc := Max(\@xa, \@ya)

```

```

%% The coefficient .5 below is the degree of overlap of
%% successive points, where 1 is no overlap and 0 is
%% complete overlap. A coefficient of C multiplies
%% the number of points plotted by 1/C.
%%
\@xa := .5 * \@halfwidth
@sc := @sc / \@halfwidth
@sc := Max(@sc, qbeziermax)
ELSE @sc := N
@scp := @sc+1
\@xb := 2 * (BX - AX) * \unitlength
\@xa := ((CX-AX)*\unitlength - \@xb)/@sc
\@yb := 2 * (BY - AY) * \unitlength
\@ya := ((CY-AY)*\unitlength - \@yb)/@sc
\@pictdot := square rule of width \@wholewidth
\count@ := 0
WHILE \count@ < @scp
DO \@xdim := ((\count@*\@xa + @xb) / @sc) * \count@
\@ydim := ((\count@*\@ya + @yb) / @sc) * \count@
plot pt with relative coords (\@xdim,\@ydim)
\count@ := \count@+1
OD

\qbeziermax The maximum number of points to plot.
337 \*2ekernel | def>
338 \def\ifx\qbeziermax\undefined
339 \gdef\qbeziermax{500}
340 \def\fi

In the code below, to save registers \@a ... are not used. Instead other registers
are reused.
\newcounter{sc} -> \c@multicnt
\newcounter{scp} -> \@tempcnta
\newdimen\@xa -> \@ovxx
\newdimen\@xb -> \@ovdx
\newdimen\@ya -> \@ovyy
\newdimen\@yb -> \@ovdy
\newsavebox{\@pictdot} -> \@tempboxa

\qbezier Main user-level command to plot quadratic bezier curves. #2 should be (.
341 \newcommand\qbezier[2][0]{\bezier{#1}#2}

\bezier Form of \bezier compatible with 2.09 bezier.sty, but modified to ignore spaces
between its arguments. #2 should be white space, and #4 should be (.
342 \gdef\bezier#1)#2(#3)#4({\@bezier#1)(#3){}

\@bezier
343 \gdef\@bezier#1(#2,#3)(#4,#5)(#6,#7){%
344 \ifnum #1=\z@
345 \ovxx #4\unitlength
346 \advance\ovxx -#2\unitlength
347 \ifdim \ovxx<\z@ \ovxx -\ovxx \fi
348 \ovdx #6\unitlength
349 \advance\ovdx -#4\unitlength
350 \ifdim \ovdx<\z@ \ovdx -\ovdx \fi
351 \ifdim \ovxx<\ovdx \ovxx \ovdx \fi
352 \ovyy #5\unitlength
353 \advance\ovyy -#3\unitlength

```

```

354     \ifdim \@ovyy<\z@ \ovyy -\ovyy \fi
355     \ovdy #7\unitlength
356     \advance\ovdy -#5\unitlength
357     \ifdim \ovdy<\z@ \ovdy -\ovdy \fi
358     \ifdim \@ovyy<\ovdy \ovyy \ovdy \fi
359     \multicnt
360     \ifdim \@ovxx>\ovyy \ovxx \else \ovyy \fi
361     \ovxx .5\halfwidth \divide\multicnt\ovxx
362     \ifnum \qbeziermax<\multicnt \multicnt\qbeziermax\relax \fi
363 \else \multicnt#1\relax \fi
364 \@tempcnta\multicnt \advance\@tempcnta\@ne
365 \ovdx #4\unitlength \advance\ovdx -#2\unitlength
366     \multiply\ovdx \tw@
367 \ovxx #6\unitlength \advance\ovxx -#2\unitlength
368     \advance\ovxx -\ovdx \divide\ovxx\multicnt
369 \ovdy #5\unitlength \advance\ovdy -#3\unitlength
370     \multiply\ovdy \tw@
371 \ovyy #7\unitlength \advance\ovyy -#3\unitlength
372     \advance\ovyy -\ovdy \divide\ovyy\multicnt

373 \setbox\@tempboxa\hbox{%
374     \hskip -\halfwidth
375     \vrule \height\halfwidth
376         \depth \halfwidth
377         \width \wholewidth}%
378 \put(#2,#3){%
379     \count@\z@
380     \@whilenum{\count@<\@tempcnta}\do
381         {\@xdim\count@\ovxx
382             \advance\@xdim\ovdx
383             \divide\@xdim\multicnt
384             \multiply\@xdim\count@
385             \@ydim\count@\ovyy
386             \advance\@ydim\ovdy
387             \divide\@ydim\multicnt
388             \multiply\@ydim\count@
389             \raise \@ydim
390             \hb@xt@\z@{\kern\@xdim
391                 \unhcopy\@tempboxa\hss}%
392             \advance\count@\@ne}}}
393 </2ekernel | def>

```

File E

ltthm.dtx

60 Theorem Environments

The user creates his own theorem-like environments with the command

```
\newtheorem{<name>}{<text>}[<counter>] or  
\newtheorem{<name>}[<oldname>]{<text>}
```

This defines the environment $\langle name \rangle$ to be just as one would expect a theorem environment to be, except that it prints $\langle text \rangle$ instead of “Theorem”.

If $\langle oldname \rangle$ is given, then environments $\langle name \rangle$ and $\langle oldname \rangle$ use the same counter, so using a $\langle name \rangle$ environment advances the number of the next $\langle name \rangle$ environment, and vice-versa.

If $\langle counter \rangle$ is given, then environment $\langle name \rangle$ is numbered within $\langle counter \rangle$.

E.g., if $\langle counter \rangle = \text{subsection}$, then the first $\langle name \rangle$ in subsection 7.2 is numbered $\langle text \rangle$ 7.2.1.

The way $\langle name \rangle$ environments are numbered can be changed by redefining $\the\langle name \rangle$.

DOCUMENT STYLE PARAMETERS

$\@thmcounter\{COUNTER\}$: A command such that
 $\edef\theCOUNTER{\@thmcounter\{COUNTER\}}$
defines \theCOUNTER to produce a number for a theorem environment.
The default is:
BEGIN \noexpand\arabic{COUNTER} END

$\@thmcountersep$: A separator placed between a theorem number and the number of the counter within which it is numbered.
E.g., to make the third theorem of section 7.2 be numbered 7.2-3, $\@thmcountersep$ should be \def'ed to '-'. Its default is '.'.

$\@begintheorem\{NAME\}\{NUMBER\}$: A command that begins a theorem environment for a 'theorem' named 'NAME NUMBER' – e.g., $\@begintheorem\{Lemma\}\{3.7\}$ starts Lemma 3.7.

$\@opargbegintheorem\{NAME\}\{NUMBER\}\{OPARG\}$:
A command that begins a theorem environment for a 'theorem' named 'NAME NUMBER' with optional argument OPARG – e.g., $\@begintheorem\{Lemma\}\{3.7\}\{Jones\}$ starts 'Lemma 3.7 (Jones):'.

$\@endtheorem$: A command that ends a theorem environment.

```
\newtheorem{NAME}\{TEXT\}[COUNTER] ==  
BEGIN  
  if \NAME is definable  
  then \@definecounter{NAME}  
    if COUNTER present  
    then \@newctr{NAME}[COUNTER] fi  
    \theNAME == BEGIN \theCOUNTER \@thmcountersep  
                  eval\@thmcounter{NAME}  
END
```

```

        else \theNAME == BEGIN eval\@thmcounter{NAME} END
\NAME == \@thm{NAME}{TEXT}
\endNAME == \@endtheorem
    else error
    fi
END

\newtheorem{NAME}[OLDNAME]{TEXT}==
BEGIN
    if counter OLDNAME nonexistant
    then ERROR
    else
        if \NAME is definable
        then BEGIN
            \theNAME == \theOLDNAME
            \NAME == \@thm{OLDNAME}{TEXT}
            \endNAME == \@endtheorem
            END
        else error
        fi
    fi
END

\@thm{NAME}{TEXT} ==
BEGIN
    \refstepcounter{NAME}
    if next char = [
        then \@ythm{NAME}{TEXT}
        else \@xthm{NAME}{TEXT}
    fi
END

\@xthm{NAME}{TEXT} ==
BEGIN
    \@begintheorem{TEXT}{\theNAME}
    \ignorespaces
END

\@ythm{NAME}{TEXT}[OPARG] ==
BEGIN
    \@opargbegintheorem{TEXT}{\theNAME}{OPARG}
    \ignorespaces
END

\newtheorem \newtheorem ought really be allowed only in the preamble Which would be good
document style, and allow some main memory to be saved by declaring these
commands to be \@onlypreamble. Unfortunately the LATEX book indicates that
\newtheorem may be used anywhere in the document...

1 \*2ekernel
2 \def\newtheorem#1{%
3   \@ifnextchar[{\@othm{#1}}{\@nthm{#1}}

\@nthm

4 \def\@nthm#1#2{%
5   \@ifnextchar[{\@xnthm{#1}{#2}}{\@ynthm{#1}{#2}}

```


\@xnthm 92/09/18 RmS: Changed \@addtoreset to \@newctr to produce error message if counter #3 does not exist (to be consistent with behaviour of \newcounter)

```

6 \def\@xnthm#1#2[#3]{%
7   \expandafter\@ifdefinable\csname #1\endcsname
8     {\@definecounter{#1}\@newctr{#1}[#3]%
9     \expandafter\xdef\csname the#1\endcsname{%
10      \expandafter\noexpand\csname the#3\endcsname \@thmcountersep
11      \@thmcounter{#1}}}%
12   \global\@namedef{#1}{\@thm{#1}{#2}}%
13   \global\@namedef{end#1}{\@endtheorem}}}
```

\@ynthm

```

14 \def\@ynthm#1#2{%
15   \expandafter\@ifdefinable\csname #1\endcsname
16     {\@definecounter{#1}%
17     \expandafter\xdef\csname the#1\endcsname{\@thmcounter{#1}}%
18     \global\@namedef{#1}{\@thm{#1}{#2}}%
19     \global\@namedef{end#1}{\@endtheorem}}}
```

\@othm

```

20 \def\@othm#1[#2]#3{%
21   \@ifundefined{c@#2}{\@nocounterr{#2}}%
22   {\expandafter\@ifdefinable\csname #1\endcsname
23     {\global\@namedef{the#1}{\@nameuse{the#2}}%
24     \global\@namedef{#1}{\@thm{#2}{#3}}%
25     \global\@namedef{end#1}{\@endtheorem}}}}
```

\@thm

```

26 \def\@thm#1#2{%
27   \refstepcounter{#1}%
28   \@ifnextchar[{\@ythm{#1}{#2}}{\@xthm{#1}{#2}}}
```

\@xthm

\@ythm

```

29 \def\@xthm#1#2{%
30   \@begintheorem{#2}{\csname the#1\endcsname}\ignorespaces}
31 \def\@ythm#1#2[#3]{%
32   \@opargbegintheorem{#2}{\csname the#1\endcsname}{#3}\ignorespaces}
```

Default values

\@thmcounter

\@thmcountersep

```

33 \def\@thmcounter#1{\noexpand\arabic{#1}}
34 \def\@thmcountersep{.}
```

\@begintheorem

Providing theorem defaults.

\@opargbegintheorem

\@endtheorem

```

35 \def\@begintheorem#1#2{\trivlist
36   \item[\hskip \labelsep{\bfseries #1\ #2}]{\itshape}
37 \def\@opargbegintheorem#1#2#3{\trivlist
38   \item[\hskip \labelsep{\bfseries #1\ #2\ (#3)}]{\itshape}
39 \def\@endtheorem{\endtrivlist}
40 \</2ekernel)
```

File F

ltsect.dtx

61 Sectioning Commands

This file defines the declarations such as `\author` which are used by `\maketitle`. `\maketitle` itself is defined by each class, not in the L^AT_EX kernel.

The second part of the file defines the generic commands used for defining sectioning commands such as `\chapter`. Again the actual document level commands are defined in the class files, in terms of these commands.

```
1 \*2ekernel
2 \message{title,}
```

61.1 The Title

```
\title The user defines the title and author by the declarations \title{<name>},
\author \author{<name>}
\date Similarly the date is declared with \date{<date>}.
\thanks Inside these, the \thanks{<footnote text>} command may be used to make
\and acknowledgements, notice of address, etc. in a footnote. If there are multiple
\maketitle authors, they have to be separated with the \and command.
And finally, the \maketitle command produces the actual title, using the
information previously saved with the other commands.

\title \title for use in \maketitle. If not given \maketitle will produce an error
\@title message.
3 \def\title#1{\gdef\@title{#1}}
4 \def\@title{\@latex@error{No \noexpand\title given}\@ehc}

\author \author for use in \maketitle. If not given \maketitle will produce a warning
\@author message.
5 \def\author#1{\gdef\@author{#1}}
6 \def\@author{\@latex@warning{no@line{No \noexpand\author given}}

\date \date for use in \maketitle. If not given \maketitle will produce \today as the
\@date default.
7 \def\date#1{\gdef\@date{#1}}
8 \gdef\@date{\today}

\thanks
9 \def\thanks#1{\footnotemark
10 \protected@xdef\@thanks{\@thanks
11 \protect\footnotetext[\the\c@footnote]{#1}}%
12 }

\@thanks
13 \let\@thanks\@empty

\and
14 \def\and{% % \begin{tabular}
15 \end{tabular}%
16 \hskip 1em \@plus.17fil%
17 \begin{tabular}[t]{c}}% % \end{tabular}
18 \message{sectioning,}
```

61.2 Sectioning

```
\@secpenalty
19 \newcount\@secpenalty
20 \@secpenalty = -300

\if@noskipsec Way back in 1991 (08/26) FMi & RmS set the \@noskipsec switch to true for the
\@noskipsectrue preamble and to false in \document. This was done to trap lists and related text
in the preamble but it does not catch everything.
21 \newif\if@noskipsec \@noskipsectrue

\@startsection The \@startsection{\langle name\rangle}{\langle level\rangle}{\langle indent\rangle}{\langle beforeskip\rangle}
{\langle afterskip\rangle}{\langle style\rangle}*[\langle altheading\rangle ]{\langle heading\rangle} command is the mother of all
the user level sectioning commands. The part after the *, including the * is
optional.
```

name: e.g., 'subsection'

level: a number, denoting depth of section – e.g., chapter=1, section = 2, etc.

indent: Indentation of heading from left margin

beforeskip: Absolute value = skip to leave above the heading. If negative, then paragraph indent of text following heading is suppressed.

afterskip: if positive, then skip to leave below heading, else negative of skip to leave to right of run-in heading.

style: Commands to set style. Since June 1996 release the *last* command in this argument may be a command such as \MakeUppercase or \fbox that takes an argument. The section heading will be supplied as the argument to this command. So setting #6 to, say, \bfseries\MakeUppercase would produce bold, uppercase headings.

If '*' is missing, then increment the counter. If it is present, then there should be no [\langle altheading\rangle] argument. The command uses the counter 'secnumdepth'. It contains a pointer to the highest section level that is to be numbered.

Warning: The \@startsection command should be at the same or higher grouping level as the text that follows it. For example, you should *not* do something like

```
\def\foo{ \begingroup ...
           \paragraph{...}
           \endgroup}
```

Pseudocode for the \@startsection command

```
\@startsection
{NAME}{LEVEL}{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE} ==
BEGIN
  IF @noskipsec = T THEN \leavevmode FI
                                % true if previous section had no body.

  \par
  \@tempskipa := BEFORESKIP
  @afterindent := T
  IF \@tempskipa < 0 THEN \@tempskipa := -\@tempskipa
                                @afterindent := F

  FI
  IF @nobreak = true
    THEN \everypar == null
    ELSE \addpenalty{\@secpenalty}
```

```

\addvspace{\@tempskipa}
FI
IF * next
THEN \@ssect{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}
ELSE \@dblarg{\@sect
{NAME}{LEVEL}{INDENT}
{BEFORESKIP}{AFTERSKIP}{STYLE}}
FI
END

22 \def\@startsection#1#2#3#4#5#6{%
23 \if@noskipsec \leavevmode \fi
24 \par
25 \@tempskipa #4\relax
26 \@afterindenttrue
27 \ifdim \@tempskipa <\z@
28 \@tempskipa -\@tempskipa \@afterindentfalse
29 \fi
30 \if@nobreak
31 \everypar{}%
32 \else
33 \addpenalty\@secpenalty\addvspace\@tempskipa
34 \fi
35 \@ifstar
36 {\@ssect{#3}{#4}{#5}{#6}}%
37 {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}%

\@sect Pseudocode for the \@sect command

\@sect{NAME}{LEVEL}{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}[ARG1]{ARG2}
==
BEGIN
IF LEVEL > \c@secnumdepth
THEN \@svsec :=L null
ELSE \refstepcounter{NAME}
\@svsec :=L BEGIN \@secntformat{#1}\relax END
FI
IF AFTERSKIP > 0
THEN \begingroup
STYLE
\@hangfrom{\hskip INDENT\@svsec}
{\interlinepenalty 10000 ARG2\par}
\endgroup
\NAMEmark{ARG1}
\addcontentsline{toc}{NAME}
{ IF LEVEL > \c@secnumdepth
ELSE \protect\numberline{\theNAME} FI
ARG1 }
ELSE \@svsechd == BEGIN STYLE
\hskip INDENT\@svsec
ARG2
\NAMEmark{ARG1}
\addcontentsline{toc}{NAME}
{ IF LEVEL > \c@secnumdepth
ELSE

\protect\numberline{\theNAME}

FI
ARG1 }

END

```

```

FI
\@xsect{AFTERSKIP}
END
38 \def\@sect#1#2#3#4#5#6[#7]#8{%
39   \ifnum #2>\c@secnumdepth
40     \let\@svsec\@empty
41   \else
42     \refstepcounter{#1}%

```

Since \@secntformat might end with an improper \hskip which is scanning forward for plus or minus we end the definition of \@svsec with \relax as a precaution.

```

43   \protected@edef\@svsec{\@secntformat{#1}\relax}%
44   \fi
45   \@tempskipa #5\relax
46   \ifdim \@tempskipa>\z@
47     \begingroup

```

This { used to be after the argument to \@hangfrom but was moved here to allow commands such as \MakeUppercase to be used at the end of #6.

```

48     #6{%
49       \@hangfrom{\hskip #3\relax\@svsec}%
50       \interlinepenalty \@M #8\@@par}%
51   \endgroup
52   \csname #1mark\endcsname{#7}%
53   \addcontentsline{toc}{#1}{%
54     \ifnum #2>\c@secnumdepth \else
55       \protect\numberline{\csname the#1\endcsname}%
56     \fi
57     #7}%
58   \else
\relax added 2 May 90
59   \def\@svsechd{%
60     #6{\hskip #3\relax
61       \@svsec #8}%
62     \csname #1mark\endcsname{#7}%
63     \addcontentsline{toc}{#1}{%
64       \ifnum #2>\c@secnumdepth \else
65         \protect\numberline{\csname the#1\endcsname}%
66       \fi
67       #7}}%
68   \fi
69   \@xsect{#5}}

```

\@xsect Pseudocode for the \@xsect command

```

\@xsect{AFTERSKIP} ==
BEGIN
  IF AFTERSKIP > 0
    THEN \par \nobreak
        \vskip AFTERSKIP
        \@afterheading
    ELSE @nobreak :=G F
        @noskipsec :=G T
        \everypar{ IF @noskipsec = T
                    THEN @noskipsec :=G F
                        \clubpenalty :=G 10000
                        \hskip -\parindent
                        \begingroup
                        \@svsechd
                        \endgroup

```

```

\unskip
\hskip -AFTERSKIP \relax
%% relax added 14 Jan 91
ELSE \clubpenalty :=G \@clubpenalty
\everypar := NULL
FI
}

```

FI

END

```

70 \def\@xsect#1{%
71   \@tempskipa #1\relax
72   \ifdim \@tempskipa>\z@

```

Why not combine \@sect and \@xsect and save doing the same test twice? It is not possible to change this now as these have become hooks!

This \par seems unnecessary.

```

73   \par \nobreak
74   \vskip \@tempskipa
75   \@afterheading
76   \else
77     \@nobreakfalse
78     \global\@noskipsectrue
79     \everypar{%
80       \if@noskipsec
81         \global\@noskipsecfalse
82         {\setbox\z@\lastbox}%
83         \clubpenalty\@M
84         \begingroup \svsechd \endgroup
85         \unskip
86         \@tempskipa #1\relax
87         \hskip -\@tempskipa
88       \else
89         \clubpenalty \@clubpenalty
90         \everypar{}%
91       \fi}%
92   \fi
93   \ignorespaces}

```

\@seccntformat This command formats the section number including the space following it.

```

94 \def\@seccntformat#1{\csname the#1\endcsname\quad}

```

Pseudocode for the \@ssect command

```

\@ssect{INDENT}{BEFORESKIP}{AFTERSKIP}{STYLE}{ARG} ==
BEGIN
  IF AFTERSKIP > 0
    THEN \begingroup
      STYLE
      \@hangfrom{\hskip INDENT}{\interlinepenalty 10000
ARG\par}
      \endgroup
    ELSE \@svsechd == BEGIN STYLE
      \hskip INDENT
      ARG
    END
  FI
  \@xsect{AFTERSKIP}
END

```

Pseudocode for the \@afterheading command

```

\@afterheading ==
BEGIN
  @nobreak :=G true
  \everypar := BEGIN IF @nobreak = T
                        THEN @nobreak :=G false
                        \clubpenalty :=G 10000
                        IF @afterindent = F
                        THEN remove \lastbox
                        FI
                        ELSE \clubpenalty :=G \@clubpenalty
                        \everypar := NULL
                        FI
  END
END

\@ssect
95 \def\@ssect#1#2#3#4#5{%
96   \@tempskipa #3\relax
97   \ifdim \@tempskipa>\z@
98     \begingroup
This { used to be after the argument to \@hangfrom but was moved here to allow
commands such as \MakeUppercase to be used at the end of #4.
99     #4{%
100       \@hangfrom{\hskip #1}%
101       \interlinepenalty \@M #5\@par}%
102     \endgroup
103   \else
104     \def\@svsechd{#4{\hskip #1\relax #5}}%
105     \fi
106   \@xsect{#3}}

\if@afterindent
\@afterindenttrue 107 \newif\if@afterindent \@afterindenttrue

\@afterheading This hook is used in setting up custom-built headings in classes.dtx.
108 \def\@afterheading{%
109   \@nobreaktrue
110   \everypar{%
111     \if@nobreak
112       \@nobreakfalse
113       \clubpenalty \@M
114       \if@afterindent \else
115         {\setbox\z@\lastbox}%
116       \fi
117     \else
118       \clubpenalty \@clubpenalty
119       \everypar{%
120         \fi}}

\@hangfrom \@hangfrom{<text>} : Puts <text> in a box, and makes a hanging indentation of
the following material up to the first \par. Should be used in vertical mode.
121 \def\@hangfrom#1{\setbox\@tempboxa\hbox{#1}}%
122   \hangindent \wd\@tempboxa\noindent\box\@tempboxa}

\c@secnumdepth
\c@tocdepth 123 \newcount\c@secnumdepth
124 \newcount\c@tocdepth

```

`\secdef` `\secdef{⟨unstarcmds⟩}{⟨unstarcmds⟩}{⟨starcmds⟩}`
 When defining a `\chapter` or `\section` command without using `\@startsection`, you can use `\secdef` as follows:

1. `\def\chapter{... \secdef \⟨starcmd⟩ \⟨unstarcmd⟩ }`
2. `\def\⟨starcmd⟩[#1]#2{...} % Command to define \chapter[...]{...}`
3. `\def\⟨unstarcmd⟩#1{...} % Command to define \chapter*{...}`

```
125 \def\secdef#1#2{\ifstar{#2}{\@dblarg{#1}}}
```

61.2.1 Initializations

```
\sectionmark
\subsectionmark 126 \let\sectionmark\@gobble
\subsubsectionmark 127 \let\subsectionmark\@gobble
\paragraphmark 128 \let\subsubsectionmark\@gobble
\subparagraphmark 129 \let\paragraphmark\@gobble
130 \let\subparagraphmark\@gobble

131 \message{contents,}
```

61.3 Table of Contents etc.

61.3.1 Convention

`\tf@⟨foo⟩` = file number for output for table foo. The file is opened only if `@filesw = true`.

61.3.2 Commands

A `\l@⟨type⟩{⟨entry⟩}{⟨page⟩}` Macro needs to be defined by document style for making an entry of type `⟨type⟩` in a table of contents, etc. E.g., the document style should define `\l@chapter`, `\l@section`, etc.

Note: When the `\protect` command is used in the `⟨entry⟩` or `⟨text⟩` of one of the commands below, it causes the following control sequence to be written on the file without being expanded. The sequence will be expanded when the table of contents entry is processed.

Surprise: Inside an `\addcontentsline` or `\addtocontents` command argument, the commands: `\index`, `\glossary`, and `\label` are no-ops. This could cause a problem if the user puts an `\index` or `\label` into one of the commands he writes, or into the optional ‘short version’ argument of a `\section` or `\caption` command.

`\@starttoc` The `\@starttoc{⟨ext⟩}` command is used to define the commands: `\tableofcontents`, `\listoffigures`, etc.

For example: `\@starttoc{lof}` is used in `\listoffigures`. This command reads the `.⟨ext⟩` file and sets up to write the new `.⟨ext⟩` file.

```
\@starttoc{EXT} ==
BEGIN
  \begingroup
    \makeatletter
    read file \jobname.EXT
    IF @filesw = true
      THEN open \jobname.EXT as file \tf@EXT
    FI
    @nobreak :=G FALSE %% added 24 May 89
  \endgroup
END
```

```
132 \def\@starttoc#1{%
```



```

133 \begingroup
134   \makeatletter
135   \@input{\jobname.#1}%
136   \if@filesw
137     \expandafter\newwrite\csname tf@#1\endcsname
138     \immediate\openout \csname tf@#1\endcsname \jobname.#1\relax
139   \fi
140   \@nobreakfalse
141 \endgroup}

```

\addcontentsline The `\addcontentsline{<table>}{<type>}{<entry>}` command allows the user to add his/her own entry to a table of contents, etc. The command adds the entry `\contentsline{<type>}{<entry>}{<page>}` to the `.<table>` file.

This macro is implemented as an application of `\addtocontents`. Note that `\thepage` is not expandable during `\protected@write` therefore one gets the page number at the time of the `\shipout`.

```

142 \def\addcontentsline#1#2#3{%
143   \addtocontents{#1}{\protect\contentsline{#2}{#3}{\thepage}}}

```

\addtocontents The `\addtocontents{<table>}{<text>}` command adds `<text>` to the `.<table>` file, with no page number.

```

144 \long\def\addtocontents#1#2{%
145   \protected@write\@auxout
146     {\let\label\@gobble \let\index\@gobble \let\glossary\@gobble}%
147     {\string\@writefile{#1}{#2}}}

```

\contentsline The `\contentsline{<type>}{<entry>}{<page>}` macro produces a `<type>` entry in a table of contents, etc. It will appear in the `.toc` or other file. For example, The entry for subsection 1.4.3 in the table of contents for example, might be produced by:

```

\contentsline{subsection}
  {\makebox{30pt}[r]{1.4.3} Gnats and Gnus}{22}

```

The `\protect` command causes command sequences to be written without expanding them.

```

148 \def\contentsline#1{\csname l@#1\endcsname}

```

`\@dottedtocline{<level>}{<indent>}{<numwidth> }{<title>}{<page>}`: Macro to produce a table of contents line with the following parameters:

level If `<level>` $>$ `\c@tocdepth`, then no line produced.

indent Total indentation from the left margin.

numwidth Width of box for number if the `<title>` has a `\numberline` command. As of 25 Jan 1988, this is also the amount of extra indentation added to second and later lines of a multiple line entry.

title Contents of entry.

page Page number.

Uses the following parameters, which must be set by the document style. They should be defined with `\def`'s.

pnumwidth Width of box in which page number is set.

tocrmarg Right margin indentation for all but last line of multiple-line entries.

dotsep Separation between dots, in mu units. Should be `\def`'d to a number like 2 or 1.7

`\@dottedtocline`

```

149 \def\@dottedtocline#1#2#3#4#5{%
150   \ifnum #1>\c@tocdepth \else
151     \vskip \z@ \@plus.2\p@
152     {\leftskip #2\relax \rightskip \@tocrmarg \parfillskip -\rightskip
153     \parindent #2\relax\@afterindenttrue
154     \interlinepenalty\@M
155     \leavevmode
156     \@tempdima #3\relax

157     \advance\leftskip \@tempdima \null\nobreak\hskip -\leftskip
158     {#4}\nobreak
159     \leaders\hbox{$\m@th

```

If a document uses fonts other than computer modern, the use of a dot from math can be very disturbing despite the fact that this might be the only place in a document that then uses computer modern. Therefore we surround the dot with an `\hbox` to escape to the surrounding text font.

```

160       \mkern \@dotsep mu\hbox{.}\mkern \@dotsep
161       mu$}\hfill
162       \nobreak
163       \hb@xt@\@pnumwidth{\hfil\normalfont \normalcolor #5}%
164       \par}%
165   \fi}

```

Note: `\nobreak`'s added 7 Jan 86 to prevent bad line break that left the page number dangling by itself at left edge of a new line.

Changed 25 Jan 88 to use `\leftskip` instead of `\hangindent` so leaders of multiple-line contents entries would line up properly.

`\numberline` `\numberline{<number>}`: For use in a `\contentsline` command. It puts `<number>` flushleft in a box of width `\@tempdima` (Before 25 Jan 88 change, it also added `\@tempdima` to the hanging indentation.)

```

166 \def\numberline#1{\hb@xt@\@tempdima{#1\hfil}}
167 </2ekernel>

```

File G

ltfloat.dtx

62 Floats

The different types of floats are identified by a $\langle type \rangle$ name, which is the name of the counter for that kind of float. For example, figures are of type ‘figure’ and tables are of type ‘table’. Each $\langle type \rangle$ has associated a positive $\langle type\ number \rangle$, which is a power of two. E.g., figures might be have type number 1, tables type number 2, programs type number 4, etc.

The locations where a float can go are specified by a $\langle placement\ specifier \rangle$, which is a list of the possible locations, each denoted by a letter as follows:

h : here	— at the current location in the text.
t : top	— at the top of a text page.
b : bottom	— at the bottom of a text page.
p : page	— on a separate float page

In addition, in conjunction with these, you can use ‘!’ which means that the current values of the float positioning parameters are ignored for this float. (Has no effect on ‘p’, float page positioning.) For example, ‘pht’ specifies that the float can appear in any of three locations: page, here or top.

62.1 Floating Environments

```
1 \*2kernel)
2 \message{floats,}
```

Where floats may appear on a page, and how many may appear there are specified by the following float placement parameters. The numbers are named like counters so the user can set them with the ordinary counter-setting commands.

<code>\c@topnumber</code>	: Number of floats allowed at the top of a column.
<code>\topfraction</code>	: Fraction of column that can be devoted to floats.
<code>\c@dbltopnumber, \dbltopfraction</code>	: Same as above, but for double-column floats.
<code>\c@bottomnumber, \bottomfraction</code>	: Same as above for bottom of page.
<code>\c@totalnumber</code>	: Number of floats allowed in a single column, including in-text floats.
<code>\textfraction</code>	: Minimum fraction of column that must contain text.
<code>\floatpagefraction</code>	: Minimum fraction of page that must be taken up by float page.
<code>\dblfloatpagefraction</code>	: Same as above, for double-column floats.

The document style must define the following.

<code>\fps@TYPE</code>	: The default placement specifier for floats of type TYPE.
<code>\ftype@TYPE</code>	: The type number for floats of type TYPE.
<code>\ext@TYPE</code>	: The file extension indicating the file on which the contents list for float type TYPE is stored.

For example, `\ext@figure = 'lof'`.

`\fnum@TYPE` : A macro to generate the figure number for a caption.
For example, `\fnum@TYPE == Figure \thefigure`.

`\@makecaption{NUM}{TEXT}` :
A macro to make a caption, with NUM the value
produced by `\fnum@...` and TEXT the text of the caption.
It can assume it's in a `\parbox` of the appropriate width.

`\@float{TYPE}[PLACEMENT]` : This macro begins a float environment
for a
single-column float of type TYPE with PLACEMENT as the
placement
specifier. The default value of PLACEMENT is defined by
`\fps@TYPE`. The environment is ended by `\end@float`.
E.g., `\figure == \@float{figure}, \endfigure == \end@float`.

```
\@float{TYPE}[PLACEMENT] ==
BEGIN
  if hmode then \bsphack
    \@floatpenalty := -10002
  else \@floatpenalty := -10003
  fi
  \@capytype ==L TYPE
  \@dblflset
  \@fps ==L PLACEMENT
  \@onelevel@sanitize \@fps
  add default PLACEMENT if at most ! in PLACEMENT ==
\@fpsadddefault
  if inner
    then LaTeX Error: 'Not in outer paragraph mode.'
    \@floatpenalty := 0
  else if \@freelist nonempty
    then \@currbox :=L head of \@freelist
    \@freelist :=G tail of \@freelist
    \count\@currbox :=G 32*\ftype@TYPE +
                                bits determined by
PLACEMENT
    else \@floatpenalty := 0
    LaTeX Error: 'Too many unprocessed floats'
  fi
  fi
  \@currbox :=G \color@vbox
    \normalcolor
    \vbox{
      %% 15 Dec 87 -
      %% removed \boxmaxdepth :=L 0pt
      %% that made box 0 depth because it screwed
      %% things up. Instead, added \vskip0pt at
end
                                \hsize = \columnwidth
                                \@parboxrestore
                                \@floatboxreset

END

\caption ==
```

```

BEGIN
  \refstepcounter{\@capttype}
  \@dblarg{\@caption{\@capttype}}
END

```

In following definition, `\par` moved from after `\addcontentsline` to before `\addcontentsline` because the `\write` could cause an extra blank line to be added to the paragraph above the caption. (Change made 12 Jun 87)

```

\@caption{TYPE}[STEXT]{TEXT} ==
BEGIN
  \par

\addcontentsline{\ext@TYPE}{TYPE}{\numberline{\theTYPE}{STEXT}}
  \begingroup
  \@parboxrestore
  \@normalsize
  \@makecaption{\fnum@TYPE}{TEXT}
  \par
\endgroup
END

```

`\@dblfloat{TYPE}[PLACEMENT]` : Macro to begin a float environment for a double-column float of type TYPE with PLACEMENT as the placement specifier. The default value of PLACEMENT is 'tp'

The environment is ended by `\end@dblfloat`.
 E.g., `\figure* == \@dblfloat{figure}`,
`\endfigure* == \end@dblfloat`.

```

\@dblfloat{TYPE}[PLACEMENT] ==
  Identical to \@float{TYPE}[PLACEMENT] except \hsize and
\linewidth
  are set to \textwidth.

```

`\@floatpenalty`

```

3 \newcount\@floatpenalty

```

`\caption` This is set to be an error message outside a float since no capttype is defined there; this may need to be changed by some classes.

```

4 \def\caption{%
5   \ifx\@capttype\undefined
6     \@latex@error{\noexpand\caption outside float}\@ehd
7     \expandafter\gobble
8   \else
9     \refstepcounter\@capttype
10    \expandafter\@firstofone
11  \fi
12  {\@dblarg{\@caption\@capttype}}%
13 }

```

`\@caption`

```

14 \long\def\@caption#1[#2]#3{%
15   \par
16   \addcontentsline{\csname ext@#1\endcsname}{#1}%
17   {\protect\numberline{\csname the#1\endcsname}{\ignorespaces #2}}%
18   \begingroup

```

The paragraph setting parameters are normalised at this point, however `\@parboxrestore` resets `\everypar` which is not correct in this context so `\@setminipage` is called if needed.

The float mechanism, like minipage, sets the flag `@minipage` true before executing the user-supplied text. Many L^AT_EX constructs test for this flag and do not add vertical space when it is true. The intention is that this emulates T_EX's ‘top of page’ behaviour. The flag must be set false at the start of the first paragraph. This is achieved by a redefinition of `\everypar`, but the call to `\@parboxrestore` removes that redefinition, so it is re-inserted if needed. If the flag is already false then the `\caption` was not the first entry in the float, and so some other paragraph has already activated the special `\everypar`. In this case no further action is needed.

```

19   \@parboxrestore
20   \if@minipage
21     \@setminipage
22   \fi

23   \normalsize
24   \@makecaption{\csname fnum@#1\endcsname}{\ignorespaces #3}\par
25 \endgroup

\@float
\@dblflset 26 \def\@float#1{%
27   \@ifnextchar[%
28     {\@xfloat{#1}}%
29     {\edef\reserved@a{\noexpand\@xfloat{#1}[\csname fps@#1\endcsname]}}%
30     \reserved@a}}

\@dblfloat
31 \def\@dblfloat{%
32   \if@twocolumn\let\reserved@a\@dbflt\else\let\reserved@a\@float\fi
33   \reserved@a}

```

`\fps@dbl` Note that all double floats have default fps ‘tp’.

`\@setfps` This sets the fps, dealing with error conditions by adding the default.

`\@xfloat` The first part of this sets the count register that stores all the information about the type and fps of the float.

We assume here that the default specifiers already contain no active characters.

It may be better to store the defaults as numbers, rather than symbol strings.

```

34 \def\@xfloat #1[#2]{%
35   \@nodocument
36   \def \@capttype {#1}%
37   \def \@fps {#2}%
38   \@onelevel@sanitize \@fps
39   \def \reserved@b {!}%
40   \ifx \reserved@b \@fps
41     \@fpsadddefault
42   \else
43     \ifx \@fps \@empty
44       \@fpsadddefault
45     \fi
46   \fi
47   \ifhmode
48     \@bsphack
49     \@floatpenalty -\@Mii
50   \else
51     \@floatpenalty-\@Miii
52   \fi
53   \ifinner

```

```

54     \@parmoderr\@floatpenalty\z@
55 \else
56   \@next\@currbox\@freelist
57   {%
58     \@tempcnta \sixt@@n
59     \expandafter \@tfor \expandafter \reserved@a
60     \expandafter :\expandafter =\@fps
61     \do
62     {%
63       \if \reserved@a h%
64         \ifodd \@tempcnta
65         \else
66           \advance \@tempcnta \@ne
67         \fi
68       \fi
69       \if \reserved@a t%
70         \setfpsbit \tw@
71       \fi
72       \if \reserved@a b%
73         \setfpsbit 4%
74       \fi
75       \if \reserved@a p%
76         \setfpsbit 8%
77       \fi
78       \if \reserved@a !%
79         \ifnum \@tempcnta>15
80           \advance\@tempcnta -\sixt@@n\relax
81         \fi
82       \fi
83     }%
84     \@tempcntb \csname ftype@\@capttype \endcsname
85     \multiply \@tempcntb \@xxxii
86     \advance \@tempcnta \@tempcntb
87     \global \count\@currbox \@tempcnta
88   }%
89   \@fltovf
90 \fi

```

The remainder sets up the box in which the float is typeset, and the typesetting environment to be used. It is essential to have the extra box to avoid the unwanted space that would otherwise often be put at the top of the float.

It ends with a hook; not sure how useful this is but it is needed at present to deal with double-column floats.

```

91 \global \setbox\@currbox
92   \color@vbox
93   \normalcolor
94   \vbox \bgroup
95     \hsize\columnwidth
96     \@parboxrestore
97     \@floatboxreset
98 }

```

\@floatboxreset The rationale for allowing these normally global flags to be set locally here, via **\@parboxrestore**, was stated originally by Donald Arseneau and extended by Chris Rowley. It is because these flags are only set globally to true by section commands, and these should never appear within marginals or floats or, indeed, in any group; and they are only ever set globally to false when they are definitely true.

If anyone is unhappy with this argument then both flags should be treated as in **\set@nobreak**; otherwise this command will be redundant.

```

99 \def \@floatboxreset {%
100   \reset@font

```

```

101         \normalsize
102         \@setminipage
103 }

\@setnobreak

104 \def \@setnobreak{%
105     \if@nobreak
106         \let\outer@nobreak\@nobreaktrue
107         \@nobreakfalse
108     \fi
109 }

\@setminipage

110 \def \@setminipage{%
111     \@minipagetrue
112     \everypar{\@minipagefalse\everypar{}}%
113 }

\end@float

114 \def\end@float{%
115     \@endfloatbox
116     \ifnum\@floatpenalty <\z@
        We make sure that we never exceed \textheight, otherwise float will never get
        typeset (91/03/15 FMi).
117         \@largefloatcheck
118         \@cons\@currlist\@currbox
119         \ifnum\@floatpenalty <-\@Mii
120             \penalty -\@Miv
            Saving and restoring \prevdepth added 26 May 87 to prevent extra vertical space
            when used in vertical mode.
121             \@tempdima\prevdepth
122             \vbox{}%
123             \prevdepth\@tempdima
124             \penalty\@floatpenalty

125         \else
126             \vadjust{\penalty -\@Miv \vbox{ }\penalty\@floatpenalty}\@Esphack
127         \fi
128     \fi
129 }

\end@dblfloat

130 \def\end@dblfloat{%
131     \if@twocolumn
132         \@endfloatbox
133         \ifnum\@floatpenalty <\z@
            We make sure that we never exceed \textheight, otherwise float will never get
            typeset (91/03/15 FMi).
134             \@largefloatcheck
135             \@cons\@dbldeferlist\@currbox
136         \fi
            RmS 92/03/18 changed \@esphack to \@Esphack.
137         \ifnum \@floatpenalty =-\@Mii \@Esphack\fi
138     \else
139         \end@float
140     \fi
141 }

```


`\@endfloatbox` This macro is not intended to be a hook; it is designed to help maintain the integrity of this code, which is used twice and, as can be seen, is subject to frequent changes.

```

142 \def \@endfloatbox{%
143     \par\vskip\z@skip      %% \par\vskip\z@ added 15 Dec 87
144     \@minipagefalse
145     \outer@nobreak
146     \egroup                %% end of vbox
147     \color@endbox
148 }
149 %
150 % \begin{macro}{\outer@nobreak}
151 % \changes{v1.0h}{1994/05/20}{Macro added: default is to do nothing.}
152 % \begin{macrocode}
153 \let\outer@nobreak\@empty

```

`\@largefloatcheck` This calculates by how much a float is oversize for the page and prints this in a warning message.

```

154 \def \@largefloatcheck{%
155     \ifdim \ht\@currbox>\textheight
156         \tempdima -\textheight
157         \advance \tempdima \ht\@currbox
158         \@latex@warning {Float too large for page by \the\tempdima}%
159         \ht\@currbox \textheight
160     \fi
161 }

```

`\@dbflt`

```

\@xdblfloat 162 \def \@dbflt#1{\@ifnextchar[{\@xdblfloat{#1}}{\@xdblfloat{#1}[tp]}}
163 \def \@xdblfloat#1[#2]{%
164     \@xfloat{#1}[#2]\hsize\textwidth\linewidth\textwidth}

```

Moved to ltoutput 93/12/16

```

165 %\newcount\c@topnumber
166 %\newcount\c@dbltopnumber
167 %\newcount\c@bottomnumber
168 %\newcount\c@totalnumber

```

An analysis of `\@floatplacement`:

This should be called whenever `\@colht` has been set.

```

169 \def \@floatplacement{\global\@topnum\c@topnumber
170     % Textpage bit, global:
171     \global\@toproom \topfraction\@colht
172     \global\@botnum \c@bottomnumber
173     \global\@botroom \bottomfraction\@colht
174     \global\@colnum \c@totalnumber
175     % Floatpage bit, local:
176     \fpmin \floatpagefraction\@colht}

```

`\@dblfloatplacement` This should be called only within a group. Now changed to provide extra checks in `\@addtodblcol`, needed when processing a BANG float.

```

177 \def \@dblfloatplacement {%
178     % Textpage bit: global, but need not be.
179     \global \@dbltopnum \c@dbltopnumber
180     \global \@dbltoproom \dbltopfraction\@colht
181     % This new bit uses \@textmin to locally store the amount of extra room in the
182     % column.
183     \@textmin \@colht
184     \advance \@textmin -\@dbltoproom

```

Floatpage bit: must be local.

```

182 \@fpmin \dblfloatpagefraction\textheight
183 \@fptop \@dblfpbot
184 \@fpsep \@dblfpsep
185 \@fpbot \@dblfpbot
186 }

```

MARGINAL NOTES:

Marginal notes use the same mechanism as floats to communicate with the `\output` routine. Marginal notes are distinguished from floats by having a negative placement specification. The command `\marginpar [LTEXT]{RTEXT}` generates a marginal note in a parbox, using LTEXT if it's on the left and RTEXT if it's on the right. (Default is RTEXT = LTEXT.) It uses the following parameters.

```

\marginparwidth : Width of marginal notes.
\marginparsep   : Distance between marginal note and text.
                  the page layout to determine how to move the marginal
                  note into the margin. E.g., \leftmarginsep ==
                  \hskip -\marginparwidth \hskip -\marginparsep .
\marginparpush   : Minimum vertical separation between \marginpar's

```

Marginal notes are normally put on the outside of the page if `@mparswitch = true`, and on the right if `@mparswitch = false`. The command `\reversemarginpar` reverses the side where they are put. `\normalmarginpar` undoes `\reversemarginpar`. These commands have no effect for two-column output.

SURPRISE: if two marginal notes appear on the same line of text, then the second one could appear on the next page, in a funny position.

```

\marginpar [LTEXT]{RTEXT} ==
BEGIN
  if hmode then \bsphack
    \@floatpenalty := -10002
    else \@floatpenalty := -10003
  fi
  if inner
    then LaTeX Error: 'Not in outer paragraph mode.'
    \@floatpenalty := 0
  else if \@freelist has two elements:
    then get \@marbox, \@currbox from \@freelist
    \count\@marbox :=G -1
    else \@floatpenalty := 0
    LaTeX Error: 'Too many unprocessed floats'
    \@currbox, \@marbox := \@tempboxa    %%use \def
  fi
fi
if optional argument
then %% \@xmpar ==
  \savemarbox\@marbox{LTEXT}
  \savemarbox\@currbox{RTEXT}
else %% \@ympar ==
  \savemarbox\@marbox{RTEXT}
  \box\@currbox :=G \box\@marbox

```

```

fi
\@xympar
END

```

```

\reversemarginpar == BEGIN \@mparbottom :=G 0
                        @reversemargin :=G true
                        END

```

```

\normalmarginpar == BEGIN \@mparbottom :=G 0
                        @reversemargin :=G false
                        END

```

\marginpar

```

187 \def\marginpar{%
188   \ifhmode
189     \@bsphack
190     \@floatpenalty -\@Mii
191   \else
192     \@floatpenalty-\@Miii
193   \fi
194   \ifinner
195     \@parmoderr
196     \@floatpenalty\z@
197   \else
198     \@next\@currbox\@freelist{}{}%
199     \@next\@marbox\@freelist{\global\count\@marbox\m@ne}%
200     {\@floatpenalty\z@
201       \fletovf\def\@currbox{\@tempboxa}\def\@marbox{\@tempboxa}}%
202   \fi
203   \@ifnextchar [\@xmpar\@ympar}

```

\@xmpar

```

204 \long\def\@xmpar[#1]#2{%
205   \@savemarbox\@marbox{#1}%
206   \@savemarbox\@currbox{#2}%
207   \@xympar}

```

\@ympar

```

208 \long\def\@ympar#1{%
209   \@savemarbox\@marbox{#1}%
210   \global\setbox\@currbox\copy\@marbox
211   \@xympar}

```

\@savemarbox

```

212 \long\def \@savemarbox #1#2{%
213   \global\setbox #1%
214     \color@vbox
215     \vtop{%
216       \hsize\marginparwidth
217       \@parboxrestore
218       \@marginparreset
219       #2%
220       \@minipagefalse
221       \outer@nobreak
222     }%
223   \color@endbox
224 }

```

\@marginparreset The rational for allowing these normally global flags to be set locally here, via \@parboxrestore was stated originally by Donald Arsenau and extended by Chris

Rowley. It is because these flags are only set globally to true by section commands, and these should never appear within marginals or floats or, indeed, in any group; and they are only ever set globally to false when they are definitely true.

If anyone is unhappy with this argument then both flags should be treated as in `\set@nobreak`; otherwise this command will be redundant.

```
225 \def \@marginparreset {%
226     \reset@font
227     \normalsize
228 %     \let\if@nobreak\iffalse
229 %     \let\if@noskipsec\iffalse
230 %     \setnobreak
231     \@setminipage
232 }
```

`\@xympar`

Setting the box here is done only because the code uses `\end@float`; it will be empty and gets discarded.

```
233 \def \@xympar{%
234     \ifnum\@floatpenalty <\z@\@cons\@currlist\@marbox\fi
235     \setbox\@tempboxa
236         \color@vbox
237         \vbox \bgroup
238     \end@float
239     \@ignorefalse
240     \@esphack
241 }
```

`\reversemarginpar`

```
\normalmarginpar 242 \def\reversemarginpar{\global\@mparbottom\z@ \@reversemargintrue}
243 \def\normalmarginpar{\global\@mparbottom\z@ \@reversemarginfalse}
244 \message{footnotes,}
```

62.2 Footnotes

`\footnote{NOTE}` : User command to insert a footnote.

`\footnote[NUM]{NOTE}`: User command to insert a footnote numbered NUM, where NUM is a number – 1, 2, etc. For example, if footnotes are numbered *, **, etc. within pages, then `\footnote[2]{...}` produces footnote ‘**’. This command does not step the footnote counter.

`\footnotemark[NUM]` : Command to produce just the footnote mark in the text, but no footnote. With no argument, it steps the footnote counter before generating the mark.

`\footnotetext[NUM]{TEXT}` : Command to produce the footnote but no mark. `\footnote` is equivalent to `\footnotemark \footnotetext` .

As in PLAIN, footnotes use `\insert\footins`, and the following parameters:

`\footnotesize` : Size-changing command for footnotes.

`\footnotesep` : The height of a strut placed at the beginning of

every footnote.

`\skip\footins` : Space between main text and footnotes. The rule separating footnotes from text occurs in this space. This space lies above the strut of height `\footnotesep` which is at the beginning of the first footnote.

`\footnoterule` : Macro to draw the rule separating footnotes from text. It is executed right after a `\vspace` of `\skip\footins`. It should take zero vertical space—i.e., it should to a negative skip to compensate for any positive space it occupies. (See PLAIN.TEX.)

`\interfootnotelinepenalty` : Interline penalty for footnotes.

`\thefootnote` : In usual LaTeX style, produces the footnote number. If footnotes are to be numbered within pages, then the document style file must include an `\@addtoreset` command to cause the footnote counter to be reset when the page counter is stepped. This is not a good idea, though, because the counter will not always be reset in time to ensure that the first footnote on a page is footnote number one.

`\@thefnmark` : Holds the current footnote's mark—e.g., `\dag` or '1' or 'a'.

`\@mpfnnumber` : A macro that generates the numbers for `\footnote` and `\footnotemark` commands. It == `\thefootnote` outside a minipage environment, but can be changed inside to generate numbers for `\footnote`'s.

`\@makefnmark` : A macro to generate the footnote marker from `\@thefnmark`. The default definition was `\hbox{$^\@thefnmark$}`.

This is now replaced by
`\@thefnmark`

`\@makefntext{NOTE}` :

Must produce the actual footnote, using `\@thefnmark` as the mark of the footnote and `NOTE` as the text. It is called when effectively inside a `\parbox`, with `\hsize = \columnwidth`.

For example, it might be as simple as
`$^\@thefnmark$ NOTE`

In a minipage environment, `\footnote` and `\footnotetext` are redefined so that

(a) they use the counter `mpfootnote`

(b) the footnotes they produce go at the bottom of the minipage.

The switch is accomplished by letting `\@mpfn == footnote` or `mpfootnote` and `\thempfn == \thefootnote` or `\thempfootnote`, and by redefining `\@footnotetext` to be `\@mpfootnotetext` in the minipage.

`\footnote{NOTE}` ==
 BEGIN

```

\stepcounter{\@mpfn}
begingroup
  \protect == \noexpand
  \@thefnmark :=G eval (\thempfn)
endgroup
\@footnotemark
\@footnotetext{NOTE}
END

\footnote[NUM]{NOTE} ==
BEGIN
  begingroup
    \protect == \noexpand
    counter \@mpfn :=L NUM
    \@thefnmark :=G eval (\thempfn)
  endgroup
  \@footnotemark
  \@footnotetext{NOTE}
END

\footnotemark ==
BEGIN \stepcounter{footnote}
  begingroup
    \protect == \noexpand
    \@thefnmark :=G eval(\thefootnote)
  endgroup
  \@footnotemark
END

\footnotemark[NUM] ==
BEGIN
  begingroup
    footnote counter :=L NUM
    \protect == \noexpand
    \@thefnmark :=G eval(\thefootnote)
  endgroup
  \@footnotemark
END

\@footnotemark ==
BEGIN
  \leavevmode
  IF hmode THEN \@x@sf := \the\spacefactor FI
  \@makefnmark % put number in main text
  IF hmode THEN \spacefactor := \@x@sf FI
END

\footnotetext ==
BEGIN begingroup \protect == \noexpand
  \@thefnmark :=G eval (\thempfn)
endgroup
\@footnotetext
END

\footnotetext[NUM] ==
BEGIN begingroup counter \@mpfn :=L NUM
  \protect == \noexpand

```

```

\@thefnmark :=G eval (\thempfn)
endgroup
\@footnotetext
END

\footins LATEX does use the same insert for footnotes as PLAIN.
245 \newinsert\footins
      LATEX leaves these initializations for the \footins insert.
246 \skip\footins=\bigskipamount % space added when footnote is present
247 \count\footins=1000 % footnote magnification factor (1 to 1)
248 \dimen\footins=8in % maximum footnotes per page

\footnoterule LATEX keeps PLAIN TEX's \footnoterule as the default.
249 \def\footnoterule{\kern-3\p@
250   \hrule \@width 2in \kern 2.6\p@} % the \hrule is .4pt high

\thefootnote
251 \definecounter{footnote}
252 \def\thefootnote{\@arabic\c@footnote}

\thempfootnote The default display for the footnote counter in minipages is to use italic letters.
                We use \itshape not \textit as the latter would add an italic correction.
253 \definecounter{mpfootnote}
254 \def\thempfootnote{{\itshape\@alph\c@mpfootnote}}

\@makefnmark Default definition.
255 %\def\@makefnmark{\hbox{$\sim\@thefnmark\m@th$}}
256 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}

\textsuperscript This command provides superscript characters in the current text font. It's im-
                  plementation might change!!!
257 \DeclareRobustCommand*\textsuperscript[1]{%
258   \@textsuperscript{\selectfont#1}}

\@textsuperscript This command should not be used directly, but may be used to define other
                   commands \textsuperscript, \@makefnmark. #1 should always start with a
                   font selection command, to activate the font size switch.
259 \def\@textsuperscript#1{%
260   {\m@th\ensuremath{\sim\mbox{\fontsize\sf@size\z@#1}}}}

\footnotesep
261 \newdimen\footnotesep

\footnote
262 \def\footnote{\@ifnextchar[\@xfootnote{\stepcounter\@mpfn
263   \protected@xdef\@thefnmark{\thempfn}%
264   \@footnotemark\@footnotetext}}

\@xfootnote
265 \def\@xfootnote[#1]{%
266   \begingroup
267     \csname c@\@mpfn\endcsname #1\relax
268     \unrestored@protected@xdef\@thefnmark{\thempfn}%
269   \endgroup
270   \@footnotemark\@footnotetext}

```

```

\@footnotetext
271 \long\def\@footnotetext#1{\insert\footins{%
272   \reset@font\footnotesize
273   \interlinepenalty\interfootnotelinepenalty
274   \splittopskip\footnotesep
275   \splitmaxdepth \dp\strutbox \floatingpenalty \@MM
276   \hsize\columnwidth \@parboxrestore
277   \protected@edef\@currentlabel{%
278     \csname p@footnote\endcsname\@thefnmark
279   }%
280   \color@begingroup
281     \makefntext{%
282       \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
283   \color@endgroup}}%

\footnotemark
284 \def\footnotemark{%
285   \@ifnextchar[\@xfootnotemark
286     {\stepcounter{footnote}%
287     \protected@xdef\@thefnmark{\thefootnote}%
288     \@footnotemark}}

\@xfootnotemark
289 \def\@xfootnotemark[#1]{%
290   \begingroup
291     \c@footnote #1\relax
292     \unrestored@protected@xdef\@thefnmark{\thefootnote}%
293   \endgroup
294   \@footnotemark}

\@footnotemark
295 \def\@footnotemark{%
296   \leavevmode
297   \ifhmode\edef\@xsf{\the\spacefactor}\nobreak\fi
298   \makefnmark
299   \ifhmode\spacefactor\@xsf\fi
300   \relax}

\footnotetext
301 \def\footnotetext{%
302   \@ifnextchar [\@xfootnotenext
303     {\protected@xdef\@thefnmark{\thempfn}%
304     \@footnotetext}}

\@xfootnotenext
305 \def\@xfootnotenext[#1]{%
306   \begingroup
307     \csname c@\mpfn\endcsname #1\relax
308     \unrestored@protected@xdef\@thefnmark{\thempfn}%
309   \endgroup
310   \@footnotetext}

\thempfn
\@mpfn 311 \def\@mpfn{footnote}
312 \def\thempfn{\thefootnote}
313 </2kernel>

```


File H

ltidxglo.dtx

63 Index and Glossary Generation

Index and Glossary commands.

```

\makeindex      A preamble command to turn on indexing.
\makeglossary   A preamble command to turn on making glossary entries.
  \index        Make an index entry for #1.
  \glossary     Make a glossary entry for #1.

\makeindex ==
  BEGIN
    \index == BEGIN \@bsphack
              \begingroup
              \protect{X} == \string X\space
              %% added 3 Feb 87 for \index

commands

              %% in \footnotes
              re-\catcode special characters
              to 'other'
              \@wrindex

  END

  \@wrindex{ITEM} ==
    BEGIN
      write of {\indexentry{ITEM}{page number}}
      \endgroup
      \@esphack
    END

INITIALIZATION:

\index == BEGIN \@bsphack
          \begingroup
          re-\catcode special characters (in case '%' there)
          \@index
        END

  \@index{ITEM} == BEGIN \endgroup \@esphack END

Changes made 14 Apr 89 to write \glossaryentry's instead of
\indexentry's on the .glo file.
1 \<*2ekernel>
2 \message{index,}

\makeindex

3 \def\makeindex{%
4   \newwrite\@indexfile
5   \immediate\openout\@indexfile=\jobname.idx
6   \def\index{\@bsphack\begingroup
7     \sanitize
8     \@wrindex}\typeout
9     {Writing index file \jobname.idx}%

```

Opening the write channel should be done only once since on some OS multiple opens are forbidden and in any case it is useless. So we turn this into a no-op after use.

```
10 \let\makeindex\@empty
11 }
12 \@onlypreamble\makeindex
```

\@wrindex

```
13 \def\@wrindex#1{%
14   \protected@write\@indexfile{%
15     {\string\indexentry{#1}{\thepage}}}%
16   \endgroup
17   \@esphack}
```

\index

```
18 \def\index{\@bsphack\begingroup \@sanitize\@index}
```

\@index

```
19 \def\@index#1{\endgroup\@esphack}
```

\makeglossary

```
20 \def\makeglossary{%
21   \newwrite\@glossaryfile
22   \immediate\openout\@glossaryfile=\jobname.glo
23   \def\glossary{\@bsphack\begingroup
24     \@sanitize
25     \@wrglossary}\typeout
26     {Writing glossary file \jobname.glo }%
```

Opening the write channel should be done only once since on some OS multiple opens are forbidden and in any case it is useless. So we turn this into a no-op after use.

```
27   \let\makeglossary\@empty
28 }
29 \@onlypreamble\makeglossary
```

\@wrglossary

```
30 \def\@wrglossary#1{%
31   \protected@write\@glossaryfile{%
32     {\string\glossaryentry{#1}{\thepage}}}%
33   \endgroup
34   \@esphack}
```

\glossary

```
35 \def\glossary{\@bsphack\begingroup\@sanitize\@index}
36 </2ekernel>
```

File I

ltbibl.dtx

64 Bibliography Generation

A bibliography is created by the `thebibliography` environment, which generates a title such as “References”, and a list of entries. The `BIBTEX` program will create a file containing such an environment, which will be read in by the `\bibliography` command. With `BIBTEX`, the following commands will be used.

`\bibliography` `\bibliography{\file1,file2, ...,filen}` : specifies the bibdata files. Writes a `\bibdata` entry on the `.aux` file and tries to read in `mainfile.bbl`.
`\bibliographystyle` `\bibliographystyle{style}` : Writes a `\bibstyle` entry on the `.aux` file.
`thebibliography` The `thebibliography` environment is a list environment. To save the use of an extra counter, it should use `enumiv` as the item counter. Instead of using `\item`, items in the bibliography are produced by the following commands:
`\bibitem{<name>}` : Produces a numbered entry cited as `<name>`.
`\bibitem[<label>]{<name>}` : Produces an entry labeled by `<Label>` and cited by `<name>`.

The former is used for bibliographies with citations like [1], [2], etc.; the latter is used for citations like [Knuth82].

The document class must define the `thebibliography` environment. This environment has a single argument, which is the widest bibliography label— e.g., if the [Knuth67] is the widest entry, then this argument will be Knuth67. The `\thebibliography` command must begin a list environment, which the `\endthebibliography` command ends.

`\cite` Entries are cited by the command `\cite{<name>}`.
`\nocite` `\nocite{< citations>}` puts information on the `.aux` file that causes `BIBTEX` to include the `{< citations>}` list in the bibliography, but puts nothing in the text.
`\nocite{*}` is special: it tells `BIBTEX` to put the whole of a collection of references into the bibliography.

```
1 (*2kernel)
2 \message{bibliography,}
```

PARAMETERS

`\@cite` : A macro such that `\@cite{LABEL1,LABEL2}{NOTE}` produces the output for a `\cite[NOTE]{FOO1,FOO2}` command,
where entry `FOOi` is defined by `\bibitem[LABELi]{FOOi}`.
The switch `@tempswa` is true if the optional `NOTE` argument
is present.

The default definition is :

```
\@cite{LABELS}{NOTE} ==
  BEGIN [LABELS
    IF @tempswa = T THEN , NOTE FI
  ]
END
```

`\@biblabel` : A macro to produce the label in the bibliography entry. For `\bibitem[LABEL]{NAME}`, the label is generated by `\@biblabel{LABEL}`. It has the default definition `\@biblabel{LABEL} -> [LABEL]`.

CONVENTION

`\b@FOO` : The name or number of the reference created by `\cite{FOO}`

E.g., if `\cite{FOO}` -> [17] , then `\b@FOO` -> 17.

```

\bbibitem
3 \def\bbibitem{\@ifnextchar[\@lbbibitem\@bibitem}

\@lbbibitem
4 \def\@lbbibitem[#1]#2{\item[\@biblabel{#1}\hfill]\if@filesw
5     {\let\protect\noexpand
6     \immediate
7     \write\@auxout{\string\bibcite{#2}{#1}}}\fi\ignorespaces}

\@bibitem
8 \def\@bibitem#1{\item\if@filesw \immediate\write\@auxout
9     {\string\bibcite{#1}{\the\value{\@listctr}}}\fi\ignorespaces}

\bibcite
10 \def\bibcite{\@newl@bel b}

\citation
11 \let\citation\@gobble

\cite
12 \DeclareRobustCommand\cite{%
13   \@ifnextchar [{\@tempwatrue\@citex}{\@tempwafalse\@citex[]}}

\@citex \penalty\@m added to definition of \@citex to allow a line break after the ‘,’ in
citations like [Jones80,Smith77] (Added 23 Oct 86)
        space added after the ‘,’ (21 Nov 87)
14 \def\@citex[#1]#2{\leavevmode
15   \let\@citea\@empty
16   \@cite{\@for\@citeb:=#2\do
17     {\@citea\def\@citea{,\penalty\@m }%
18     \edef\@citeb{\expandafter\@firstofone\@citeb\@empty}%
19     \if@filesw\immediate\write\@auxout{\string\citation{\@citeb}}}\fi

Using \hbox instead of \mbox is fine because of the \leavevmode above. In fact
the use of a box around the citation contents is more than questionable in my
view (FMi), but within 2e I have to keep that for compatibility reasons as it
would probably change too many existing documents. Its main reason is to avoid
hyphenation of labels such as [FOOB89] into [FOO- B89] so in certain styles it
makes sense; but, for example, in author year citations it becomes more than
questionable.

So Chris added yet another hook here, as suggested by, at least, Donald Ar-
senau. Note that this one is inside the first argument of the \@cite hook. This
decouples the top-level typesetting of the citation from the details of the other
business conducted here. All this really needs a complete rethink to get the right
modularity.

20   \@ifundefined{b@\@citeb}{\hbox{\reset@font\bfseries ?}}%
21   \G@refundefinedtrue
22   \@latex@warning
23     {Citation ‘\@citeb’ on page \thepage \space undefined}}%
24   {\@cite@ofmt{\csname b@\@citeb\endcsname}}}{#1}}

\bbibdata
\bbibstyle 25 \let\bbibdata=\@gobble
26 \let\bbibstyle=\@gobble

```

`\bibliography`

```

27 \def\bibliography#1{%
28   \if@filesw
29     \immediate\write\@auxout{\string\bibdata{#1}}%
30   \fi
31   \@input@{\jobname.bbl}}

```

`\bibliographystyle`

```

32 \def\bibliographystyle#1{%
33   \ifx\@begindocumenthook\@undefined\else
34     \expandafter\AtBeginDocument
35   \fi
36   {\if@filesw
37     \immediate\write\@auxout{\string\bibstyle{#1}}%
38   \fi}}

```

`\nocite` (Added 14 Jun 85)

This puts information on the `.aux` file that causes BibTeX to include the citation list in the bibliography, but puts nothing in the text.

RmS 93/08/06: Made loop for `\nocite` like that for `\citex`, to get rid of leading spaces.

```

39 \def\nocite#1{\@bsphack

```

With the implementation designed already in L^AT_EX 2.09 the `\nocite` command will not work before `\begin{document}` since it tries to write to the `.aux` file which is not open before that point. As a result the “reference” will appear on the terminal and nothing else will happen.

This would be easy to fix, but then a document using the fix will silently fail on an older release of L^AT_EX, missing all citations done with `\nocite`. Thus we do only generate an error message and leave the fix for a L^AT_EX 2_ε successor.

```

40   \ifx\@onlypreamble\document

```

Since we are after `\begin{document}` we can do the citations:

```

41     \@for\@citeb:=#1\do{%
42       \edef\@citeb{\expandafter\@firstofone\@citeb}%
43       \if@filesw\immediate\write\@auxout{\string\citation{\@citeb}}\fi
44       \ifundefined{b@\@citeb}{\G@refundefinedtrue
45         \latex@warning{Citation ‘\@citeb’ undefined}}{}%
46     \else

```

But before `\begin{document}` we raise an error message:

```

47     \latex@error{Cannot be used in preamble}\@eha

```

Without the compatibility problems we could fix the problem as follows:

```

48     % \AtBeginDocument{\nocite{#1}}
49   \fi
50   \@esphack}

```

Since `\nocite{*}` should not produce a warning about undefined citation keys (see PR 557), we need to set the control sequence ‘`b@*`’ to something other than `\relax`. As a result `\cite{*}` will not warn either (but that never worked with BibTeX in the first place).

```

51 \expandafter\let\csname b@*\endcsname\@empty

```

64.1 Default definitions

This hook determines the ‘relative formatting’ of the two logical parts of a citation with comment.

`\@cite`

```

52 \def\@cite#1#2{[{\#1\if@tempswa , #2\fi}]}

```

`\@cite@ofmt` This is, in general, a command that appears to have one argument whose value is, in the kernel, a single cs whose name is the expansion of `b@ \@citeb`; the expansion of this cs will typically be some hmode material that produces the detailed typeset form of just the citations themselves.

```
53 \let \@cite@ofmt \hbox
```

`\@biblabel`

```
54 \def \@biblabel#1{[#1]}
55 \</2kernel>
```

File J

ltpage.dtx

65 Page styles and related commands

65.1 Page Style Commands

`\pagestyle{<style>}` : sets the page style of the current and succeeding pages to *style*

`\thispagestyle{<style>}` : sets the page style of the current page only to *style*.

To define a page style *style*, you must define `\ps@style` to set the page style parameters.

65.2 How a page style makes running heads and feet

The `\ps@...` command defines the macros `\@oddhead`, `\@oddfoot`, `\@evenhead`, and `\@evenfoot` to define the running heads and feet. (See output routine.) To make headings determined by the sectioning commands, the page style defines the commands `\chaptermark`, `\sectionmark`, etc., where `\chaptermark{<text>}` is called by `\chapter` to set a mark. The `\...mark` commands and the `\...head` macros are defined with the help of the following macros.

(All the `\...mark` commands should be initialized to no-ops.)

65.3 marking conventions

L^AT_EX extends T_EX's `\mark` facility by producing two kinds of marks a 'left' and a 'right' mark, using the following commands:

`\markboth{<left>}{<right>}` : Adds both marks.

`\markright{<right>}` : Adds a 'right' mark.

`\leftmark` : Used in the output routine, gets the current 'left' mark. Works like T_EX's `\botmark`.

`\rightmark` : Used in the output routine, gets the current 'right' mark. Works like T_EX's `\firstmark`. The marking commands work reasonably well for right marks 'numbered within' left marks—e.g., the left mark is changed by a `\chapter` command and the right mark is changed by a `\section` command. However, it does produce somewhat anomalous results if 2 `\markboth`'s occur on the same page.

Commands like `\tableofcontents` that should set the marks in some page styles use a `\mkboth` command, which is `\let` by the `pagestyle` command (`\ps@...`) to `\markboth` for setting the heading or to `\gobbletwo` to do nothing.

```
1 \*2kernel
```

`\pagestyle` User command to set the page style for this and following pages.

```
2 \def\pagestyle#1{%
3   \ifundefined{ps@#1}%
4     \undefinedpagestyle
5     {\@nameuse{ps@#1}}}
```

`\thispagestyle` User command to set the page style for this page only.

```
6 \def\thispagestyle#1{%
7   \ifundefined{ps@#1}%
8     \undefinedpagestyle
9     {\global\@specialpagetrue\gdef\@specialstyle{#1}}}
```

`\ps@empty` The empty page style: No head or foot line.

```
10 \def\ps@empty{%
11   \let\mkboth\gobbletwo\let\@oddhead\@empty\let\@oddfoot\@empty
12   \let\@evenhead\@empty\let\@evenfoot\@empty}
```

`\ps@plain` The plain page style: No head, centred page number in foot.

```

13 \def\ps@plain{\let\@mkboth\@gobbletwo
14   \let\@oddhead\@empty\def\@oddfoot{\reset@font\hfil\thepage
15     \hfil}\let\@evenhead\@empty\let\@evenfoot\@oddfoot}

```

`\@leftmark` We implement `\@leftmark` and `\@rightmark` in terms of already defined commands to save token space. We can't get rid of them since they are sometimes used in applications.

```

16 \let\@leftmark\@firstoftwo
17 \let\@rightmark\@secondoftwo

```

`\markboth` User commands for setting L^AT_EX marks.

`\markright` Test for `\@nobreak` added 15 Apr 86 in `\markboth` and `\markright` letting `\label` and `\index` to `\relax` added 22 Feb 86 so these commands can appear in sectioning command arguments RmS 91/06/21 Same for `\glossary`

```

18 \def\markboth#1#2{%
19   \begingroup
20     \let\label\relax \let\index\relax \let\glossary\relax
21     \unrestored@protected@xdef\@themark {{#1}{#2}}%
22     \@temptokena \expandafter{\@themark}%
23     \mark{\the\@temptokena}%
24   \endgroup
25   \if@nobreak\ifvmode\nobreak\fi\fi}
26 \def\markright#1{%
27   \begingroup
28     \let\label\relax \let\index\relax \let\glossary\relax

```

Protection is handled inside `\@markright`.

```

29     \expandafter\@markright\@themark {#1}%
30     \@temptokena \expandafter{\@themark}%
31     \mark{\the\@temptokena}%
32   \endgroup
33   \if@nobreak\ifvmode\nobreak\fi\fi}

```

`\@markright`

```

\leftmark 34 \def\@markright#1#2#3{\@temptokena {#1}%
\rightmark 35   \unrestored@protected@xdef\@themark{{\the\@temptokena}{#3}}}
36 \def\leftmark{\expandafter\@leftmark\botmark\@empty\@empty}
37 \def\rightmark{\expandafter\@rightmark\firstmark\@empty\@empty}

```

`\@themark` Initialise L^AT_EX's marks without setting a T_EX mark *<whatsit>*.

```

38 \def\@themark{{}{}}

```

`\mark` Test versions of L^AT_EX 2_ε initialised T_EX's `\mark` system at this point, but this was removed before the first release.

```

\AtBeginDocument{\mark{{}{}}}

```

`\raggedbottom` `\raggedbottom` typesets pages with no vertical stretch, so they have their natural height instead of all being exactly the same height. (Uses a space of .0001fil to avoid interfering with the 1fil space of `\newpage`.)

```

39 \def\raggedbottom{%
40   \def\@textbottom{\vskip \z@ \@plus.0001fil}\let\@texttop\relax}

```

`\flushbottom` `\flushbottom`: Inverse of `\raggedbottom` — makes all pages the same height.

```

41 \def\flushbottom{%
42   \let\@textbottom\relax \let\@texttop\relax}

```


`\sloppy` `\sloppy` will never (well, hardly ever) produce overfull boxes, but may produce underfull ones. (14 June 85)

```

43 \def\sloppy{%
44   \tolerance 9999%
45   \emergencystretch 3em%
46   \hfuzz .5\p@
47   \vfuzz\hfuzz}

```

`sloppypar` A `sloppypar` environment is equivalent to `{\par \sloppy ... \par}`.

```

48 \def\sloppypar{\par\sloppy}
49 \def\endsloppypar{\par}

```

`\fussy` Resets \TeX 's parameters to their normal finicky values.

```

50 \def\fussy{%
51   \emergencystretch\z@
52   \tolerance 200%
53   \hfuzz .1\p@
54   \vfuzz\hfuzz}

```

`\overfullrule` \LaTeX default is no overfull box rule. Changed by document class option.

```

55 \overfullrule 0pt
56 \</2kernel>

```

File K

ltoutput.dtx

66 Output Routine

66.1 Floats

The ‘2ekernel’ code ensures that a `\usepackage{autoout1}` is essentially ignored if a ‘full’ format is being used that has the autoloader file mode already in the format.

```

1 \def\begingroup
2 \def\makeatletter
3 \def\nfss@catcodes
4 \expandafter\let\csname ver@autoout1.sty\endcsname\fmtversion
5 \if2ekernel\autoloader
6 \message{output,}

*****
*                               *
*                               *
*****

```

PAGE LAYOUT PARAMETERS

```

\topmargin      : Extra space added to top of page.
@twoside        : boolean.  T if two-sided printing
\oddsidemargin  : IF @twoside = T
                  THEN extra space added to left of odd-numbered
                  pages.
                  ELSE extra space added to left of all pages.
\evensidemargin : IF @twoside = T
                  THEN extra space added to left of
even-numbered
                  pages.
\headheight     : height of head
\headsep        : separation between head and text
\footskip       : distance separation between baseline of last
                  line of text and baseline of foot.
                  Note difference between \footSKIP and \headSEP.
\textheight     : height of text on page, excluding head and foot
\textwidth      : width of printing on page
\columnsep      : IF @twocolumn = T
                  THEN width of space between columns
\columnseprule  : IF @twocolumn = T
                  THEN width of rule between columns (0 if none).
\columnwidth    : IF @twocolumn = T
                  THEN (\textwidth - \columnsep)/2
                  ELSE \textwidth
                  It is set by the \twocolumn and
                  \onecolumn commands.
\@textbottom    : Command executed at bottom of vbox holding text
of
                  page (including figures). The \raggedbottom
                  command almost \let's this to \vfil (actually sets
                  it to \vskip \z@ plus.0001fil).
                  Should have depth 0pt.

```

`\@texttop` : Command executed at top of vbox holding text of page (including figures). Used by letter style; can also be used to produce centered pages. Let to `\relax` by `\raggedbottom` and `\flushbottom`.

Page layout must initialize `\@colht` and `\@colroom` to `\textheight`.

PAGE STYLE PARAMETERS:

`\floatsep` : Space left between floats.
`\textfloatsep` : Space between last top float or first bottom float and the text.
`\topfigrule` : Command to place rule (or whatever) between floats at top of page and text. Executed in inner vertical mode right before the `\textfloatsep` skip separating the floats from the text. Must occupy zero vertical space. (See `\footnoterule`.)
`\botfigrule` : Same as `\topfigrule`, but put after the `\textfloatsep` skip separating text from the floats at bottom of page.
`\intextsep` : Space left on top and bottom of an in-text float.
`\dblfloatsep` : Space between double-column floats.
`\dbltextfloatsep` : Space between top double-column floats and text.
`\dblfigrule` : Similar to `\topfigrule`, but for double-column floats.
`\@fptop` : Glue to go at top of float column – must be 0pt + stretch
`\@fpsep` : Glue to go between floats in a float column.
`\@fpbot` : Glue to go at bottom of float column – must be 0pt + stretch
`\@dblfpptop`, `\@dblfpsep`, `\@dblfpbot` : Analogous for double-column float page in two-column format.

FOOTNOTES: As in PLAIN, footnotes use `\insert\footins`.

PAGE LAYOUT SWITCHES AND MACROS

`@twocolumn` : Boolean. T if two columns per page globally.

PAGE STYLE MACROS AND SWITCHES

`\@oddhead` : IF `@twoside = T`
THEN macro to generate head of
odd-numbered
pages.
ELSE macro to generate head of all pages.
`\@evenhead` : IF `@twoside = T`
THEN macro to generate head of
even-numbered
pages.
`\@oddfoot` : IF `@twoside = T`
THEN macro to generate foot of
odd-numbered

pages.
ELSE macro to generate foot of all pages.
`\@evenfoot` : IF `@twoside = T`
THEN macro to generate foot of
even-numbered pages.
`@specialpage` : boolean. T if current page is to have a special
format.
`\@specialstyle` : If its value is `foo` then
IF `@specialpage = T`
THEN the command `\ps@foo` is executed to
temporarily reset the page style parameters
before composing the current page.
This command should execute only `\def`'s
and `\edef`'s, making only local definitions.

FLOAT PLACEMENT PARAMETERS

The following parameters are set by the macro `\@floatplacement`.

When `\@floatplacement` is called,

`\@colht` is the height of the page or column being built. I.e.:

* For single-column page it equals `\textheight`.

* For double-column page it equals `\textheight - height`
of double-column floats on page.

Note that some are set globally and some locally:

`\@topnum` :=G Maximum number of floats allowed on the top of a
column.

`\@toproom` :=G Maximum amount of top of column devoted to floats—
excluding `\textfloatsep` separation below the floats
and `\floatsep` separation between them. For
two-column output, should be computed as a function
of `\@colht`.

`\@botnum`, `\@botroom`
: Analogous to above.

`\@colnum` :=G Maximum number of floats allowed in a column,
including in-text floats.

`\@textmin` :=L Minimum amount of text (excluding footnotes) that
must appear on a text page.

%% 27 Sep 85 : made local to

%% `\@addtocurcol` and `\@addtonextcol`

It is now also used locally in processing double
floats.

`\@fpmin` :=L Minimum height of floats in a float column.

The macro `\@dblfloatplacement` sets the following parameters.

`\@dbltopnum` :=G Maximum number of double-column floats allowed
at

the top of a two-column page.

`\@dbltoproom` :=G Maximum height of double-column floats allowed at
top of two-column page.

`\@fpmin` :=L Minimum height of floats in a float column.

It should also perform the following local assignments where necessary

– i.e., where the new value differs from the old one:

`\@fptop` :=L `\@dblfpptop`

`\@fpsep` :=L `\@dblfpsep`

`\@fpbot` :=L `\@dblfpbot`

OUTPUT ROUTINE VARIABLES

`\@colht` : The total height of the current column. In single column style, it equals `\textheight`. In two-column style, it is `\textheight` minus the height of the double-column floats on the current page. MUST BE INITIALIZED TO `\textheight`.

`\@colroom` : The height available in the current column for text and footnotes. It equals `\@colht` minus the height of all floats committed to the top and bottom of the current column.

`\@textfloatsheight` : The total height of in-text floats on the current page.

`\footins` : Footnote insertion number.

`\@maxdepth` : Saved value of TeX's `\maxdepth`. Must be set when any routine sets `\maxdepth`.

CALLING THE OUTPUT ROUTINE

The output routine is called either by TeX's normal page-breaking mechanism, or by a macro putting a penalty $< \text{or } = -10000$ in the output list. In the latter case, the penalty indicates why the output routine was called, using the following code.

penalty	reason
-10000	<code>\pagebreak</code> <code>\newpage</code>
-10001	<code>\clearpage</code> (<code>\penalty -10000 \vbox{}</code> <code>\penalty -10001</code>)
-10002	float insertion, called from horizontal mode
-10003	float insertion, called from vertical mode.
-10004	float insertion.

Note: A float or marginpar puts the following sequence in the output list:

- (i) a penalty of -10004,
- (ii) a null `\vbox`
- (iii) a penalty of -10002 or -10003.

This solves two special problems:

1. If the float comes right after a `\newpage` or `\clearpage`, then the first penalty is ignored, but the second one invokes the output routine.
2. If there is a split footnote on the page, the second 'page' puts out the rest of the footnote.

THE OUTPUT ROUTINE

FUNCTIONS USED IN THE OUTPUT ROUTINE:

`\@outputpage` : Produces an output page with the contents of box `\@outputbox` as the text part.

Also sets `\@colht :=G \textheight`.
The page style is determined as follows.
IF `@thispagestyle = true`
THEN use `\thispagestyle` style
ELSE use ordinary page style.

`\@tryfcolumn\FLIST` : Tries to form a float column composed of floats from `\FLIST` (if nonempty) with the following parameters:

`\@colht` : height of box
`\@fpmin` : minimum height of floats in the box
`\@fpsep` : interfloat space
`\@fptop` : glue at top of box
`\@fpbot` : glue at bottom of box.

If it succeeds, then it does the following:

* `\@outputbox :=L` the composed float box.
* `@fcolmade :=G true`
* `\FLIST :=G \FLIST` - floats put in box
* `\@freelist :=G \@freelist +` floats put in box

If it fails, then:

* `@fcolmade :=G false`

NOTE: BIT MUST BE A SINGLE TOKEN!

`\@makefcolumn \FLIST` : Same as `\@tryfcolumn` except that it fails to make a float column only if `\FLIST` is empty. Otherwise, it makes a float column containing at least the first box in `\FLIST`, disregarding `\@fpmin`.

`\@startcolumn` :

Calls `\@tryfcolumn\@deferlist`. If `\@tryfcolumn` returns with (globally set) `@fcolmade = false`, then:

* Globally sets `\@toplist` and `\@botlist` to floats from `\@deferlist` to go at top and bottom of column, deleting them from `\@deferlist`. It does this using `\@colht` as the total height, the page style parameters `\@floatsep` and `\@textfloatsep`, and the float placement parameters `\@topnum`, `\@toproom`, `\@botnum`, `\@botroom`, `\@colnum` and `\textfraction`.
* Globally sets `\@colroom` to `\@colht` minus the height of the added floats.

`\@startdblcolumn` :

Calls `\@tryfcolumn\@dbldeferlist{8}`. If `\@tryfcolumn` returns with (globally set) `@fcolmade = false`, then:

* Globally sets `\@dbltoplist` to floats from `\@dbldeferlist` to go at top and bottom of column, deleting them from `\@dbldeferlist`. It does this using `\textheight` as the total height, and the parameters `\@dblfloatsep`, etc.
* Globally sets `\@colht` to `\textheight` minus the height of the added floats.

`\@combinefloats` : Combines the text from box

`\@outputbox` with the floats from `\@toplist` and

`\@botlist`,

putting the new box in `\@outputbox`. It uses `\floatsep` and `\textfloatsep` for the appropriate separations.

It puts the elements of `\TOPLIST` and `\BOTLIST` onto

`\@freelist`, and makes those lists null.

`\@makecol` : Makes the contents of `\box255` plus the accumulated footnotes, plus the floats in `\@toplist` and `\@botlist`, into a single column of height `\@colht` (unless the page height has been locally changed), which it puts into box `\@outputbox`. It puts boxes in `\@midlist` back onto `\@freelist` and restores `\maxdepth`.

`\@opcol` : Outputs a column whose text is in box `\@outputbox`
If `@twocolumn = false`, then it calls `\@outputpage`, sets `\@colht :=G \textheight`, and calls `\@floatplacement`.

If `@twocolumn = true`, then:

If `@firstcolumn = true`, then it puts box `\@outputbox` into `\@leftcolumn` and sets `@firstcolumn :=G false`.

If `@firstcolumn = false`, then it puts out the current two-column page, any possible two-column float pages, and determines `\@dbltoplist` for the next page.

USER COMMANDS THAT CALL OR AFFECT THE OUTPUT ROUTINE

`\newpage == BEGIN \par\vfil\penalty -10000 END`

`\clearpage == BEGIN \newpage`
 `\write -1{}` % Part of hack to make sure no
 `\vbox{}` % `\write`'s get lost.
 `\penalty -10001`
 `END`

`\cleardoublepage == BEGIN \clearpage`
 if `@twoside = true` and `c@page` is even
 then `\hbox{}` `\newpage fi`
 `END`

`\twocolumn[BOX]` : starts a new page, changing to `twocolumn` setting and puts `BOX` in a parbox of width `\textwidth` across the top. Useful for full-width titles for double-column pages.
SURPRISE: The stretch from `\@dbltextfloatsep` will be inserted between the `BOX` and the top of the two columns.

FLOAT-HANDLING MECHANISMS

The float environment obtains an insertion number `B` from the `\@freelist` (see below for a description of list manipulation), puts the float into box `B` and sets `\count B` to a FLOAT SPECIFIER. For a normal (not double-column) float, it then causes a page break in one of the following two ways:

- In outer hmode: `\vadjust{\penalty -10002}`
- In vmode : `\penalty -10003`.

For a double-column float, it puts B onto the `\@dbldeferlist`.
The float specifier has two components:

- * A PLACEMENT SPECIFICATION, describing where the float may be placed.
- * A TYPE, which is a power of two—e.g., figures might be type 1 floats, tables type 2 floats, programs type 4 floats, etc.

The float specifier is encoded as follows, where bit 0 is the least significant bit.

Bit	Meaning
0	1 iff the float may go where it appears in the text.
1	1 iff the float may go on the top of a page.
2	1 iff the float may go on the bottom of a page.
3	1 iff the float may go on a float page.
4	1 unless the PLACEMENT includes a !
5	1 iff a type 1 float
6	1 iff a type 2 float
etc.	

A negative float specifier is used to indicate a marginal note.

MACROS AND DATA STRUCTURES FOR PROCESSING FLOATS

A FLOAT LIST consisting of the floats in boxes `\boxa ... \boxN` has the form:

`\@elt \boxa ... \@elt \boxN`

where `\boxI` is defined by

`\newinsert\boxI`

Normally, `\@elt` is `\let` to `\relax`. A test can be performed on the entire float list by locally `\def`'ing `\@elt` appropriately and executing the list.

This is a lot more efficient than looping through the list.

The following macros are used for manipulating float lists.

```

\@next \CS \LIST {NONEMPTY}{EMPTY} == %% NOTE: ASSUME
\@elt = \relax
  BEGIN assume that \LIST == \@elt \B1 ... \@elt \Bn
    if n = 0
      then EMPTY
    else \CS :=L \B1
        \LIST :=G \@elt \B2 ... \@elt \Bn
        NONEMPTY
    fi
  END

```

`\@bitor\NUM\LIST` : Globally sets switch `@test` to the disjunction for all I of bit `log2 \NUM` of the float specifiers of all the floats in `\LIST`.

I.e., `@test` is set to true iff there is at least one float in `\LIST` having bit `log2 \NUM` of its float specifier equal to 1.

Note: $\log_2 [(\backslash\text{count I})/32]$ is the bit number corresponding to the type of float I. To see if there is any float in `\LIST` having the same type as float I, you run `\@bitor` with
 $\backslash\text{NUM} = [(\backslash\text{count I})/32] * 32.$

```
\@bitor\NUM\LIST ==
BEGIN
  @test :=G false
  { \@elt \CTR == if \NUM <> 0 then
                        if \count\CTR / \NUM is odd
                        then @test := true          fi fi
  \LIST
  }
END
```

`\@cons\LIST\NUM` : Globally sets `\LIST := \LIST * \@elt \NUM`

```
\@cons\LIST\NUM ==
BEGIN { \@elt == \relax
        \LIST :=G \LIST \@elt \NUM
      }
```

BOX LISTS FOR FLOAT-PLACEMENT ALGORITHMS

```
\@freelist      : List of empty boxes for placing new floats.
\@toplist       : List of floats to go at top of current column.
\@midlist       : List of floats in middle of current column.
\@botlist       : List of floats to go at bottom of current column.
\@deferlist     : List of floats to go after current column.
\@dbltoplist    : List of double-col. floats to go at top of current
                  page.
\@dbldeferlist  : List of double-column floats to go on subsequent
                  pages.
```

FLOAT-PLACEMENT ALGORITHMS

`\@addtobot` : Tries to put insert `\@currbox` on `\@botlist`.
 Called only when:

```
* \ht BOX < \@colroom
* type of \@currbox not on \@deferlist
* \@colnum > 0
* @insert = false
```

If it succeeds, then:

```
* sets @insert true
* decrements \@botroom by \ht BOX
* decrements \@botnum and \@colnum by 1
* decrements \@colroom by \ht BOX + either
```

`\floatsep`

or `\textfloatsep`, as appropriate.

```
* sets \maxdepth to 0pt
```

`\@addtotoporbot` : Tries to put insert `\@currbox` on `\@toplist` or `\@botlist`.
 Called only under same conditions as `\@addtobot`.

```

                                If it succeeds, then:
                                * sets @insert true
                                * decrements \@toproom or \@botroom by \ht
BOX
                                * decrements \@colnum and either \@topnum or
                                \@botnum by 1
                                * decrements \@colroom by \ht BOX +
\floatsep
                                or \textfloatsep, as appropriate.

\@addtocurcol : Tries to add \@currbox to current column, setting
                @insert true if it succeeds, false otherwise.
                It will add \@currbox to top only if bit 0 of
                \count \@currbox is 0, and to the bottom only if
                bit 0 = 0 or an earlier float of the same type is
                put on the bottom.
                If the float is put in the text, then
                \penalty\interlinepenalty is put
                right after the float, before the following \vskip,
                and \outputpenalty :=L 0.

\@addtonextcol : Tries to add \@currbox to the next column, setting
                @insert true if it succeeds, false otherwise.

\@addtodblcol : Tries to add \@currbox to the next double-column page,
                adding it to \@dbltoplist if it succeeds and
                \@dbldeferlist if it fails.

\@addmarginpar ==
BEGIN
  if \@currlist nonempty
  then remove \@marbox from \@currlist
    add \@marbox and \@currbox to \@freelist
    %% NOTE: \@currbox = left box
  else LaTeX error: ? %% shouldn't happen
  fi
  \@tempcnta := 1      %% 1 = right, -1 = left
  if @twocolumn = true
  then if @firstcolumn = true
    then \@tempcnta := -1
    fi
  else if @mparswitch = true
    then if count0 odd
      else \@tempcnta := -1
      fi
    fi
  if @reversemargin = true
    then \@tempcnta := -\@tempcnta
    fi
  fi
  if \@tempcnta < 0 then \box\@marbox :=G \box\@currbox
  fi
  \@tempdima :=L maximum(\@mparbottom - \@pageht
                        + ht of \@marbox, 0)
  if \@tempdima > 0 then LaTeX warning: 'marginpar moved' fi
  \@mparbottom :=G \@pageht + \@tempdima + depth of \@marbox

```

```

+ \marginparpush
\@tempdima :=L \@tempdima - ht of \@marbox
\box\@marbox :=G \box\@currbox
\ vbox { \vskip \@tempdima
\ box\@marbox
}
height of \@marbox :=G depth of \@marbox :=G 0
\kern -\@pagedp
\nointerlineskip
\hbox{ if @tempcnta > 0 then \hskip \columnwidth
\hskip \marginparsep
else \hskip -\marginparsep
\hskip -\marginparwidth
fi
\box\@marbox \hss
}
\nobreak
\nointerlineskip
\hbox{\vrule height 0 width 0 depth \@pagedp}
END

```

Floats and marginpars add a lot of dead cycles.

```

7 \maxdeadcycles = 100

8 \let\@elt\relax

9 \def\@next#1#2#3#4{\ifx#2\@empty #4\else
10 \expandafter\@xnext #2\@#1#2#3\fi}

11 \def\@xnext \@elt #1#2\@#3#4{\def#3{#1}\gdef#4{#2}}

\changes{v1.1v}{1996/07/26}{put \cs{global} into definition}

12 \def\@testfalse{\global\let@if@test\iffalse}
13 \def\@testtrue {\global\let@if@test\iftrue}
14 \@testfalse

\changes{v1.1v}{1996/07/26}{remove \cs{global} before \cs{@test...}}

15 \def\@bitor#1#2{\@testfalse {\let\@elt\@xbitor
16 \@tempcnta #1\relax #2}}

```

RmS 91/11/22: Added test for `|\count#1 = 0|`.
Suggested by Chris Rowley.

```

\changes{v1.1v}{1996/07/26}{remove \cs{global} before \cs{@test...}}

17 \def\@xbitor #1{\@tempcntb \count#1
18 \ifnum \@tempcnta =\z@
19 \else
20 \divide\@tempcntb\@tempcnta
21 \ifodd\@tempcntb \@testtrue\fi
22 \fi}

```

DEFINITION OF FLOAT BOXES:

```

23 \newinsert\bx@A
24 \newinsert\bx@B
25 \newinsert\bx@C
26 \newinsert\bx@D
27 \newinsert\bx@E
28 \newinsert\bx@F
29 \newinsert\bx@G
30 \newinsert\bx@H

```

```

31 \newinsert\bx@I
32 \newinsert\bx@J
33 \newinsert\bx@K
34 \newinsert\bx@L
35 \newinsert\bx@M
36 \newinsert\bx@N
37 \newinsert\bx@O
38 \newinsert\bx@P
39 \newinsert\bx@Q
40 \newinsert\bx@R

41 \gdef\@freelist{\@elt\bx@A\@elt\bx@B\@elt\bx@C\@elt\bx@D\@elt\bx@E
42             \@elt\bx@F\@elt\bx@G\@elt\bx@H\@elt\bx@I\@elt\bx@J
43             \@elt\bx@K\@elt\bx@L\@elt\bx@M\@elt\bx@N
44             \@elt\bx@O\@elt\bx@P\@elt\bx@Q\@elt\bx@R}

45 \gdef\@toplist{}
46 \gdef\@botlist{}
47 \gdef\@midlist{}
48 \gdef\@currlist{}
49 \gdef\@deferlist{}
50 \gdef\@dbltoplist{}
51 \gdef\@dbldeferlist{}

```

PAGE LAYOUT PARAMETERS

```

52 \newdimen\topmargin
53 \newdimen\oddsidemargin
54 \newdimen\evensidemargin
55 \let\@themargin=\oddsidemargin
56 \newdimen\headheight
57 \newdimen\headsep
58 \newdimen\footskip
59 \newdimen\textheight
60 \newdimen\textwidth
61 \newdimen\columnwidth
62 \newdimen\columnsep
63 \newdimen\columnseprule
64 \newdimen\marginparwidth
65 \newdimen\marginparsep
66 \newdimen\marginparpush

```

`\AtBeginDvi` We use a box register in which to put stuff that must appear before anything else in the .dvi file.

The stuff in the box should not add any typeset material to the page when it is unboxed.

```

67 \newbox\@begindvibox
68 \def \AtBeginDvi #1{%
69   \global \setbox \@begindvibox
70   \vbox{\unvbox \@begindvibox #1}%
71 }

```

`\@maxdepth` This is not the right place to set this; it needs to be set in a class/style file when `\maxdepth` is set.

Also, many settings to `\maxdepth` should be to `\@maxdepth`, probably?

```

72 \newdimen\@maxdepth
73 \@maxdepth = \maxdepth

```

`\paperheight` New `\paper...` registers.

```

\paperwidth 74 \newdimen\paperheight
75 \newdimen\paperwidth

```

`\if@insert` Local switches first:

```

\if@fcolmade 76 \newif \if@insert

```

`\if@specialpage`

`\if@firstcolumn`

`\if@twocolumn`

`\if@twoside`

`\if@reversemarginpar`

`\if@mparswitch`

`\col@number`

These should definitely be global:

```
77 \newif \if@fcolmade
78 \newif \if@specialpage \@specialpagefalse
```

These should be global but are not always set globally in other files.

```
79 \newif \if@firstcolumn \@firstcolumntrue
80 \newif \if@twocolumn \@twocolumnfalse
```

Not sure about these: two questions. Should things which must apply to a whole document be local or global (they probably should be ‘preamble only’ commands)? Are these three such things?

```
81 \newif \if@twoside \@twosidefalse
82 \newif \if@reversemargin \@reversemarginfalse
83 \newif \if@mparswitch \@mparswitchfalse
```

This counter has been imported from ‘multicol’.

```
84 \newcount \col@number
85 \col@number \@ne
```

INTERNAL REGISTERS

```
86 \newcount\@topnum
87 \newdimen\@toproom
88 \newcount\@dbltopnum
89 \newdimen\@dbltoproom
90 \newcount\@botnum
91 \newdimen\@botroom
92 \newcount\@colnum
93 \newdimen\@textmin
94 \newdimen\@fpmin
95 \newdimen\@colht
96 \newdimen\@colroom
97 \newdimen\@pageht
98 \newdimen\@pagedp
99 \newdimen\@mparbottom \@mparbottom\z@
100 \newcount\@currtype
101 \newbox\@outputbox
102 \newbox\@leftcolumn
103 \newbox\@holdpg

104 \def\@thehead{\@oddhead} % initialization
105 \def\@thefoot{\@oddfoot}
```

`\clearpage` The tests at the beginning are an experimental attempt to avoid a completely empty page after a `\twocolumn[...]`. This prevents the text from the argument vanishing into a float box, never to be seen again. We hope that it does not produce wrong formatting in other cases.

```
106 \def\clearpage{%
107   \ifvmode
108     \ifnum \@dbltopnum =\m@ne
109       \ifdim \pagetotal <\topskip
110         \hbox{}%
111       \fi
112     \fi
113   \fi
114   \newpage
115   \write\m@ne{}%
116   \vbox{}%
117   \penalty -\@Mi
118 }
```

`\cleardoublepage`

```

119 \def\cleardoublepage{\clearpage\if@twoside \ifodd\c@page\else
120   \hbox{}\newpage\if@twocolumn\hbox{}\newpage\fi\fi\fi}
121 \</2kernel | autoload)

```

\onecolumn

```

122 \<*2kernel | autoload | fltrace)
123 \def\onecolumn{%
124   \clearpage
125   \global\columnwidth\textwidth
126   \global\hsize\columnwidth
127   \global\linewidth\columnwidth
128   \global\@twocolumnfalse
129   \col@number \@one
130   \@floatplacement}

```

\newpage The two checks at the beginning ensure that an item label or run-in section title immediately before a **\newpage** get printed on the correct page, the one before the page break.

All three tests are largely to make error processing more robust; that is why they all reset the flags explicitly, even when it would appear that this would be done by a **\leavevmode**.

```

131 \def \newpage {%
132   \if@noskipsec
133     \ifx \@nodocument\relax
134       \leavevmode
135       \global \@noskipsecfalse
136     \fi
137   \fi
138   \if@inlabel
139     \leavevmode
140     \global \@inlabelfalse
141   \fi
142   \if@nobreak \@nobreakfalse \everypar{}\fi
143   \par
144   \vfil
145   \penalty -\@M}

```

\@emptycol It may be better to use an invisible rule rather than an empty box here.

```

146 \def \@emptycol {\vbox{}\penalty -\@M}

```

\twocolumn There are several bug fixes to the two-column stuff here.

```

\@topnewpage 147 \def \twocolumn {%
148   \clearpage
149   \global\columnwidth\textwidth
150   \global\advance\columnwidth-\columnsep
151   \global\divide\columnwidth\tw@
152   \global\hsize\columnwidth
153   \global\linewidth\columnwidth
154   \global\@twocolumntrue
155   \global\@firstcolumntrue
156   \col@number \tw@

```

There is no reason to put a **\@dblfloatplacement** here since **\@topnewpage** ignores these settings. The **\@floatplacement** is needed in case this comes after some changes.

```

157   \ifnextchar [\@topnewpage\@floatplacement
158 }

```

Note that here, getting a box from the freelist can assume success since this comes just after a **\clearpage**.

```

159 \long\def \@topnewpage [#1]{%

```

```

160 \nodocument
161 \next\@currbox\@freelist{}\}%
162 \global \setbox\@currbox
163 \color@vbox
164 \normalcolor
165 \vbox {%
166 \hsize\textwidth
167 \@parboxrestore
168 \col@number \@ne
169 #1%
170 \vskip -\dbltextfloatsep
171 }%
172 \color@endbox

```

Added size test and warning message; perhaps we should use an error message.

```

173 \ifdim \ht\@currbox>\textheight
174 \ht\@currbox \textheight
175 \fi

```

This next line is not essential but it is more robust to make this value non-zero, in case of weird errors.

This next bit is what is needed from `\@addtodblcol`, plus some extra checks for error trapping.

```

176 \global \count\@currbox \tw@
177 \tempdima -\ht\@currbox
178 \advance \@tempdima -\dbltextfloatsep
179 \global \advance \@colht \tempdima
180 \ifx \@dbltoplist \@empty
181 \else
182 \latexerr{Float(s) lost}\@ehb
183 \let \@dbltoplist \@empty
184 \fi
185 \@cons \@dbltoplist \@currbox

```

This setting of `\@dbltopnum` is used only to change the typesetting in `\@combinedblfloats`.

```

186 \global \@dbltopnum \m@ne
187 (*trace)
188 \tr@ce{dbltopnum set to -1 (= \the \@dbltopnum) (topnewpage)}%
189 (/trace)

```

At points such as this we need to check that there is still a minimal amount of room left on the page; this uses an arbitrary small value at present; but note that this value is larger than that used when checking that page is too full of normal floats.

If there is little room left we just force a page-break, OK? This involves producing two empty columns. The second empty column may be produced by `\output`, in which case an extra, misleading, warning will be generated, OK? (This happens only when there is too little room left on the page for any float.) Otherwise (i.e. if the size is such that it is allowed as a normal float) the extra `\@emptycol` will be invoked in the second column by the conditional code guarded by the `\if@firstcolumn` test.

I now think that the cut-off point here should be `3\baselineskip`, but we make it a bit less so that 3 lines of text will be allowed, OK?

Since this happens only when there is nothing on the page but the ‘top-box’, the empty box should not cause any problem other than some overfull box messages, which is not entirely misleading.

Here we need two page-ends since both columns need to be empty.

```

190 \ifdim \@colht<2.5\baselineskip
191 \latex@warning@no@line {Optional argument of \noexpand\twocolumn
192 too tall on page \thepage}%
193 \@emptycol

```

```

194 \if@firstcolumn
195 \else
196 \emptycol
197 \fi
198 \else
199 \global \vsize \@colht
200 \global \@colroom \@colht
201 \floatplacement
202 \fi
203 }

```

`\output` This needs some small adjustments. We cannot guarantee that the float mechanism will interact correctly with this stuff, but that mechanism does not always work properly with footnotes already.

RmS 91/09/29:

added reset of `\par` to the output routine. This avoids problems when the output routine is called within a list where `\par` may be a no-op.

```

204 \output {%
205 \let \par \@par
206 \ifnum \outputpenalty<-\@M
207 \specialoutput
208 \else
209 \@makecol
210 \@opcol

```

Moved to `\@opcol: \floatplacement`.

```

211 \@startcolumn

```

This loop could be replaced by an `\expandafter` tail recursion in `\@startcolumn`.

```

212 \@whilesw \if@fcolmade \fi
213 {%
214 (*trace)
215 \tr@ce{PAGE: float \if@twocolumn column \else page \fi
216 completed}%
217 </trace>
218 \@opcol\@startcolumn}%
219 \fi
220 \ifnum \outputpenalty>-\@Miv

```

At points such as this we need to check that there is still a minimal amount of room left on the page; this uses an arbitrary small value at present. If there is little room left we just force a page-break, OK?

This bit is essential only if a float has just been processed so maybe it should be moved; but this is the natural place at which to set the `vsize` and a test would need to be done anyway. A check has been added to ensure that there really has been a change in the value of `\@colroom`.

Since this happens only when there is nothing on the page but floats, the empty box should not cause any problem other than some overfull box messages, which is not entirely misleading.

The twocolumn case does not need any extra code here since this is the `\output` itself; in the second column there will still not be enough room left so `\emptycol` will be executed again when the OR is called by the page builder when it gets to the penalty inserted by the first execution. (The page-builder is never invoked whilst the OR is being executed since it builds a inner vlist; thus any conditional code for the two-column case within `\output` may not get executed with the correct value of `\if@firstcolumn`.

```

221 \ifdim \@colroom<1.5\baselineskip
222 \ifdim \@colroom<\textheight
223 \latex@warning@no@line {Text page \thepage\space
224 contains only floats}%
225 \emptycol

```



```

226 %          \if@twocolumn
227 %          \if@firstcolumn
228 %          \else
229 %          \@emptycol
230 %          \fi
231 %          \fi
232      \else
233      \global \vsize \@colroom
234      \fi
235      \else
236      \global \vsize \@colroom
237      \fi
238      \else
239      \global \vsize \maxdimen
240      \fi
241 }
242 </2ekernel | autoload | fltrace>

CHANGES TO \@specialoutput:
* \penalty\z@ changed to \penalty\interlinepenalty so \samepage
works properly with figure and table environments.
(Changed 23 Oct 86)

* Definition of \@specialoutput changed 26 Feb 88 so \@pageht and
\@pagedp aren't changed for a marginal note.
(Change suggested by Chris Rowley.)

243 <*2ekernel | def1 | autoload | fltrace>
244 \gdef\@specialoutput{%
245   \ifnum \outputpenalty>-\@Mii
246     \doclearpage
247   \else
248     \ifnum \outputpenalty<-\@Miii
249       \ifnum \outputpenalty<-\@MM \deadcycles \z@ \fi
250       \global \setbox\@holdpg \vbox {\unvbox\@cclv}%
251     \else

```

Note that \boxmaxdepth should not be set here since we wish to record the natural depth of the holdpg box.

This is changed so as to not lose anything, such as writes and marks, which may get into box 255 and should be returned to the list. This should only happen when the first penalty in the mechanism is discarded and therefore \@holdpg should always be void in this case. This can happen because a penalty is discarded whenever there is no box on the list.

It was just: \setbox\@tempboxa \box \@cclv.

The last box which is removed is the box put there by the double-penalty mechanism. The \unskip then removes the \topskip which is put there since the box is the first on the page.

```

252   \global \setbox\@holdpg \vbox{%
253     \unvbox\@holdpg
254     \unvbox\@cclv

```

We must now remove the box added by the float mechanism and the \topskip glue therefore added above it by T_EX.

```

255     \setbox\@tempboxa \lastbox
256     \unskip
257   }%

```

These two are needed as separate dimensions only by \@addmarginpar; for other purposes we put the whole size into \@pageht (see below).

```

258   \@pagedp \dp\@holdpg
259   \@pageht \ht\@holdpg
260   \unvbox \@holdpg

```

```

261      \@next\@currbox\@currlist{%
262      \ifnum \count\@currbox>\z@
Putting the whole size into \@pageht (see above).
263      \advance \@pageht \@pagedp
264      \ifvoid\footins \else
265      \advance \@pageht \ht\footins
266      \advance \@pageht \skip\footins
267      \advance \@pageht \dp\footins
268      \fi
269 \*2ekernel | def1)
270      \ifvbox \@kludgeins

```

We want to make the adjustment due to this insert only if the non-star form is used. The *-form will probably not work with floats, but maybe it still could make some adjustment here even so?

```

271      \ifdim \wd\@kludgeins=\z@
272      \advance \@pageht \ht\@kludgeins
273 \*trace)
274      \tr@ce {Extra size added: \the \ht\@kludgeins}%
275 \trace)
276      \fi
277      \fi
278 \2ekernel | def1)

```

This version puts the inserts back just before the additional material; it could be moved earlier, before unboxing the page-so-far. Neither is guaranteed not to put things on the wrong page. This version is similar to the original version.

```

279      \@reinserts
280      \@addtocurcol
281      \else
282      \@reinserts
283      \@addmarginpar
284      \fi
285      }\@latexbug

```

A 2e change: use `\addpenalty` instead of `\penalty` here. Some penalty is needed to create a potential break-point immediately after the reinserts (or the marginal). Otherwise there can be no possibility to break here and this can cause the reinserts or the marginal to appear on the next page (which is often incorrect). However, if the nobreak flag is true, a `\nobreak` must be correct.

```

286      \ifnum \outputpenalty<\z@
287      \if@nobreak
288      \nobreak
289      \else
290      \addpenalty \interlinepenalty
291      \fi
292      \fi
293      \fi
294      \fi
295 }
296 \2ekernel | def1 | autoload | fltrace)

```

`\@doclearpage` This is a very much an emergency action, just dumping everything: footnotes first then floats. A more sophisticated version is needed; but even more urgent is a bug-free version (see, for example, pr/3528).

Also, it puts any left-over non-boxes (writes, specials, etc.) back after any float pages created: this is a very bad bug since, for example, a kludge insert will be in quite the wrong place and, worse, be irremovable and uncancellable.

```

297 \*2ekernel | autoload)
298 \def \@doclearpage {%
299      \ifvoid\footins

```

We empty any left over kludge insert box here; this is a temporary fix. It should perhaps be applied to one page of cleared floats, but who cares? The whole of this stuff needs completely redoing for many such reasons.

```

300     \ifvbox\@kludgeins
301     {\setbox \@tempboxa \box \@kludgeins}%
302 \trace
303     \trace {kludgeins box made void}%
304 \traced
305     \fi
306     \setbox\@tempboxa\vsplit\@cclv to\z@ \unvbox\@tempboxa
307     \setbox\@tempboxa\box\@cclv
308     \xdef\@deferlist{\@toplist\@botlist\@deferlist}%

309     \global \let \@toplist \@empty
310     \global \let \@botlist \@empty
311     \global \@colroom \@colht
312     \ifx \@currlist\@empty
313     \else
314         \latexerr{Float(s) lost}\@ehb

315         \global \let \@currlist \@empty
316     \fi
317     \makecolumn\@deferlist
318     \@whiles\if@colmade \fi{\@opcol\@makecolumn\@deferlist}%
319     \iftwocolumn
320     \if@firstcolumn
321         \xdef\@dbldeferlist{\@dbltoplist\@dbldeferlist}%

322         \global \let \@dbltoplist \@empty
323         \global \@colht \textheight
324         \begingroup
325             \dblfloatplacement
326             \makecolumn\@dbldeferlist
327             \@whiles\if@colmade \fi{\@outputpage
328                                     \makecolumn\@dbldeferlist}%
329         \endgroup
330     \else
331         \vbox{}\clearpage
332     \fi
333     \fi
334 \else
335     \setbox\@cclv\vbox{\box\@cclv\vfil}%
336     \makecol\@opcol
337     \clearpage
338 \fi
339 }
340 \if2kernel | autoload

```

\@opcol Several changes in detail here.

```

341 \if2kernel | autoload | ftrace
342 \def \@opcol {%
343     \iftwocolumn
344         \outputdblcol
345     \else
346         \outputpage
347 \trace
348     \trace{PAGE: one column (float? see above) page completed}%
349 \traced

```

Not needed since it comes after \@outputpage:

```

350 % \global\@colht\textheight
351 \fi

```

These do not need to be done every time `\@opcol` is used: they should be grouped together since they all need to be done at the end of the non-special output routine, or at the end of a clearpage one.

```

352 \global \mparbottom \z@ \global \@textfloatsheight \z@
353 \@floatplacement
354 }
355 </2ekernel | autoload | fltrace>

```

`\@makecol` We must rewrite this macro to allow for variations in page-makeup required by changes in page-length.

This uses a different macro if a special-length column is being produced.

```

356 <*2ekernel | def1 | autoload>
357 \gdef \@makecol {%
358   \ifvoid\footins
359     \setbox\@outputbox \box\@cc1v
360   \else
361     \setbox\@outputbox \vbox {%

```

This `\boxmaxdepth` setting is to ensure that deep footnotes do not overwrite the footer (on account of the negative skip added later): it should use `\@maxdepth` otherwise the change is pointless when there are footnotes.

But see also its use when combining floats.

```

362   \boxmaxdepth \@maxdepth

363 %   \@tempdima\dp\@cc1v
364   \unvbox \@cc1v
365 %   \vskip-\@tempdima
366   \vskip \skip\footins

367   \color@begingroup
368   \normalcolor
369   \footnoterule
370   \unvbox \footins
371   \color@endgroup
372 }%
373 \fi

```

The h floats have now been finally committed to this page so we can reset their list. The top and bottom floats are then added to the page.

```

374 \let\@elt\relax
375 \xdef\@freelist{\@freelist\@midlist}%

376 \global \let \@midlist \@empty
377 \@combinefloats

```

The variations start here in case `\enlargethispage` has been used.

```

378 <*2ekernel | def1>
379 \ifvbox\@kludgeins
380   \@makespecialcolbox
381 \else
382 </2ekernel | def1>

```

This extra reboxing is only needed to add the `\@texttop` and `\@textbottom` but this could be done earlier, when the floats are added.

The `\boxmaxdepth` resetting here will have no effect unless `\@textbottom` ends with a box or rule. So is this (or possibly `\@maxdepth`) the correct value?

The `\vskip -\dimen@` ensures that the visible depth of the box does not affect the placement of anything on the page. Thus very deep pages will overprint the footer; but these should have been prevented by suitable settings of the maxdepths at appropriate times.

If `\@textbottom` ends with a box or rule of non-zero depth then this skip adjustment should be done again after it.

I think that the final boxing of the main text page could have a common ending which may make it simpler to see what is going on.

This needs further investigation, especially in the ‘special case’.

Also, the `\boxmaxdepth` setting here affects what happens within `\@texttop` and `\@textbottom`, should it? Is it needed at all?

RmS 91/10/22: Replaced `\dimen128` by `\dimen@`.

```

383   \setbox\@outputbox \vbox to\@colht {%
384 %   \boxmaxdepth \maxdepth           %??
385   \@texttop
386   \dimen@ \dp\@outputbox
387   \unvbox \@outputbox
388   \vskip -\dimen@
389   \@textbottom
390   }%
391 \*2ekernel | def1)
392   \fi
393 \</2ekernel | def1)
394   \global \maxdepth \@maxdepth
395 }
396 \</2ekernel | def1 | autoload)

```

`\@reinserts` This is the code which reinserts the inserts. It puts them all in one place; this can make some of them come out on the wrong page. It has been put into a separate macro to expedite experimentation.

```

397 \*2ekernel | def1 | autoload)
398 \gdef \@reinserts{%
399   \ifvoid\footins\else\insert\footins{\unvbox\footins}\fi
400 \<+2ekernel | def1)   \ifvbox\@kludgeins\insert\@kludgeins
401 \<+2ekernel | def1)   {\unvbox\@kludgeins}\fi
402 }
403 \</2ekernel | def1 | autoload)

```

`\@makespecialcolbox` This implements certain variations in page-makeup.

```

404 \*2ekernel | def1 | fltrace)
405 \gdef \@makespecialcolbox {%
406 \*trace)
407   \tr@ce{Kludgeins ht \the\ht\@kludgeins\space
408           dp \the\dp\@kludgeins\space
409           wd \the\wd\@kludgeins}%
410 \</trace)

```

First we find the natural height of the column.

See above for discussion of what is happening here.

This needs further investigation, especially in this ‘special case’.

```

411   \setbox\@outputbox \vbox {%
412   \@texttop
413   \dimen@ \dp\@outputbox
414   \unvbox\@outputbox
415   \vskip-\dimen@
416   }%
417   \@tempdima \@colht
418   \ifdim \wd\@kludgeins>\z@

```

Note that in this case (the *-version), the height of the `\@kludgeins` box is not used since its value is somewhat arbitrary: it need only be big enough to ensure that the page-break is not taken prematurely.

Here we calculate how much vertical space needs to be added in order to enable the column to fit into a box of size `\@colht` using the best information we have about the amount of shrink available (another thing which is known internally about a box, but cannot be accessed at the $\text{T}_{\text{E}}\text{X}$ level!).

This needs $\text{T}_{\text{E}}\text{X}3$ otherwise `\pageshrink` is zero anyway; it may not be exactly the figure we wish as it is the total available from the all the material collected

before the page-break decision is made. It will, we think, always be an overestimate of the actual shrink in the box; therefore this should always force the shortest possible column with the possibility of an overfull box.

This should work for both the flush- and ragged-bottom setting since it makes the contents no smaller than the size (`\@colht`) of the box into which they are put.

There should perhaps be an upper limit, of 0pt?, on the extra space added to force shrinking.

See above for a discussion of the `\boxmaxdepth` setting here.

```

419   \advance \@tempdima -\ht\@outputbox
420   \advance \@tempdima \pageshrink
421  (*trace)
422   \tr@ce {Natural ht of col: \the \ht\@outputbox}%
423   \tr@ce {\string \@colht: \the \@colht}%
424   \tr@ce {Pageshrink added: \the \pageshrink}%
425   \tr@ce {Hence, space added: \the \@tempdima}%
426  (/trace)
427   \setbox\@outputbox \vbox to \@colht {%
428 %       \boxmaxdepth \maxdepth
429       \unvbox\@outputbox
430       \vskip \@tempdima
431       \@textbottom
432   }%
```

For the unstarred version, the final size of the page is precisely specified. Therefore, at least for the flush-bottom case, we need to ensure that, visually, it has this size exactly.

Thus we calculate this size and set the material in a box of this size, which is then put into a box of size `\@colht` with `\vss` at the bottom.

```

433   \else
434   \advance \@tempdima -\ht\@kludgeins
435  (*trace)
436   \tr@ce {Natural ht of col: \the \ht\@outputbox}%
437   \tr@ce {\string \@colht: \the \@colht}%
438   \tr@ce {Extra size added: -\the \ht \@kludgeins}%
439   \tr@ce {Hence, height of inner box: \the \@tempdima}%
440   \tr@ce {Max? pageshrink available: \the \pageshrink}%
441  (/trace)
```

This type of final packaging could be done always; this may simplify all of this page-makeup.

It is not necessary to set `\boxmaxdepth` here since the `\@outputbox` ends with glue.

```

442   \setbox \@outputbox \vbox to \@colht {%
443       \vbox to \@tempdima {%
444           \unvbox\@outputbox
445           \@textbottom}%
446       \vss}%
447   \fi
```

Finally we need to explicitly make the insert box void.

```

448   {\setbox \@tempboxa \box \@kludgeins}%
449  (*trace)
450   \tr@ce {kludgeins box made void}%
451  (/trace)
452 }
453 </2ekernel | def1 | fltrace>
```

```

\@texttop  These do nothing as a default.
\@textbottom 454 <2ekernel | autoload>
455 \let \@texttop \relax
456 \let \@textbottom \relax
```

`\@resetactivechars` RmS 93/09/06: added hook to protect against certain active characters in the
`\@activechar@info` output routine. Default checks are for active space and end-of-line.

```

457 \def\@activechar@info #1{%
458     \latex@info@no@line {Active #1 character found while
459         output routine is active
460         \MessageBreak
461         This may be a bug in a package file
462         you are using}%
463 }
```

Do not put any spaces in this next bit!

```

464 \begingroup
465 \obeylines\obeyspaces%
466 \catcode'\@active%
467 \gdef\@resetactivechars{%
468 \def~M{\@activechar@info{EOL}\space}%
469 \def {\@activechar@info{space}\space}%
470 \let'\active@math@prime}%
471 \endgroup
```

`\@outputpage` The `\color@hbox` hooks here are used to avoid putting just a colour special into
`\@shipoutsetup` an otherwise empty box (in a header or footer). These boxes are often set to be
`\@writsetup` completely empty and so adding a special produces a very underfull box message.

There has been extensive tidying up of the old code here; including the removal of a level of grouping.

The setting of `\protect` immediately before the `\shipout` is needed so that protected commands within `\writes` are handled correctly.

Within shipout's vbox it is reset to its default value, `\relax`.

Resetting it to its default value after the shipout has been completed (and the contents of the writes have been expanded) must be done by use of `\aftergroup`. This is because it must have the value `\relax` before macros coming from other uses of `\aftergroup` within this box are expanded.

Putting this into the `\aftergroup` token list does not affect the definition used in expanding the `\writes` because the aftergroup token list is only constructed when popping the save-stack, it is not expanded until after the shipout is completed.

Question: should things from an `\aftergroup` within the shipped out box be executed in the environment set up for the writes, or after it finishes?

A lot of this code has been in-lined to prevent mis-use of internal commands as hooks.

```

472 \def\@outputpage{%
473 \begingroup           % the \endgroup is put in by \aftergroup
```

Now all the set-up stuff has been in-lined for Frank.

First the stuff for the writes.

From here ... was in the command `\@writsetup`.

```

474 \let \protect \noexpand
```

RmS 93/08/19: Redefined accents to allow changes in font encoding; but exactly why was this needed?

The `\catcode'\ = 10` was removed as it was considered useless (presumably because nothing gets tokenised during shipout).

This was put in as some error produced active spaces in a mark, I think.

Why was the hyphen reset?

```

475 \@resetactivechars
```

If a page break happens between the start of a list and its first item the `@newlist` will be true and this will mess up any list that is used in the header or footer of the page. So we have to reset that flag.

```

476 \global\let\@if@newlist@if@newlist
477 \global\@newlistfalse
```

This next hook replaces the following:

```
\let\-\@dischyph
\let'\@acci\let'\@accii\let\=\@acciii
\let\\\@normalcr
\let\par\@par %% 15 Sep 87 (this was once inside the box)
```

and it does more than they did; in particular it sets:

```
\parindent\z@
\parskip\z@skip
\everypar{}\%
\leftskip\z@skip
\rightskip\z@skip
\parfillskip\@flushglue
\lineskip\normallineskip
\baselineskip\normalbaselineskip
\sloppy
```

```
478 \@parboxrestore
```

... to here was in the command `\@writesetup`.

```
479 \shipout \vbox{%
480   \set@typeset@protect
481   \aftergroup \endgroup
482   \aftergroup \set@typeset@protect
483                                     % correct? or just restore by ending
484                                     % the group?
```

This first bit has been moved inside the shipped out box.

Now the setup inside the shipped out box; this should contain all the stuff that could only affect typesetting; other stuff may need to be reset for the writes also.

From here ... was in the command `\@shipoutsetup`.

```
485 \if@specialpage
486   \global\@specialpagefalse\@nameuse{ps@\@specialstyle}%
487 \fi
488 \if@twoside
489   \ifodd\count\z@ \let\@thehead\@oddhead \let\@thefoot\@oddfoot
490   \let\@themargin\oddsidemargin
491   \else \let\@thehead\@evenhead
492   \let\@thefoot\@evenfoot \let\@themargin\evensidemargin
493 \fi
494 \fi
```

The rest was always inside the box.

RmS 91/08/15: added this line:

```
495 \reset@font
```

RmS 93/08/06 Added `\lineskiplimit=0pt` to guard against it being nonzero; e.g. by `\offinterlineskip` being in effect.

There are probably lots of other things that may need resetting.

```
496 \normalsize
```

Reset the space factors.

```
497 \normalsfcodes
```

Reset these here (previously reset separately for head and foot)

```
498 \let\label\@gobble
499 \let\index\@gobble
500 \let\glossary\@gobble
501 \baselineskip\z@skip \lineskip\z@skip \lineskiplimit\z@
```


... to here was in the command \@shipoutsetup.

```

502  \@beginndvi
503  \vskip \topmargin
504  \moveright\@themargin \vbox {%
505    \setbox\@tempboxa \vbox to\headheight{%
506      \vfil
507      \color@hbox
508      \normalcolor
509      \hb@xt@\textwidth{\@thehead}%
510      \color@endbox
511    }%
512    \dp\@tempboxa \z@
513    \box\@tempboxa
514    \vskip \headsep
515    \box\@outputbox
516    \baselineskip \footskip
517    \color@hbox
518    \normalcolor
519    \hb@xt@\textwidth{\@thefoot}%
520    \color@endbox
521  }%
522  }%

```

\endgroup now inserted by \aftergroup
Restore \if@newlist

```

523  \global\let\if@newlist\@if@newlist
524  \global \colht \textheight
525  \stepcounter{page}%

```

It is now clear that this does something useful, thanks to Piet van Oostrum. It is needed because a float page is made without using TeX's page-builder; thus the output routine is never called so the marks are not updated.

```

526  \let\firstmark\botmark
527  }

```

\@beginndvi This unboxes stuff that must appear before anything else in the .dvi file, then returns that box register to the free list and cancels itself.

The stuff in the box should not add any typeset material to the page.

```

528 \def \@beginndvi{%
529   \unvbox \@beginndvibox
530   \global\let \@beginndvi \@empty
531 }

```

\@combinefloats The \boxmaxdepth setting here was not made local to a box so was dangerous. It is needed only within the box made by \@cflt (and not normally even there), so it has been moved there; this also agrees with the original pseudocode.

```

532 \def \@combinefloats {%
533 %   \boxmaxdepth \maxdepth
534   \ifx \@toplist\@empty \else \@cflt \fi
535   \ifx \@botlist\@empty \else \@cflb \fi
536 }

537 \def \@cflt{%
538   \let \@elt \@comflelt
539   \setbox\@tempboxa \vbox{%
540     \@toplist
541     \setbox\@outputbox \vbox{%
542       \boxmaxdepth \maxdepth
543       \unvbox\@tempboxa
544       \vskip -\floatsep
545       \topfigrule
546       \vskip \textfloatsep

```

```

547 \unvbox\@outputbox
548 }%
549 \let\@elt\relax
550 \xdef\@freelist{\@freelist\@toplist}%
551 \global\let\@toplist\@empty
552 }

553 \def \@cflb {%
554 \let\@elt\@comflelt
555 \setbox\@tempboxa \vbox{%
556 \@botlist
557 \setbox\@outputbox \vbox{%
558 \unvbox\@outputbox
559 \vskip \textfloatsep
560 \botfigrule
561 \unvbox\@tempboxa
562 \vskip -\floatsep
563 }%
564 \let\@elt\relax
565 \xdef\@freelist{\@freelist\@botlist}%
566 \global \let \@botlist\@empty
567 }

```

\@comflelt

```

\@comdblfilelt 568 \def\@comflelt#1{\setbox\@tempboxa
\@combinedblfloats 569 \vbox{\unvbox\@tempboxa\box #1\vskip\floatsep}}

570 \def\@comdblfilelt#1{\setbox\@tempboxa
571 \vbox{\unvbox\@tempboxa\box #1\vskip\dblfloatsep}}

572 \def \@combinedblfloats{%
573 \ifx \@dbltoplist \@empty
574 \else
575 \setbox\@tempboxa \vbox{%
576 \let \@elt \@comdblfilelt
577 \@dbltoplist
578 \let \@elt \relax
579 \xdef \@freelist {\@freelist\@dbltoplist}%
580 \global\let \@dbltoplist \@empty
581 \setbox\@outputbox \vbox to\textheight

```

The setting of \boxmaxdepth here has no effect since the \@outputbox should already have depth zero. Even so, it would have no effect on the layout of the page.

```

582 {\boxmaxdepth\maxdepth %% probably not needed, CAR
583 \unvbox\@tempboxa\vskip-\dblfloatsep

```

Here we need different typesetting if the top float comes from \@topnewpage.

```

584 \ifnum \@dbltopnum>\m@ne
585 \dblfigrule
586 \fi
587 \vskip \dbltextfloatsep
588 \box\@outputbox
589 }%
590 \fi
591 }
592 \</2ekernel | autoload>

```

\@startcolumn We could combine (most of) these two into \@startcol <list>. Note that \@xstartcol was only used once (i.e. in \@startcolumn); it has therefore been removed. This is not quite as efficient but it now has the same structure as \@startdblcolumn.

The empty-list test has been moved to \@tryfcolumn.

```

593 \<*/2ekernel | autoload | fltrace>

```

```

594 \def \@startcolumn {%
595   \global \@colroom \@colht
596   \@tryfcolumn \@deferlist
597   \if@fcolmade
598 (*trace)
599   \tr@ce{PAGE: float \if@twocolumn column \else page \fi
600           completed}%
601 \</trace>
602   \else

603   \begingroup
604     \let \reserved@b \@deferlist
605     \global \let \@deferlist \@empty
606     \let \@elt \@scolelt
607     \reserved@b
608   \endgroup
609 \fi
610 }

```

This one does not need to set \@colht.

```

611 \def \@startdblcolumn {%

Not needed since this always comes after \@outputpage:

612 % \global \@colht \textheight
613 \@tryfcolumn \@dbldeferlist
614 \if@fcolmade
615 (*trace)
616   \tr@ce{PAGE: double float page completed}%
617 \</trace>
618   \else

619   \begingroup
620     \let \reserved@b \@dbldeferlist
621     \global \let \@dbldeferlist \@empty
622     \let \@elt \@sdblcrolelt
623     \reserved@b
624   \endgroup
625 \fi
626 }

```

\@tryfcolumn Now tests if its list is empty before any further exertion.

```

627 \def \@tryfcolumn #1{%
628   \global \@fcolmadefalse
629   \ifx #1\@empty
630   \else
631 (*trace)
632   \tr@ce{PAGE: try float \if@twocolumn column/page\else page\fi
633           ---\string #1}%
634   \tr@ce{----- \string #1: #1}%
635 \</trace>

636   \xdef\@trylist{#1}%
637   \global \let \@failedlist \@empty
638   \begingroup
639     \let \@elt \@xtryfc \@trylist
640   \endgroup
641   \if@fcolmade
642     \@vtryfc #1%
643   \fi
644 \fi
645 }
646 \</2ekernel | autoload | fltrace>

647 (*2ekernel | autoload)

```

```

\@scolelt
648 \def\@scolelt#1{\def\@currbox{#1}\@addtonextcol}

\@sdblcrolelt
649 \def\@sdblcrolelt#1{\def\@currbox{#1}\@addtodblcol}

\@vtryfc
650 \def\@vtryfc #1{%
651   \global\setbox\@outputbox\vbox{%
652     \let\@elt\@wtryfc
653     \@flsucceed
654     \global\setbox\@outputbox \vbox to\@colht{%
655       \vskip \@fptop
656       \vskip -\@fpsep
657       \unvbox \@outputbox
658       \vskip \@fpbot}%
659     \let\@elt\relax
660     \xdef #1{\@failedlist\@flfail}%
661     \xdef\@freelist{\@freelist\@flsucceed}}

\@wtryfc
662 \def\@wtryfc #1{%
663   \global\setbox\@outputbox\vbox{%
664     \unvbox\@outputbox
665     \vskip\@fpsep
666     \box #1}}

\@xtryfc
667 \def\@xtryfc #1{%
668   \@next\reserved@a\@trylist{}{}%
669   \@currtype \count #1%
670   \divide\@currtype\@xxxii
671   \multiply\@currtype\@xxxii
672   \@bitor \@currtype \@failedlist
673   \@testfp #1%
674   \ifdim \ht #1>\@colht
675     \@testtrue
676   \fi
677   \if@test
678     \@cons\@failedlist #1%
679   \else
680     \@ytryfc #1%
681   \fi}

\@ytryfc
682 \def\@ytryfc #1{%
683   \begingroup
684     \gdef\@flsucceed{\@elt #1}%
685     \global\let\@flfail\@empty
686     \@tempdima\ht #1%
687     \let\@elt\@ztryfc
688     \@trylist
689     \ifdim \@tempdima >\@fpmin
690       \global\@fcolmadetrue
691     \else
692       \@cons\@failedlist #1%
693     \fi
694   \endgroup
695   \if@fcolmade
696     \let\@elt\@gobble
697   \fi}

```

\@ztryfc

```

698 \def\@ztryfc #1{%
699   \@tempcnta \count#1%
700   \divide\@tempcnta\@xxxii
701   \multiply\@tempcnta\@xxxii
702   \@bitor \@tempcnta {\@failedlist \@flfail}%
703   \@testfp #1%
704   \@tempdimb\@tempdima
705   \advance\@tempdimb \ht#1%
706   \advance\@tempdimb\@fpsep
707   \ifdim \@tempdimb >\@colht
708     \@testtrue
709   \fi
710   \if@test
711     \@cons\@flfail #1%
712   \else
713     \@cons\@flsucceed #1%
714     \@tempdima\@tempdimb
715   \fi}

716 </2ekernel | autoloading>

```

The major changes for float suppression and the changes to the float mechanism to make it conform to the documentation are in these next macros.

\@addtobot Lots of changes.

```

717 <*2ekernel | autoloading | fltrace>
718 \def \@addtobot {%
719 <*trace>
720   \tr@ce{***Start addtobot}%
721 </trace>
722   \@getfpsbit 4\relax
723 <*trace>
724   \tr@ce{fpstype \ifodd \@tempcnta OK \else not \fi bot:
725                                           \the \@fpstype}%
726 </trace>
727   \ifodd \@tempcnta
728     \@flsetnum \@botnum
729     \ifnum \@botnum>\z@
730       \@tempswafalse
731       \@flcheckspace \@botroom \@botlist
732     \if@tempswa

```

This next line means that this page is produced with box 255 having depth zero, rather than the normal maxdepth: is this needed, useful?

```

733     \global \maxdepth \z@
734     \@flupdates \@botnum \@botroom \@botlist
735 <*trace>
736     \tr@ce{colroom (after-bot) = \the \@colroom}%
737     \tr@ce{colnum (after-bot) = \the \@colnum}%
738     \tr@ce{botnum (after-bot) = \the \@botnum}%
739     \tr@ce{***Success: bot}%
740 </trace>
741     \@inserttrue
742   \fi
743 <*trace>
744   \else
745     \tr@ce{Fail: botnum = \the \@botnum:
746                                           fpstype \the \@fpstype=ORD?}%
747     \ifnum \@fpstype<\sist@on
748       \tr@ce{ERROR: !b float not successful (addtobot)}%
749     \fi
750 </trace>

```

```

751     \fi
752     \fi
753 }

```

\@addtotoporbot Lots of changes.

```

754 \def \@addtotoporbot {%
755 <*trace>
756   \tr@ce{***Start addtotoporbot}%
757 </trace>
758   \@getfpsbit \tw@
759 <*trace>
760   \tr@ce{fpstype \ifodd \@tempcnta OK \else not \fi top:
761                                           \the \@fpstype}%
762 </trace>
763   \ifodd \@tempcnta
764     \@flsetnum \@topnum
765     \ifnum \@topnum>\z@
766       \@tempwafalse
767       \@flcheckspace \@toproom \@toplist
768       \if@tempswa
769         \@bitor\@currtype{\@midlist\@botlist}%
770 <*trace>
771         \tr@ce{(mid+bot)list: \@midlist, \@botlist:
772                                     (addtotoporbot-before)}}%
773 </trace>
774     \if@test
775 <*trace>
776         \tr@ce{type already on list: mid or bot---sent to addtobot}%
777 </trace>
778     \else
779       \@flupdates \@topnum \@toproom \@toplist
780 <*trace>
781       \tr@ce{colroom (after-top) = \the \@colroom}%
782       \tr@ce{colnum (after-top) = \the \@colnum}%
783       \tr@ce{topnum (after-top) = \the \@topnum}%
784       \tr@ce{***Success: top}%
785 </trace>
786       \@inserttrue
787       \fi
788       \fi
789 <*trace>
790     \else
791       \tr@ce{Fail: topnum = \the \@topnum: fpstype
792                                           \the \@fpstype=ORD?}%
793       \ifnum \@fpstype<\sist@n
794         \tr@ce{ERROR: !t float not successful (addtotoporbot)}}%
795       \fi
796 </trace>
797       \fi
798       \fi
799       \if@insert
800       \else
801 <*trace>
802         \tr@ce{sent to addtobot (addtotoporbot)}}%
803 </trace>
804       \@addtobot
805       \fi
806 }
807 </2ekernel | autoloading | fltrace>

```

\@addtocurcol Lots of changes.

```

808 <*2ekernel | autoloading | fltrace | flafter>

```

```

809 \def \@addtocurcol {%
810 \< *trace>
811 \tr@ce{***Start addtocurcol}}%
812 \< /trace>
813 \@insertfalse
814 \@setfloattypecounts
815 \ifnum \@fpstype=8
816 \< *trace>
817 \tr@ce{fpstype !p only (addtocurcol): \the \@fpstype = 8?}%
818 \< /trace>
819 \else
820 \ifnum \@fpstype=24
821 \< *trace>
822 \tr@ce{fpstype p only (addtocurcol): \the \@fpstype = 24?}%
823 \< /trace>
824 \else
825 \@flsettextmin

```

This is a new adjustment which is quite a major change in functionality; but it implements the documentation. Note that \@reqcolroom will include the whole of the page-so-far, and hence includes \@textfloatsheight of floats, so before comparing it with \@textmin, we add this to \@textmin also.

```

826 \< *trace>
827 \tr@ce{textfloatsheight (before) = \the \@textfloatsheight}%
828 \< /trace>
829 \advance \@textmin \@textfloatsheight
830 \@reqcolroom \@pageht

```

This line must be removed since \@specialoutput changed.

```

831 % \advance \@reqcolroom \@pagedp
832 \< *trace>
833 \tr@ce{textmin + textfloatsheight: \the \@textmin}%
834 \tr@ce{page-so-far: \the \@reqcolroom}%
835 \< /trace>
836 \ifdim \@textmin>\@reqcolroom
837 \@reqcolroom \@textmin
838 \< *trace>
839 \tr@ce{ORD? textmin being used}%
840 \< /trace>
841 \fi
842 \advance \@reqcolroom \ht\@currbox
843 \< *trace>
844 \tr@ce{float size = \the \ht \@currbox (addtocurcol)}%
845 \tr@ce{colroom = \the \@colroom (addtocurcol)}%
846 \tr@ce{reqcolroom = \the \@reqcolroom (addtocurcol)}%
847 \< /trace>
848 \ifdim \@colroom>\@reqcolroom
849 \@flsetnum \@colnum
850 \ifnum \@colnum>z@
851 \@bitor\@currtype\@deferlist
852 \< *trace>
853 \tr@ce{deferlist: \@deferlist: (addtocurcol-before)}%
854 \< /trace>
855 \if@test
856 \< *trace>
857 \tr@ce{type already on list: defer (addtocurcol)}%
858 \< /trace>
859 \else
860 \@bitor\@currtype\@botlist
861 \< *trace>
862 \tr@ce{botlist: \@botlist: (addtocurcol-before)}%
863 \< /trace>
864 \if@test

```

```

865 (*trace)
866         \tr@ce{type already on list: bot---sent to addtobot}%
867 (/trace)
868         \@addtobot
869     \else
870 (*trace)
871         \tr@ce{fpstype \ifodd \@tempcnta OK \else not \fi
872             here: \the \@fpstype}%
873 (/trace)
874         \ifodd \count\@currbox
875             \advance \@reqcolroom \intextsep
876             \ifdim \@colroom>\@reqcolroom
877                 \global \advance \@colnum \m@ne
878                 \global \advance \@textfloatsheight \ht\@currbox

```

This may sometimes give an overestimate.

```

879         \global \advance \@textfloatsheight 2\intextsep
880         \@cons \@midlist \@currbox
881 (*trace)
882         \tr@ce{***Success: here}%
883         \tr@ce{textfloatsheight (after-here) =
884             \the \@textfloatsheight}%
885         \tr@ce{colnum (after-here) = \the \@colnum}%
886 (/trace)

```

CHANGE TO \@addtocurcol:

\penalty\z@ changed to \penalty\interlinepenalty so \samepage works properly with figure and table environments. (Changed 23 Oct 86)

There is also an \addpenalty\interlinepenalty above.

Since in 2e \samepage is no longer supported, these could be removed.

Although it is best to use \addvspace in case two h floats come together, this makes other spacing more difficult to adjust; whereas if a user specifies two h floats together then they can more easily get the spacing correct by ad hoc commands.

It is necessary to adjust for the addition of \parskip here in case the float is added between paragraphs (i.e. when in vertical mode).

If the nobreak switch is true we need to reset it and clear \everypar sionce the float may not reset the flag and cannot reset the \everypar globally.

Typesetting starts here (we are in vertical mode).

```

887         \if@nobreak
888             \nobreak
889             \@nobreakfalse
890             \everypar{}%
891         \else
892             \addpenalty \interlinepenalty
893             \fi
894             \vskip \intextsep
895             \box\@currbox
896             \penalty\interlinepenalty
897             \vskip\intextsep
898             \ifnum\outputpenalty <-\@Mii \vskip -\parskip\fi

```

Typesetting ends here.

```

899         \outputpenalty \z@
900         \@inserttrue
901 (*trace)
902         \else
903             \tr@ce{Fail---no room at 2nd test of colroom
904                 (addtocorcol \string\intextsep)}%
905 (/trace)
906         \fi
907     \fi
908     \if@insert
909     \else

```



```

910 <*2ekernel | autoloading | fltrace>
911 <*trace>
912             \tr@ce{not here: sent to addtotoporbot}%
913 </trace>
914             \@addtotoporbot
915 </2ekernel | autoloading | fltrace>
916 <*!2ekernel&!autoloading&!fltrace>
917 <*trace>
918             \tr@ce{not here: sent to addtobot}%
919 </trace>
920             \@addtobot
921 </!2ekernel&!autoloading&!fltrace>
922             \fi
923             \fi
924             \fi
925 <*trace>
926             \else
927             \tr@ce{Fail: colnum = \the \@colnum:
928                     fpstype \the \@fpstype=ORD?}%
929             \ifnum \@fpstype<\sist@n
930             \tr@ce{ERROR: BANG float not successful (addtocurcol)}%
931             \fi
932 </trace>
933             \fi
934 <*trace>
935             \else
936             \tr@ce{Fail---no room: fl box ht: \the \ht \@currbox
937                     (addtocurcol)}%
938 </trace>
939             \fi
940             \fi
941             \fi
942             \if@insert
943             \else
944             \@resethfps
945 <*trace>
946             \tr@ce{put on deferlist (addtocurcol)}%
947 </trace>
948             \@cons\@deferlist\@currbox
949 <*trace>
950             \tr@ce{deferlist: \@deferlist: (addtocurcol-after)}%
951 </trace>
952             \fi
953 }
954 </2ekernel | autoloading | fltrace | flafter>

```

\@addtonextcol Lots of changes.

```

955 <*2ekernel | autoloading | fltrace>
956 \def\@addtonextcol{%
957     \begingroup
958 <*trace>
959     \tr@ce{***Start addtonextcol}%
960 </trace>
961     \@insertfalse
962     \@setfloattypecounts
963     \ifnum \@fpstype=8
964 <*trace>
965     \tr@ce{fpstype not curcol: \the \@fpstype = 8?}%
966 </trace>
967     \else
968     \ifnum \@fpstype=24
969 <*trace>

```

```

970      \tr@ce{fpstype not curcol: \the \@fpstype = 24?}}%
971 \
972   \else
973     \@flsettextmin
974 (*trace)
975     \tr@ce{text-so-far: Opt (top of col)}}%
976 \
977     \@reqcolroom \ht\@currbox
978 (*trace)
979     \tr@ce{float size: \the \@reqcolroom (addtonextcol)}}%
980 \
981     \advance \@reqcolroom \@textmin
982 (*trace)
983     \tr@ce{colroom = \the \@colroom (addtonextcol)}}%
984     \tr@ce{reqcolroom = \the \@reqcolroom (addtonextcol)}}%
985 \
986     \ifdim \@colroom>\@reqcolroom
987       \@flsetnum \@colnum
988       \ifnum \@colnum>\z@
989         \@bitor\@currtype\@deferlist
990 (*trace)
991         \tr@ce{deferlist: \@deferlist: (addtonextcol-before)}}%
992 \
993         \if@test
994 (*trace)
995         \tr@ce{type already on list: defer (addtonextcol)}}%
996 \
997         \else
998 (*trace)
999         \tr@ce{sent to addtotoporbot (addtonextcol)}}%
1000 \
1001         \@addtotoporbot
1002         \fi
1003     \fi
1004 (*trace)
1005     \else
1006       \tr@ce{Fail---no room: fl box ht: \the \ht \@currbox
1007         (addtonextcol)}}%
1008 \
1009     \fi
1010   \fi
1011 \fi
1012 \if@insert
1013 \else
1014 (*trace)
1015     \tr@ce{put back on deferlist (addtonextcol)}}%
1016 \
1017     \@cons\@deferlist\@currbox
1018 (*trace)
1019     \tr@ce{deferlist: \@deferlist: (addtonextcol-after)}}%
1020 \
1021     \fi
1022 (*trace)
1023     \tr@ce{End of addtonextcol -- locally counts:}}%
1024     \tr@ce{ col: \the \@colnum. top: \the \@topnum. bot: \the \@botnum.}}%
1025 \
1026 \endgroup
1027 (*trace)
1028     \tr@ce{End of addtonextcol -- globally counts:}}%
1029     \tr@ce{col: \the \@colnum. top: \the \@topnum. bot: \the \@botnum.}}%
1030 \
1031 }

```

\@addtodblcol Lots of changes.

```

1032 \def\@addtodblcol{%
1033   \begingroup
1034   \*trace
1035   \tr@ce{***Start addtodblcol}%
1036 \*trace
1037   \@insertfalse
1038   \@setfloattyperecounts
1039   \@getfpsbit \tw@
1040 \*trace
1041   \tr@ce{fpstype \ifodd \@tempcnta OK \else not \fi dbltop:
1042                                           \the \@fpstype}%
1043 \*trace
1044   \ifodd \@tempcnta
1045     \@flsetnum \@dbltopnum
1046     \ifnum \@dbltopnum>\z@
1047       \@tempswafalse
1048       \ifdim \@dbltoproom>\ht\@currbox
1049         \@tempwattrue
1050 \*trace
1051       \tr@ce{Space OK: \@dbltoproom =
1052             \the \@dbltoproom > \the \ht \@currbox
1053             (dbltoproom)}%
1054 \*trace
1055     \else
1056 \*trace
1057       \tr@ce{fpstype: \the \@fpstype (addtodblcol)}%
1058 \*trace
1059     \ifnum \@fpstype<\sist@n
1060 \*trace
1061       \tr@ce{BANG float ignoring \@dbltoproom}%
1062       \tr@ce{\@spaces \@dbltoproom = \the \@dbltoproom.
1063             Ht float: \the \ht \@currbox-BANG}%
1064 \*trace

```

Need to check that there is room on the page, using the local value of \@textmin to make the necessary adjustment to \@dbltoproom.

```

1065   \advance \@dbltoproom \@textmin
1066 \*trace
1067   \tr@ce{Local value of texmin: \the \@textmin}%
1068   \tr@ce{\@spaces space on page = \the \@dbltoproom.
1069         Ht float: \the \ht \@currbox-BANG}%
1070 \*trace
1071   \ifdim \@dbltoproom>\ht\@currbox
1072     \@tempwattrue
1073 \*trace
1074   \tr@ce{Space OK BANG: space on page = \the \@dbltoproom >
1075         \the \ht \@currbox}%
1076   \else
1077     \tr@ce{fpstype: \the \@fpstype}%
1078     \tr@ce{Fail---no room dbltoproom-BANG?:}%
1079     \tr@ce{\@spaces space on page = \the \@dbltoproom.
1080           Ht float: \the \ht \@currbox}%
1081 \*trace
1082   \fi
1083   \advance \@dbltoproom -\@textmin
1084 \*trace
1085   \else
1086     \tr@ce{fpstype: \the \@fpstype}%
1087     \tr@ce{Fail---no room dbltoproom-ORD?:}%
1088     \tr@ce{\@spaces \@dbltoproom = \the \@dbltoproom.
1089           Ht float: \the \ht \@currbox}%

```

```

1090 </trace>
1091     \fi
1092     \fi
1093     \if@tempswa
1094         \@bitor \@currtype \@dbldeferlist
1095 <*trace>
1096         \tr@ce{dbldeferlist: \@dbldeferlist: (before)}%
1097 </trace>
1098     \if@test
1099 <*trace>
1100         \tr@ce{type already on list: dbldefer}%
1101 </trace>
1102     \else
1103         \@tempdima -\ht\@currbox
1104         \advance\@tempdima
1105             -\ifx \@dbltoplist\@empty \dbltextfloatsep \else
1106                                     \dblfloatsep \fi
1107         \global \advance \@dbltoproom \@tempdima
1108         \global \advance \@colht \@tempdima
1109         \global \advance \@dbltopnum \m@ne
1110         \@cons \@dbltoplist \@currbox
1111 <*trace>
1112         \tr@ce{dbltopnum (after) = \the \@dbltopnum}%
1113         \tr@ce{***Success: dbltop}%
1114 </trace>
1115         \@inserttrue
1116     \fi
1117 \fi
1118 <*trace>
1119 \else
1120     \tr@ce{Fail: dbltopnum = \the \@dbltopnum: fpstype
1121                                     \the \@fpstype=ORD?}%
1122     \ifnum \@fpstype<\sist@n
1123         \tr@ce{ERROR: !t float not successful (addtodblcol)}%
1124     \fi
1125 </trace>
1126 \fi
1127 \fi
1128 \if@insert
1129 \else
1130 <*trace>
1131     \tr@ce{put on dbldeferlist}%
1132 </trace>
1133     \@cons\@dbldeferlist\@currbox
1134 <*trace>
1135     \tr@ce{dbldeferlist: \@dbldeferlist: (after)}%
1136 </trace>
1137 \fi
1138 <*trace>
1139     \tr@ce{End of addtodblcol -- locally count:}%
1140     \tr@ce{dbltop: \the \@dbltopnum.}%
1141 </trace>
1142 \endgroup
1143 <*trace>
1144     \tr@ce{End of addtodblcol -- globally count:}%
1145     \tr@ce{dbltop: \the \@dbltopnum.}%
1146 </trace>
1147 }
1148 </2ekernel | autoload | fltrace>

\@addmarginpar
1149 <*2ekernel | autoload>
1150 \def\@addmarginpar{\@next\@marbox\@currlist{\@cons\@freelist\@marbox

```

```

1151 \@cons\@freelist\@currbox}\@latexbug\@tempcnta\@ne
1152 \if@twocolumn
1153 \if@firstcolumn \@tempcnta\m@ne \fi
1154 \else
1155 \if@mparswitch
1156 \ifodd\c@page \else\@tempcnta\m@ne \fi
1157 \fi
1158 \if@reversemargin \@tempcnta -\@tempcnta \fi
1159 \fi
1160 \ifnum\@tempcnta <\z@ \global\setbox\@marbox\box\@currbox \fi
1161 \@tempdima\@mparbottom
1162 \advance\@tempdima -\@pageht
1163 \advance\@tempdima\ht\@marbox
1164 \ifdim\@tempdima >\z@
1165 \latexwarning@no@line {Marginpar on page \thepage\space moved}%
1166 \else
1167 \@tempdima\z@
1168 \fi
1169 \global\@mparbottom\@pageht
1170 \global\advance\@mparbottom\@tempdima
1171 \global\advance\@mparbottom\dp\@marbox
1172 \global\advance\@mparbottom\marginparpush
1173 \advance\@tempdima -\ht\@marbox

```

Putting box movement inside the ‘marbox’:

```

1174 \global\setbox \@marbox
1175 \vbox {\vskip \@tempdima
1176 \box \@marbox}%
1177 \global \ht\@marbox \z@
1178 \global \dp\@marbox \z@

```

Sticking (rather than gluing:-) the ‘marbox’ to the line above, changed vskip to kern:

```

1179 \kern -\@pagedp
1180 \nointerlineskip
1181 \hb@xt@\columnwidth
1182 {\ifnum \@tempcnta >\z@
1183 \hskip\columnwidth \hskip\marginparsep
1184 \else
1185 \hskip -\marginparsep \hskip -\marginparwidth
1186 \fi
1187 \box\@marbox \hss}%

```

For this reason the following code can vanish:

```

\ nobreak %% No longer needed. CAR92/12
\ vskip -\@tempdima %% No longer needed. CAR92/12

1188 \nointerlineskip
1189 \hbox{\vrule \@height\z@ \@width\z@ \@depth\@pagedp}}
1190 </2ekernel | autoload>

```

66.1.1 Kludgeins

This part of the file is part of the implementation of the following two new commands for L^AT_EX2_ε.

```
\enlargethispage{<dim>}
```

Adds <dim> to the height of the current column only. On the printed page the bottom of this column is extended downwards by exactly <dim> without having any effect on the placement of the footer; this may result in an overprinting.

```
\enlargethispage*{<dim>}
```

Similar to `\enlargethispage` but it tries to squeeze the column to be printed in as small a space as possible, ie it uses any shrinkability in the column. If the column was not explicitly broken (e.g. with `\pagebreak`) this may result in an overfull box message but except for this it will come out as expected (if you know what to expect).

The star form of this command is dedicated to Leslie Lamport, the other we need for ourselves (FMi, CAR).

These commands may well have unwanted effects if used soon before a

: please give keep them clear of such places.

`\@kludgeins` The insert which makes \TeX do a lot of the necessary work. All we need to put into it is the amount by which the pagegoal should be changed.

```
1191 \<2kernel | def1)
1192 \newinsert \@kludgeins
1193 \global\dimen\@kludgeins \maxdimen
1194 \global\count\@kludgeins 1000
1195 \>2kernel | def1)
```

`\enlargethispage` The user command.

```
\enlargethispage* 1196 \<2kernel | def1)
1197 \gdef \enlargethispage {%
1198   \ifstar
1199   {%
1200 \<*trace)
1201   \tr@ce{Enlarging page height * }%
1202 \>trace)
1203   \@enlargepage{\hbox{\kern\p@}}}%
1204   {%
1205 \<*trace)
1206   \tr@ce{Enlarging page height exactly---}%
1207 \>trace)
1208   \@enlargepage\@empty}%
1209 }
1210 \>2kernel | def1)
1211 \<*autoload)
1212 \def\enlargethispage{\@autoload{out1}\enlargethispage}
1213 \>autoload)
```

`\@enlargepage` This actually inserts the insert, after checking for extreme values of the change.

```
1214 \<2kernel | def1)
1215 \gdef\@enlargepage#1#2{%
1216 \<*trace)
1217   \tr@ce{\@spaces\@spaces by #2}%
1218 \>trace)
1219   \@tempskipa#2\relax
1220   \ifdim \@tempskipa>.5\maxdimen
1221     \@latexerr{Suggested\space extra\space height\space
1222               (\the\@tempskipa)\space dangerously\space
1223               large}\@eha
1224   \else
1225     \ifdim \vsize<.5\maxdimen
1226 \<*trace)
1227     \tr@ce {Kludgeins added--pagegoal before: \the\pagegoal}%
1228 \>trace)
1229     \@bsphack
1230     \insert\@kludgeins{#1\vskip-\@tempskipa}%
1231     \@esphack
```

This next bit is for tracing only:

```
1232 \<*trace)
1233   \ifvmode \par
1234   \tr@ce {Kludgeins added--pagegoal after: \the \pagegoal}%
1235   \fi
1236 \>trace)
1237   \else
1238     \@latexerr{Page\space height\space already\space
1239               too\space large}\@eha
1240   \fi
1241   \fi
1242 }
1243 \>2kernel | def1)
```

66.1.2 Float control

This part implements controllable floats and other changes to the float mechanism.

It provides, at the document level, the following command for inclusion in $\text{\LaTeX}2\epsilon$.

`\suppressfloats`

This suppresses all further floats on the current page.

With an optional argument it suppresses only floats only in certain positions on the current page.

[t] suppresses only floats at the top of the page [b] suppresses only floats at the bottom of the page

It also enables the use of an extra specifier, !, in the location optional argument of a float. If this is present then, just for this particular float, whenever it is processed by the float mechanism the following are ignored:

- all restrictions on the number of floats which can appear;
- all explicit restrictions on the amount of space which should (not) be occupied by floats and/or text.

The mechanism will still attempt to ensure that pages are not overfull.

These specifiers override, for the single float, the suppression commands described above.

In its current form, it also supplies a reasonably exhaustive, and somewhat baroque, means of tracing some aspects of the float mechanism.

More tracing.

```

\tr@ce Set-up tracing for floats independent of other tracing as it produces mega-output.
\notrace Default is no tracing.
\tracefloats 1244 < *trace>
  \@traceval 1245 \def \@tracemessage #1{\typeout{LaTeX2e: #1}}
\tracefloatvals 1246 \def \tracefloats{\let \tr@ce \@tracemessage}
  \@tracemessage 1247 \def \notrace {\let \tr@ce \gobble}
    1248 \notrace
    1249 \def \@traceval #1{\tr@ce{\string #1 = \the #1}}
    1250 \def \tracefloatvals{%
    1251   \@dblfloatplacement
    1252   \@floatplacement
    1253   \@traceval\@colnum
    1254   \@traceval\@colroom
    1255   \@traceval\@topnum
    1256   \@traceval\@toproom
    1257   \@traceval\@botnum
    1258   \@traceval\@botroom
    1259   \@traceval\@fpmin
    1260   \tr@ce{\string\textfraction = \textfraction}%
    1261   \@traceval\@dbltopnum
    1262   \@traceval\@dbltoproom
    1263 }
    1264 < /trace>
    1265 < *flafter>
    1266 \providecommand\tr@ce[1]{}
    1267 < /flafter>

\suppressfloats Float suppression commands: these set the relevant counter globally to zero. Thus
  \@flstop they are overridden for a particular float by an ! specifier.
    1268 < *2ekernel | autoload>

```



```

1269 \def \suppressfloats {%
1270   \ifnextchar [%
1271     \@flstop
1272     {\global \colnum \z@}%
1273 }

```

Maybe this should be a loop over #1?

```

1274 \def \@flstop [#1]{%
1275   \if t#1%
1276     \global \topnum \z@
1277   \fi
1278   \if b#1%
1279     \global \botnum \z@
1280   \fi
1281 }

```

Manipulation of float placement and type; both their strings and the corresponding count registers.

`\@fpstype` First a new count register to go with `\@currtype`.
`\@reqcolroom` Then a new skip register, for information needed to remove the `\@maxsep` conservatism: it is possible that this could use a temporary register.
`\@textfloatsheight` Finally a dimension register to hold the total height of in-text floats on the current page. This is needed to implement a major change in the functionality of `\@addtocurcol` which is, nevertheless, a bug fix. It is not local and therefore cannot be a temporary register.

```

1282 \newcount \@fpstype
1283 \newdimen \@reqcolroom
1284 \newdimen \@textfloatsheight
1285 \<2kernel | autoload>

```

`\@fpsadddefault` Adds the default placement to what is already there.
Should not need to change this, but could do it as follows:

```

\def \@fpsadddefault {%
  \@temptokena \expandafter\expandafter\expandafter
    {\csname fps@\@captype \endcsname}%
  \edef \reserved@a {\the\@temptokena}%
  \@onelevel@sanitize \reserved@a
  \edef \@fps {\@fps\reserved@a}%
}

```

```

1286 \<2kernel | autoload | ftrace>
1287 \def \@fpsadddefault {%
1288 \<*trace>
1289   \trace{fps changed from: \@fps}%
1290 \</trace>
1291   \edef \@fps {\@fps\csname fps@\@captype \endcsname}%
1292   \latex@warning {%
1293     No positions in optional float specifier.\MessageBreak
1294     Default added (so using '\@fps')}%
1295 }

```

`\@setfloattypecounts` Sets counters `\@fpstype` and `\@currtype`.
BANG == bit4 of `\count\@currbox` = 0.

```

1296 \def \@setfloattypecounts {%
1297   \@currtype \count\@currbox
1298   \@fpstype \count\@currbox
1299   \divide\@currtype\@xxxii \multiply\@currtype\@xxxii
1300   \advance \@fpstype -\@currtype
1301 \<*trace>

```

```

1302 \tr@ce{(mod 32) fpstype: \the \@fpstype}%
1303 \tr@ce{(mult of 32) currtype: \the \@currtype}%
1304 % Tracing only: but some should be changed into real errors/warnings?
1305 \ifnum \@fpstype<\sist@n
1306   \ifnum \@fpstype=\z@
1307     \tr@ce{ERROR: no PLACEMENT, fpstype = \the \@fpstype = 0?}%
1308   \fi
1309   \ifnum \@fpstype=\@ne
1310     \tr@ce{WARNING: only h, fpstype = \the \@fpstype = 1?}%
1311   \fi
1312   \tr@ce{BANG float}%
1313 \else
1314   \ifnum \@fpstype=\sist@n
1315     \tr@ce{ERROR: no PLACEMENT, fpstype = \the \@fpstype = 16?}%
1316   \fi
1317   \ifnum \@fpstype=17
1318     \tr@ce{WARNING: only h, fpstype = \the \@fpstype = 17?}%
1319   \fi
1320   \tr@ce{ORD float}%
1321 \fi
1322 </trace>
1323 }
1324 </2ekernel | autoloading | fltrace>

```

Macros for getting, testing and setting bits of the fps.

\@getfpsbit Sets \@tempcnta to required bit of \count\@currbox.

```

1325 <*2ekernel | autoloading>
1326 \def \@getfpsbit {%
1327   \@boxfpsbit \@currbox
1328 }

```

\@boxfpsbit Used above.

```

1329 \def \@boxfpsbit #1#2{%
1330   \@tempcnta \count#1%
1331   \divide \@tempcnta #2\relax
1332 }

```

\@testfp New definition of the float page test.

```

1333 \def \@testfp #1{%
1334   \@boxfpsbit #18\relax % Really ‘#1 8’ for human readers!
1335   \ifodd \@tempcnta
1336   \else
1337     \@testtrue
1338   \fi
1339 }

```

\@setfpsbit Sets required bit of \@tempcnta (to 1).

```

1340 \def \@setfpsbit #1{%
1341   \@tempcntb \@tempcnta
1342   \divide \@tempcntb #1\relax
1343   \ifodd \@tempcntb
1344   \else
1345     \advance \@tempcnta #1\relax
1346   \fi
1347 }
1348 </2ekernel | autoloading>

```

\@resethfps Globally adds t as a possible location for an h or !h only placement: this must be done using the count.

Although it will leave `\@fpstype` set to 17 even if it was originally 1, this does not matter since it is the last thing in `\@addtocurcol`.

```

1349 (*2ekernel | autoload | fltrace)
1350 \def \@resethfps {%
1351   \let\reserved@a\@empty
1352   \ifnum \@fpstype=\@ne
1353     \def \reserved@a {!}%
1354     \@fpstype 17
1355   \fi
1356   \ifnum \@fpstype=17
1357     \global \advance \count\@currbox \tw@
1358     \@latex@warning@no@line {%
1359       '\reserved@a h' float specifier changed to '\reserved@a ht'}%
1360 (*trace)
1361   \tr@ce{%
1362     't' added to '\reserved@a h'- new Count: \the \count\@currbox}%
1363 
1364   \fi
1365 }

```

Special stuff for BANG floats.

`\@flsetnum` Ignores any zero float counter value in case BANG.

It uses a local assignment to the normally global counter: a bit naughty, perhaps?

These assignments are safe so long as the counter involved is only consulted once (i.e. only for the 'bang float') with the changed value. This is the case within `\@addtocurcol` because it is used only once within a call of the output routine (which forms a group).

For `\@addtonextcol` this is achieved by putting a group around its code; this is needed because it is called (by `\@startcolumn`) for each float which was on the deferlist. Almost identical considerations pertain to `\@addtodblcol`. There may be more efficient ways to handle this, but the group seems to be the simplest.

```

1366 \def \@flsetnum #1{%
1367 (*trace)
1368   \tr@ce{fpstype: \the \@fpstype (flsetnum \string#1)}%
1369 
1370   \ifnum \@fpstype<\sist@n
1371     \ifnum #1=\z@
1372 (*trace)
1373       \tr@ce{BANG float resetting \string#1 to 1}%
1374 
1375     #1\@ne
1376   \fi
1377   \fi
1378 (*trace)
1379   \tr@ce{#1 (before) = \the #1}%
1380 
1381 }

```

`\@flsettextmin` This ignores `\textfraction` space restriction in case BANG.

```

1382 \def \@flsettextmin {%
1383 (*trace)
1384   \tr@ce{fpstype: \the \@fpstype (flsettextmin)}%
1385 
1386   \ifnum \@fpstype<\sist@n
1387 (*trace)
1388     \tr@ce{BANG ignoring textmin}%
1389 
1390   \@textmin \z@
1391   \else

```

```

1392 \textmin \textfraction\@colht
1393 \*trace>
1394 \tr@ce{ORD textmin = \the \textmin}%
1395 \*trace<
1396 \fi
1397 }

```

`\@flcheckspace` This ignores space restriction in case BANG; this is still slightly conservative since it does not allow for the fact that, if there is no text in the column then `\textfloatsep` is not needed. Sets `@tempswa` true if there is room for `\@currbox`.

```

1398 \def \@flcheckspace #1#2{%
1399 \advance \@reqcolroom
1400 \ifx #2\@empty \textfloatsep \else \floatsep \fi
1401 \*trace>
1402 \tr@ce{colroom = \the \@colroom (flcheckspace \string#1 \string#2)}%
1403 \tr@ce{reqcolroom = \the \@reqcolroom
1404 (flcheckspace \string#1 \string#2)}%
1405 \*trace<
1406 \ifdim \@colroom>\@reqcolroom
1407 \ifdim #1>\ht\@currbox
1408 \@tempswatrue
1409 \*trace>
1410 \tr@ce{Space OK: #1 = \the #1 > \the \ht \@currbox
1411 (flcheckspace \string#1 \string#2)}%
1412 \*trace<
1413 \else
1414 \*trace>
1415 \tr@ce{fpstype: \the \@fpstype
1416 (flcheckspace \string#1 \string#2)}%
1417 \*trace<
1418 \ifnum \@fpstype<\sift@@n
1419 \*trace>
1420 \tr@ce{BANG float ignoring #1
1421 (flcheckspace \string#1 \string#2):}%
1422 \tr@ce{\@spaces #1 = \the #1. Ht float: \the \ht \@currbox
1423 BANG}%
1424 \*trace<
1425 \@tempswatrue
1426 \*trace>
1427 \else
1428 \tr@ce{Fail---no room (flcheckspace \string#1 \string#2)
1429 (fpstype \the \@fpstype=ORD?):}%
1430 \tr@ce{\@spaces #1 = \the #1. Ht float: \the \ht \@currbox
1431 ORD?}%
1432 \*trace<
1433 \fi
1434 \fi
1435 \*trace>
1436 \else
1437 \tr@ce{Fail---no room at 2nd test of colroom
1438 (flcheckspace \string#1 \string#2)}%
1439 \*trace<
1440 \fi
1441 }
1442 \*2ekernel | autoloading | fltrace)

```

`\@flupdates` This updates everything when a float is placed.

```

1443 \*2ekernel | autoloading |
1444 \def \@flupdates #1#2#3{%
1445 \global \advance #1\m@ne
1446 \global \advance \@colnum \m@ne
1447 \@tempdima -\ht\@currbox

```

```

1448 \advance \@tempdima
1449 -\ifx #3\@empty \textfloatsep \else \floatsep \fi
1450 \global \advance #2\@tempdima
1451 \global \advance \@colroom \@tempdima
1452 \@cons #3\@currbox
1453 }
1454 \</2ekernel | autoloader

```

Interesting facts about float mechanisms past and present, together with a summary of various features, some unresolved:

1. The value `\textfraction` does not affect the processing of doublecol floats: this seems sensible, but should be documented.
2. `\twocolumn` floatplacement was wrong: dbl not needed, ord needed.
3. `\floatplacement` was not called after `\startdblcol` or `\topnewpage`. This has been changed; it is clearly a bug fix.
4. The use `\topnewpage` when `\dblfigrule` is non-trivial produced a rule in the wrong place. This has been fixed by not using `\dblfigrule` when processing the ‘float’ from `\topnewpage`.
5. If the specifier was just h and the float could not be put here, it went on the deferlist and stayed there until a clearpage. It now gets changed to a ‘th’: this is only an error-recovery action, putting just h or !h should be deprecated.
6. `\dblmaxsep` was ‘the maximum of `\dblfloatsep` and `\dbltextfloatsep`’. But it was never used! Now gone completely, like `\maxsep`.
7. After an h float is put on a page, it was counted as text when applying the `\textfraction` test; this is possibly too big a change although it is a bug fix?
8. Two consecutive h floats are separated by twice `\intertextsep`: this could be changed to one by use of `\addvspace`, OK? Note that it would also mean that less space is put in if an h float immediately follows other spaces. This is also possibly too big a change, at least for compatibility mode? Or it may be simply wrong! It has not been changed.
9. Now `\addtocurcol` checks first for just p fps. I think that this is an increase in efficiency, but maybe the coding should be made even more efficient.
10. `\tryfcolumn` now tests if the list is empty first, otherwise lots of wasted time! Thus this test has been removed from `\startcolumn`. As Frank pointed out, this makes `\startcolumn` less efficient. But it is now the same as `\startdblcolumn`: I can see no reason why they should be different, but which is best?
11. Why is `\colroom` set in `\doclearpage`?
12. Footnotes. Check what `\clearpage` does when footnotes are left over. Footnotes are not put on float pages and, also, `\addtonextcol` ignores the existence of held-over footnotes in deciding what floats can go on the page. Not changed.
13. `\clearpage` can still lose non-boxes, at least when floats are involved. It also moves some to the ‘wrong page’, but this may be a coding problem.
14. The ! option makes it necessary to check in `\output` that there is enough room left on the page after adding a float. (This would have been necessary anyway if anyone set `\textmin` too close to zero! A similar danger existed

also if the text in a `\twocolumn[text]` entity gets too large.) The current implementation of this also makes the normal case a little less efficient, OK? Not enough room means, at present, less than `\baselineskip`, with a warning: is this OK? Should it be made generic (another parameter)?

15. There are four possibilities for supporting this:

```
\twocolumn[\maketitle more text]
```

One is to change `\maketitle` slightly to allow this. Another is to change `\@topnewpage` so that more than one `\twocolumn[]` command is allowed; in this case `\maketitle\twocolumn[more text]` will work. The former is more robust from the user's viewpoint, but makes the code for `\maketitle` rather ad hoc (maybe it is already?). Another is to misuse the global `twocolumn` flag locally within `\@topnewpage`. Yet another is to move the column count register from the `multicol` package into the kernel. This has been done.

16. Where should the reinserts be put to maximise the probability that footnotes come out on the correct page? Or should we go for as much compatibility as possible (but see next item)?
17. Should we continue to support (as much as possible) `\samepage`? Some of its intended functionality is now advertised as being provided by `\enlargethispage`. Use of either is likely to result in wrongly placed footnotes, marginals, etc. Which should have priority: obeying the pagination instructions, or correct placement of notes/marginalia?
18. Is the adjustment of space to cause shrinking in the kludge-* case correct? Should it be limited to 0pt?
19. Is the setting of `\boxmaxdepth` in `makecol` and friends needed? It only has any effect if `\@textbottom` ends with a box or rule, in which case the `vskip` to allow for its depth should also be added. If it is kept, it should probably be the last thing in the box. It has now been removed.

It would perhaps be better to document that `\@textbottom` and `\@texttop` must have natural height 0pt.
20. I cannot see why the `vskip` adjustment for the depth is needed if `boxmaxdepth` is used to ensure that there is never a too deep box.
21. The value of `\boxmaxdepth` should be explicitly set whenever necessary: it is too risky to assume that it has any particular value. Care is needed in deciding what to set it to.

It is interesting to note that the value of `\boxmaxdepth` is unique in being read before the local settings for the box group are reset; all other parameter settings which affect the box construction use their values outside the box group.
22. Should `\@maxdepth` store the setting of `\maxdepth` from `lplain`? Or should we provide a proper interface to class files for setting these?

An analysis of various other macros.

`\@opcol` should do `\@floatplacement`, but where? Right at the end, since it always occurs at the start of a column.

```
\def\@opcol{%
  % Why is this done first?
  \global \@mparbottom \z@
  \if@twocolumn
    \@outputdblcol
  else
    \@outputpage
```

```

% This is not needed since it is done at the end of
%   |\@outputpage|:
\global \@colht \textheight
\fi}

```

Only tracing has been added to these.

```

1455 <*2ekernel | autoload | ftrace>
1456 \def\@makefcolumn #1{%
1457   \begingroup
1458     \@fpmin \z@
1459     \let \@testfp \@gobble
1460     \@tryfcolumn #1%
1461   \endgroup
1462 <*trace>
1463   \if@fcolmade
1464     \tr@ce{PAGE: in \string\clearpage \if@twocolumn ---twocolumn\fi---}%
1465     \tr@ce{----- float column/page completed from \string#1}%
1466   \fi
1467 </trace>
1468 }

```

This will line up the last baselines in the two columns provided they are constructed in the normal way: i.e. ending in a skip of minus the original depth, with `\@textbottom` adding nothing.

Thus again it is essential for `\@textbottom` to have depth 0pt.

```

1469 \def\@outputdblcol{%
1470   \if@firstcolumn
1471     \global \@firstcolumnfalse
1472     \global \setbox\@leftcolumn \box\@outputbox
1473 <*trace>
1474     \tr@ce{PAGE: first column boxed}%
1475 </trace>
1476   \else
1477     \global \@firstcolumntrue
1478     \setbox\@outputbox \vbox {%
1479       \hb@xt@\textwidth {%
1480         \hb@xt@\columnwidth {%
1481           \box\@leftcolumn \hss}%
1482         \hfil
1483         {\normalcolor\vrule \@width\columnseprule}%
1484         \hfil
1485         \hb@xt@\columnwidth {%
1486           \box\@outputbox \hss}%
1487         }%
1488       }%
1489 <*trace>
1490     \tr@ce{PAGE: second column also boxed}%
1491 </trace>
1492     \@combinedblfloats
1493     \@outputpage
1494 <*trace>
1495     \tr@ce{PAGE: two column page completed}%
1496 </trace>
1497     \begingroup
1498     \@dblfloatplacement
1499     \@startdblcolumn

```

This loop could be replaced by an `\expandafter` tail recursion in `\@startdblcolumn`.

```

1500     \@whiles\if@fcolmade \fi
1501     {\@outputpage
1502 <*trace>

```

```

1503      \tr@ce{PAGE: double float page completed}%
1504 \end{trace}
1505      \@startdblcolumn}%
1506    \endgroup
1507  \fi
1508 }
1509 \end{kernel} \autoload | fltrace)

```

66.1.3 Float placement parameters

The main purpose of this section is to ensure that all the float-placement parameters which need to be set in a class file or package have been declared. It also describes their use and sets values for them which are reasonable for typical documents using US letter or A4 sized paper.

Limits for the placement of floating objects

- \c@topnumber** This counter holds the maximum number of floats that can appear at the top of a text page or column.
- ```

1510 \newcount\c@topnumber
1511 \setcounter{topnumber}{2}

```
- \topfraction** This macro holds the maximum proportion (as a decimal number) of a text page or column that can be occupied by floats at the top.
- ```

1513 \newcommand\topfraction{.7}

```
- \c@bottomnumber** This counter holds the maximum number of floats that can appear at the bottom of a text page or column.
- ```

1514 \newcount\c@bottomnumber
1515 \setcounter{bottomnumber}{1}

```
- \bottomfraction** This macro holds the maximum proportion (as a decimal number) of a text page or column that can be occupied by floats at the bottom.
- ```

1516 \newcommand\bottomfraction{.3}

```
- \c@totalnumber** This counter holds the maximum number of floats that can appear on any text page or column.
- ```

1517 \newcount\c@totalnumber
1518 \setcounter{totalnumber}{3}

```
- \textfraction** This macro holds the minimum proportion (as a decimal number) of a text page or column that must be occupied by text.
- ```

1519 \newcommand\textfraction{.2}

```
- \floatpagefraction** This macro holds the minimum proportion (as a decimal number) of a page or column that must be occupied by floating objects before a ‘float page’ is produced.
- ```

1520 \newcommand\floatpagefraction{.5}

```
- \c@dbltopnumber** This counter holds the maximum number of double-column floats that can appear on the top of a two-column text page.
- ```

1521 \newcount\c@dbltopnumber
1522 \setcounter{dbltopnumber}{2}

```
- \dbltopfraction** This macro holds the maximum proportion (as a decimal number) of a two-column text page that can be occupied by double-column floats at the top.
- ```

1523 \newcommand\dbltopfraction{.7}

```
- \dblfloatpagefraction** This macro holds the minimum proportion (as a decimal number) of a page that must be occupied by double-column floating objects before a ‘double-column float page’ is produced.
- ```

1524 \newcommand\dblfloatpagefraction{.5}

```


Floats on a text page

`\floatsep` When a floating object is placed on a page with text, these parameters control the separation between the float and the other objects on the page. These parameters are used for both one-column mode and single-column floats in two-column mode. They are all rubber lengths.

`\floatsep` is the space between adjacent floats that are placed at the top or bottom of the text page or column.

`\textfloatsep` is the space between the main text and floats at the top or bottom of the page or column.

`\intextsep` is the space between in-text floats and the text.

```
1525 \newskip\floatsep
1526 \newskip\textfloatsep
1527 \newskip\intextsep
1528 \setlength\floatsep {12\p@ \@plus 2\p@ \@minus 2\p@}
1529 \setlength\textfloatsep{20\p@ \@plus 2\p@ \@minus 4\p@}
1530 \setlength\intextsep {12\p@ \@plus 2\p@ \@minus 2\p@}
```

`\dblfloatsep` When double-column floats (floating objects that span the whole `\textwidth`) are placed at the top of a text page in two-column mode, the separation between the float and the text is controlled by `\dblfloatsep` and `\dbltextfloatsep`. They are rubber lengths.

`\dblfloatsep` is the space between adjacent double-column floats placed at the top of the text page.

`\dbltextfloatsep` is the space between the main text and double-column floats at the top of the page.

```
1531 \newskip\dblfloatsep
1532 \newskip\dbltextfloatsep
1533 \setlength\dblfloatsep {12\p@ \@plus 2\p@ \@minus 2\p@}
1534 \setlength\dbltextfloatsep{20\p@ \@plus 2\p@ \@minus 4\p@}
```

Floats on their own page or column

`\@fptop` When floating objects are placed on a separate page or column, called a ‘float page’, the layout of the page is controlled by these parameters, which are rubber lengths.

At the top of the page `\@fptop` is inserted; typically this supplies some stretchable whitespace. At the bottom of the page `\@fpbot` is inserted. Between adjacent floats `\@fpsep` is inserted.

These parameters are used for all floating objects on a ‘float page’ in one-column mode, and for single-column floats in two-column mode.

Note that at least one of the two parameters `\@fptop` and `\@fpbot` should contain a `plus ...fil` so as to fill the remaining empty space.

```
1535 \newskip\@fptop
1536 \newskip\@fpsep
1537 \newskip\@fpbot
1538 \setlength\@fptop{0\p@ \@plus 1fil}
1539 \setlength\@fpsep{8\p@ \@plus 2fil}
1540 \setlength\@fpbot{0\p@ \@plus 1fil}
```

`\@dblftop` Double-column ‘float pages’ in two-column mode use similar parameters.

```
\@dblfpsep 1541 \newskip\@dblftop
\@dblfpbot 1542 \newskip\@dblfpsep
1543 \newskip\@dblfpbot
1544 \setlength\@dblftop{0\p@ \@plus 1fil}
1545 \setlength\@dblfpsep{8\p@ \@plus 2fil}
1546 \setlength\@dblfpbot{0\p@ \@plus 1fil}
```

```

\topfigrule The macros can be used to put in rules between floats and text; whatever they
\botfigrule insert should be vertical mode material which takes up zero space.
\dblfigrule 1547 \let\topfigrule=\relax
              1548 \let\botfigrule=\relax
              1549 \let\dblfigrule=\relax
              1550 </2kernel | autoloading>

```

File L

ltclass.dtx

67 Introduction

This file implements the following declarations, which replace `\documentstyle` in $\text{\LaTeX} 2_{\epsilon}$ documents.

Note that old documents containing `\documentstyle` will be run using a compatibility option—thus keeping everyone happy, we hope!

The overall idea is that there are two types of ‘style files’: ‘class files’ which define elements and provide a default formatting for them; and ‘packages’ which provide extra functionality. One difference between $\text{\LaTeX} 2_{\epsilon}$ and $\text{\LaTeX} 2.09$ is that $\text{\LaTeX} 2_{\epsilon}$ packages may have options. Note that options to classes/packages may be implemented such that they input files, but these file names are not necessarily directly related to the option name.

68 User interface

`\documentclass[<main-option-list>]{<class>}[<version>]`

There must be exactly one such declaration, and it must come first. The *<main-option-list>* is a list of options which can modify the formatting of elements which are defined in the *<class>* file as well as in all following `\usepackage` declarations (see below). The *<version>* is a version number, beginning with a date in the format `YYYY/MM/DD`. If an older version of the class is found, a warning is issued.

`\documentstyle[<main-option-list>]{<class>}[<version>]`

The `\documentstyle` declaration is kept in order to maintain upward compatibility with $\text{\LaTeX} 2.09$ documents. It is similar to `\documentclass`, but it causes all options in *<main-option-list>* that the *<class>* does not use to be passed to `\RequirePackage` after the options have been processed. This maintains compatibility with the 2.09 behaviour. Also a flag is set to indicate that the document is to be processed in $\text{\LaTeX} 2.09$ compatibility mode. As far as most packages are concerned, this only affects the warnings and errors \LaTeX generates. This flag does affect the definition of font commands, and `\sloppy`.

`\usepackage[<package-option-list>]{<package-list>}[<version>]`

There can be any number of these declarations. All packages in *<package-list>* are called with the same options.

Each *<package>* file defines new elements (or modifies those defined in the *<class>*), and thus extends the range of documents which can be processed. The *<package-option-list>* is a list of options which can modify the formatting of elements defined in the *<package>* file. The *<version>* is a version number, beginning with a date in the format `YYYY/MM/DD`. If an older version of the package is found, a warning is issued.

Each package is loaded only once. If the same package is requested more than once, nothing happens, unless the package has been requested with options that were not given the first time it was loaded, in which case an error is produced.

As well as processing the options given in the *<package-option-list>*, each package processes the *<main-option-list>*. This means that options that affect all of the packages can be given globally, rather than repeated for every package.

Note that class files have the extension `.cls`, packages have the extension `.sty`.

`filecontents`

The environment `filecontents` is intended for passing the contents of packages, options, or other files along with a document in a single file. It has one argument, which is the name of the file to create. If that file already exists (maybe only in the current directory if the OS supports a notion of a ‘current directory’ or

‘default directory’) then nothing happens (except for an information message) and the body of the environment is bypassed. Otherwise, the body of the environment is written verbatim to the file name given as the first argument, together with some comments about how it was produced.

The environment is allowed only before `\documentclass` to ensure that all packages or options necessary for this particular run are present when needed. The begin and end tags should each be on a line by itself. There is also a star-form; this does not write extra comments into the file.

68.1 Option processing

When the options are processed, they are divided into two types: *local* and *global*:

- For a class, the options in the `\documentclass` command are local.
- For a package, the options in the `\usepackage` command are local, and the options in the `\documentclass` command are global.

The options for `\documentclass` and `\usepackage` are processed in the following way:

1. The local and global options that have been declared (using `\DeclareOption` as described below) are processed first.

In the case of `\ProcessOptions`, they are processed in the order that they were declared in the class or package.

In the case of `\ProcessOptions*`, they are processed in the order that they appear in the option-lists. First the global options, and then the local ones.

2. Any remaining local options are dealt with using the default option (declared using the `\DeclareOption*` declaration described below). For document classes, this usually does nothing, but records the option on a list of unused options. For packages, this usually produces an error.

Finally, when `\begin{document}` is reached, if there are any global options which have not been used by either the class or any package, the system will produce a warning.

69 Class and Package interface

69.1 Class name and version

`\ProvidesClass` A class can identify itself with the `\ProvidesClass{<name>}[<version>]` command. The `<version>` should begin with a date in the format YYYY/MM/DD.

69.2 Package name and version

`\ProvidesPackage` A package can identify itself with the `\ProvidesPackage{<name>}[<version>]` command. The `<version>` should begin with a date in the format YYYY/MM/DD.

69.3 Requiring other packages

`\RequirePackage` Packages or classes can load other packages using `\RequirePackage[<options>]{<name>}[<version>]`. If the package has already been loaded, then nothing happens unless the requested options are not a subset of the options with which it was loaded, in which case an error is called.

`\LoadClass` Similar to `\RequirePackage`, but for classes, may not be used in package files.

`\PassOptionsToPackage` Packages can pass options to other packages using: `\PassOptionsToPackage{<options>}{<package>}`.

`\PassOptionsToClass` This adds the $\langle options \rangle$ to the options list of any future `\RequirePackage` or `\usepackage` command. For example:

```
\PassOptionsToPackage{foo,bar}{fred}
\RequirePackage[baz]{fred}
```

is the same as:

```
\RequirePackage[foo,bar,baz]{fred}
```

`\LoadClassWithOptions` `\LoadClassWithOptions{ $\langle name \rangle$ }[$\langle version \rangle$]:`

This is similar to `\LoadClass`, but it always calls class $\langle name \rangle$ with exactly the same option list that is being used by the current class, rather than an option explicitly supplied or passed on by `\PassOptionsToClass`.

`\RequirePackageWithOptions` `\RequirePackageWithOptions` is the analogous command for packages.

This is mainly intended to allow one class to simply build on another, for example:

```
\LoadClassWithOptions{article}
```

This should be contrasted with the slightly different construction

```
\DeclareOption*{\PassOptionsToClass{\CurrentOption}{article}}
\ProcessOptions
\LoadClass{article}
```

As used here, the effects are more or less the same, but the version using `\LoadClassWithOptions` is slightly quicker (and less to type). If, however, the class declares options of its own then the two constructions are different; compare, for example:

```
\DeclareOption{landscape}{...}
\ProcessOptions
\LoadClassWithOptions{article}
```

with:

```
\DeclareOption{landscape}{...}
\DeclareOption*{\PassOptionsToClass{\CurrentOption}{article}}
\ProcessOptions
\LoadClass{article}
```

In the first case, the `article` class will be called with option `landscape` precisely when the current class is called with this option; but in the second example it will not as in that case `article` is only passed options by the default option handler, which is not used for `landscape` as that option is explicitly declared.

`\@ifpackageloaded` To find out if a package has already been loaded, use

`\@ifclassloaded` `\@ifpackageloaded{ $\langle package \rangle$ }{ $\langle true \rangle$ }{ $\langle false \rangle$ }.`

`\@ifpackagelater` To find out if a package has already been loaded with a version more recent than $\langle version \rangle$, use `\@ifpackagelater{ $\langle package \rangle$ }{ $\langle version \rangle$ }{ $\langle true \rangle$ }{ $\langle false \rangle$ }.`

`\@ifclasslater` To find out if a package has already been loaded with at least the options $\langle options \rangle$, use `\@ifpackagewith{ $\langle package \rangle$ }{ $\langle options \rangle$ }{ $\langle true \rangle$ }{ $\langle false \rangle$ }.`

`\@ifpackagewith` There exists one package that can't be tested with the above commands: the `fontenc` package pretends that it was never loaded to allow for repeated reloading with different options (see `ltoutenc.dtx` for details).

`\@ifclasswith`

69.4 Declaring new options

Options for classes and packages are built using the same macros.

`\DeclareOption` To define a builtin option, use `\DeclareOption{ $\langle name \rangle$ }{ $\langle code \rangle$ }.`

`\DeclareOption*` To define the default action to perform for local options which have not been declared, use `\DeclareOption*{ $\langle code \rangle$ }.`

Note: there should be no use of `\RequirePackage`, `\DeclareOption`, `\DeclareOption*` or `\ProcessOptions` inside `\DeclareOption` or `\DeclareOption*`.

Possible uses for `\DeclareOption*` include:

```
\DeclareOption*{}
\DeclareOption*{\@unknownoptionerror}
\DeclareOption*{\PassOptionsToPackage{\CurrentOption}{\pkg-name}}
```

Do nothing. Silently accept unknown options. (This suppresses the usual warnings.)

Complain about unknown local options. (The initial setting for package files.)

Handle the the current option by passing it on to the package `\pkg-name`, which will presumably be loaded via `\RequirePackage` later in the file. This is useful for building ‘extension’ packages, that perhaps handle a couple of new options, but then pass everything else on to an existing package.

```
\DeclareOption*{\InputIfFileExists{xx-\CurrentOption.yyy}%
{}%
{\OptionNotUsed}}
```

Handle the option `foo` by loading the file `xx-foo.yyy` if it exists, otherwise do nothing, but declare that the option was not used. Actually the `\OptionNotUsed` declaration is only needed if this is being used in class files, but does no harm in package files.

69.5 Safe Input Macros

<code>\InputIfFileExists</code>	<code>\InputIfFileExists{<file>}{<then>}{<else>}</code> Inputs <code><file></code> if it exists. Immediately before the input, <code><then></code> is executed. Otherwise <code><else></code> is executed.
<code>\IfFileExists</code>	As above, but does not input the file.
<code>\@missingfileerror</code>	One thing you might like to put in the <code><else></code> clause is This starts an interactive request for a filename, supplying default extensions. Just hitting return causes the whole input to be skipped and entering <code>x</code> quits the current run,
<code>\input</code>	This has been redefined from the L ^A T _E X2.09 definition, in terms of the new commands <code>\InputIfFileExists</code> and <code>\@missingfileerror</code> .
<code>\listfiles</code>	Giving this declaration in the preamble causes a list of all files input via the ‘safe input’ commands to be listed at the end. Any strings specified in the optional argument to <code>\ProvidesPackage</code> are listed alongside the file name. So files in standard (and other non-standard) distributions can put informative strings in this argument.

70 Implementation

```
1 (*2ekernel)

@if@compatibility The flag for compatibilty mode.
2 \newif@if@compatibility

\@documentclasshook The hook called after the first \documentclass command. By default this checks
to see if \@normalsize is undefined, and if so, sets it to \normalsize.
3 \def\@documentclasshook{%
4   \ifx\@normalsize\@undefined
5     \let\@normalsize\normalsize
6   \fi
7 }

\@declaredoptions This list is automatically built by \DeclareOption. It is the list of options (separated by commas) declared in the class or package file and it defines the order in which the the corresponding \ds@<option> commands are executed. All local
```

*<option>*s which are not declared will be processed in the order defined by the optional argument of `\documentclass` or `\usepackage`.

```
8 \let\@declaredoptions\@empty
```

`\@classoptionslist` List of options of the main class.

```
9 \let\@classoptionslist\relax
10 \@onlypreamble\@classoptionslist
```

`\@unusedoptionlist` List of options of the main class that haven't been declared or loaded as class option files.

```
11 \let\@unusedoptionlist\@empty
12 \@onlypreamble\@unusedoptionlist
```

`\CurrentOption` Name of current package or option.

```
13 \let\CurrentOption\@empty
```

`\@currname` Name of current package or option.

```
14 \let\@currname\@empty
```

`\@currentt` The current file extension.

```
15 \global\let\@currentt=\@empty
```

`\@clsextension` The two possible values of `\@currentt`.

```
\@pkgextension 16 \def\@clsextension{cls}
17 \def\@pkgextension{sty}
18 \@onlypreamble\@clsextension
19 \@onlypreamble\@pkgextension
```

`\@pushfilename` Commands to push and pop the file name and extension.

```
\@popfilename #1 current name.
\@currnamestack #2 current extension.
#3 current catcode of @.
#4 Rest of the stack.
20 \def\@pushfilename{%
21   \xdef\@currnamestack{%
22     {\@currname}%
23     {\@currentt}%
24     {\the\catcode'\@}%
25     \@currnamestack}}
26 \@onlypreamble\@pushfilename

27 \def\@popfilename{\expandafter\@p@pfilename\@currnamestack\@nil}
28 \@onlypreamble\@popfilename

29 \def\@p@pfilename#1#2#3#4\@nil{%
30   \gdef\@currname{#1}%
31   \gdef\@currentt{#2}%
32   \catcode'\@#3\relax
33   \gdef\@currnamestack{#4}}
34 \@onlypreamble\@p@pfilename

35 \gdef\@currnamestack{}
36 \@onlypreamble\@currnamestack
```

`\@optionlist` Returns the option list of the file.

```
37 \def\@optionlist#1{%
38   \ifundefined{opt@#1}\@empty{\csname opt@#1\endcsname}}
39 \@onlypreamble\@optionlist
```

```

\ifpackageloaded \ifpackageloaded{<name>} Checks to see whether a file has been loaded.
\ifclassloaded 40 \def\ifpackageloaded{\ifl@aded\@pkgextension}
41 \def\ifclassloaded{\ifl@aded\@clsextension}
42 \@onlypreamble\ifpackageloaded
43 \@onlypreamble\ifclassloaded
44 \def\ifl@aded#1#2{%
45   \expandafter\ifx\csname ver@#2.#1\endcsname\relax
46     \expandafter\@secondoftwo
47   \else
48     \expandafter\@firstoftwo
49   \fi}
50 \@onlypreamble\ifl@aded

\ifpackagelater \ifpackagelater{<name>}{YYYY/MM/DD} Checks that the package loaded is
\ifclasslater more recent than the given date.
51 \def\ifpackagelater{\ifl@ter\@pkgextension}
52 \def\ifclasslater{\ifl@ter\@clsextension}
53 \@onlypreamble\ifpackagelater
54 \@onlypreamble\ifclasslater
55 \def\ifl@ter#1#2{%
56   \expandafter\ifl@t@r
57   \csname ver@#2.#1\endcsname}
58 \@onlypreamble\ifl@ter

This internal macro is also used in \NeedsTeXFormat.
59 \def\ifl@t@r#1#2{%
60   \ifnum\expandafter\@parse@version#1//00\@nil<%
61     \expandafter\@parse@version#2//00\@nil
62   \expandafter\@secondoftwo
63   \else
64     \expandafter\@firstoftwo
65   \fi}
66 \@onlypreamble\ifl@t@r
67 \def\@parse@version#1/#2/#3#4#5\@nil{#1#2#3#4 }
68 \@onlypreamble\@parse@version

\ifpackagewith \ifpackagewith{<name>}{<option-list>} Checks that <option-list> is a subset of
\ifclasswith the options with which <name> was loaded.
69 \def\ifpackagewith{\if@ptions\@pkgextension}
70 \def\ifclasswith{\if@ptions\@clsextension}
71 \@onlypreamble\ifpackagewith
72 \@onlypreamble\ifclasswith
73 \def\if@ptions#1#2{%
74   \@expandtwoargs\if@pti@ns{\@optionlist{#2.#1}}
75 \@onlypreamble\if@ptions

Probably shouldnt use \CurrentOption here... (changed to \reserved@b.)
76 \def\if@pti@ns#1#2{%
77   \let\reserved@a\@firstoftwo
78   \@for\reserved@b:=#2\do{%
79     \expandafter\in@\expandafter{\expandafter,\reserved@b,}{, #1,}%
80     \ifin@\else\let\reserved@a\@secondoftwo\fi}%
81   \reserved@a}
82 \@onlypreamble\if@pti@ns

\ProvidesPackage Checks that the current filename is correct, and defines \ver@filename.
83 \def\ProvidesPackage#1{%
84   \xdef\@gtempa{#1}%
85   \ifx\@gtempa\currname\else
86     \@latex@warning@no@line{You have requested

```



```

87      \cls@pkg\space'\@currname',\MessageBreak
88      but the \cls@pkg\space provides '#1'}%
89  \fi
90  \@ifnextchar[\@pr@videpackage{\@pr@videpackage[]}]%
91 \@onlypreamble\ProvidesPackage

92 \def\@pr@videpackage[#1]{%
93   \expandafter\xdef\csname ver@\@currname.\@current\endcsname{#1}%
94   \ifx\@current\cls@extension
95     \typeout{Document Class: \@gtempa\space#1}%
96   \else
97     \wlog{Package: \@gtempa\space#1}%
98   \fi}
99 \@onlypreamble\@pr@videpackage

```

\ProvidesClass Like **\ProvidesPackage**, but for classes.

```

100 \let\ProvidesClass\ProvidesPackage
101 \@onlypreamble\ProvidesClass

```

\ProvidesFile Like **\ProvidesPackage**, but for arbitrary files. Do not apply **\@onlypreamble** to these, as we may want to label files input during the document.

\@providesfile

```

102 \def\ProvidesFile#1{%
103   \begingroup
104   \catcode'\ 10 %
105   \ifnum \endlinechar<256 %
106     \ifnum \endlinechar>\m@ne
107       \catcode\endlinechar 10 %
108     \fi
109   \fi
110   \@makeother\/%
111   \@makeother\&%

112   \kernel@ifnextchar[{\@providesfile{#1}}{\@providesfile{#1}[]}]

```

During initex a special version of **\@providesfile** is used. The real definition is installed right at the end, in **ltfinal.dtx**.

```

\def\@providesfile#1[#2]{%
  \wlog{File: #1 #2}%
  \expandafter\xdef\csname ver@#1\endcsname{#2}%
  \endgroup}
\end{macrocode}

```

\PassOptionsToPackage If the package has been loaded, we check that it was first loaded with the options.

\PassOptionsToClass Otherwise we add the option list to that of the package.

```

113 \def\@pass@options#1#2#3{%
114   \expandafter\xdef\csname opt@#3.#1\endcsname{%
115     \@ifundefined{opt@#3.#1}\@empty
116     {\csname opt@#3.#1\endcsname,}%
117     \zap@space#2 \@empty}}
118 \@onlypreamble\@pass@options

119 \def\PassOptionsToPackage{\@pass@options\@pkgextension}
120 \def\PassOptionsToClass{\@pass@options\@cls@extension}
121 \@onlypreamble\PassOptionsToPackage
122 \@onlypreamble\PassOptionsToClass

```

\DeclareOption Adds an option as a **\ds@** command, or the default **\default@ds** command.

```

\DeclareOption* 123 \def\DeclareOption{%
124   \let\@fileswith@ptions\@badrequireerror
125   \@ifstar\@defdefault@ds\@declareoption}
126 \long\def\@declareoption#1#2{%

```

```

127 \xdef\@declaredoptions{\@declaredoptions,#1}%
128 \toks@{#2}%
129 \expandafter\edef\csname ds@#1\endcsname{\the\toks@}%
130 \long\def\@defdefault@ds#1{%
131 \toks@{#1}%
132 \edef\default@ds{\the\toks@}%
133 \@onlypreamble\DeclareOption
134 \@onlypreamble\@declareoption
135 \@onlypreamble\@defdefault@ds

```

\OptionNotUsed If we are in a class file, add `\CurrentOption` to the list of unused options. Otherwise, in a package file do nothing.

```

136 \def\OptionNotUsed{%
137 \ifx\@current\@clsextension
138 \xdef\@unusedoptionlist{%
139 \ifx\@unusedoptionlist\@empty\else\@unusedoptionlist,\fi
140 \CurrentOption}%
141 \fi}
142 \@onlypreamble\OptionNotUsed

```

\default@ds The default default option code. Set by `\@onefilewithoptions` to either `\OptionNotUsed` for classes, or `\unknownoptionerror` for packages. This may be reset in either case with `\DeclareOption*`.

```

143 % \let\default@ds\OptionNotUsed

```

\ProcessOptions `\ProcessOptions` calls `\ds@option` for each known package option, then calls `\default@ds` for each option on the local options list. Finally resets all the declared options to `\relax`. The empty option does nothing, this has to be reset on the off chance it's set to `\relax` if an empty element gets into the `\@declaredoptions` list.

The star form is similar but executes options given in the order specified in the document, not the order they are declared in the file. In the case of packages, global options are executed before local ones.

```

144 \def\ProcessOptions{%
145 \let\ds@\@empty
146 \edef\@curroptions{\@optionlist{\@currname.\@current}}%
147 \@ifstar\@xprocessoptions\@processoptions}
148 \@onlypreamble\ProcessOptions

149 \def\@processoptions{%
150 \@for\CurrentOption:=\@declaredoptions\do{%
151 \ifx\CurrentOption\@empty\else
152 \expandtwoargs\in@{,\CurrentOption,}%
153 \ifx\@current\@clsextension\else\@classoptionslist,\fi
154 \@curroptions,}%
155 \ifin@
156 \use@ption
157 \expandafter\let\csname ds@\CurrentOption\endcsname\@empty
158 \fi
159 \fi}%
160 \@processoptions}
161 \@onlypreamble\@processoptions

162 \def\@xprocessoptions{%
163 \ifx\@current\@clsextension\else
164 \@for\CurrentOption:=\@classoptionslist\do{%
165 \ifx\CurrentOption\@empty\else
166 \expandtwoargs\in@{,\CurrentOption,}{,\@declaredoptions,}%
167 \ifin@
168 \use@ption
169 \expandafter\let\csname ds@\CurrentOption\endcsname\@empty
170 \fi

```

```

171     \fi}%
172 \fi
173 \@process@pti@ns}
174 \@onlypreamble\@xprocess@ptions

```

The common part of `\ProcessOptions` and `\ProcessOptions*`.

```

175 \def\@process@pti@ns{%
176   \@for\CurrentOption:=\@curroptions\do{%
177     \@ifundefined{ds@\CurrentOption}%
178     {\@use@option
179     \default@ds}%

```

There should not be any non-empty definition of `\CurrentOption` at this point, as all the declared options were executed earlier. This is for compatibility with 2.09 styles which use `\def\ds@...` directly, and so have options which do not appear in `\@declaredoptions`.

```

180     \@use@option}%

```

Clear all the definitions for option code. First set all the declared options to `\relax`, then reset the ‘default’ and ‘empty’ options. and the list of declared options.

```

181   \@for\CurrentOption:=\@declaredoptions\do{%
182     \expandafter\let\csname ds@\CurrentOption\endcsname\relax}%
183   \let\CurrentOption\@empty
184   \let\@fileswith@pti@ns\@@fileswith@pti@ns
185   \AtEndOfPackage{\let\@unprocessedoptions\relax}}
186 \@onlypreamble\@process@pti@ns

```

`\@options` `\@options` is a synonym for `\ProcessOptions*` for upward compatibility with L^AT_EX2.09 style files.

```

187 \def\@options{\ProcessOptions*}
188 \@onlypreamble\@options

```

`\@use@option` Execute the code for the current option.

```

189 \def\@use@option{%
190   \@expandtwoargs\@removeelement\CurrentOption
191   \@unusedoptionlist\@unusedoptionlist
192   \csname ds@\CurrentOption\endcsname}
193 \@onlypreamble\@use@option

```

`\ExecuteOptions` `\ExecuteOptions{option-list}` executes the code declared for each option.

```

194 \def\ExecuteOptions#1{%
195   \def\reserved@a##1\@nil{%
196     \@for\CurrentOption:=#1\do{\csname ds@\CurrentOption\endcsname}%
197     \edef\CurrentOption{##1}}%
198   \expandafter\reserved@a\CurrentOption\@nil}
199 \@onlypreamble\ExecuteOptions

```

The top-level commands, which just set some parameters then call the internal command, `\@fileswithoptions`.

`\documentclass` The main new-style class declaration.

```

200 \def\documentclass{%
201   \let\documentclass\@twoclasseserror
202   \if@compatibility\else\let\usepackage\RequirePackage\fi
203   \@fileswithoptions\@clsextension}
204 \@onlypreamble\documentclass

```

`\documentstyle` 2.09 style class ‘style’ declaration.

```

205 \def\documentstyle{%
206   \makeatletter\input{latex209.def}\makeatother
207   \documentclass}
208 \@onlypreamble\documentstyle

```

`\RequirePackage` Load package if not already loaded.

```
209 \def\RequirePackage{%
210   \@fileswithoptions\@pkgextension}
211 \@onlypreamble\RequirePackage
```

`\LoadClass` Load class.

```
212 \def\LoadClass{%
213   \ifx\@current\@pkgextension
214     \@latex@error
215       {\noexpand\LoadClass in package file}%
216       {You may only use \noexpand\LoadClass in a class file.}%
217   \fi
218   \@fileswithoptions\@clsextension}
219 \@onlypreamble\LoadClass
```

`\@loadwithoptions` Pass the current option list on to a class or package. #1 is `\@cls-or-pkgextension`, #2 is `\RequirePackage` or `\LoadClass`, #3 is the class or package to be loaded.

```
220 \def\@loadwithoptions#1#2#3{%
221   \expandafter\let\csname opt@#3.#1\expandafter\endcsname
222     \csname opt@\@currname.\@current\endcsname
223   #2{#3}}
224 \@onlypreamble\@loadwithoptions
```

`\LoadClassWithOptions` Load class ‘#1’ with the current option list.

```
225 \def\LoadClassWithOptions{%
226   \@loadwithoptions\@clsextension\LoadClass}
227 \@onlypreamble\LoadClassWithOptions
```

`\RequirePackageWithOptions` Load package ‘#1’ with the current option list.

```
228 \def\RequirePackageWithOptions{%
229   \AtEndOfPackage{\let\unprocessedoptions\relax}%
230   \@loadwithoptions\@pkgextension\RequirePackage}
231 \@onlypreamble\RequirePackageWithOptions
```

`\usepackage` To begin with, `\usepackage` produces an error. This is reset by `\documentclass`.

```
232 \def\usepackage#1#{%
233   \@latex@error
234     {\noexpand \usepackage before \string\documentclass}%
235     {\noexpand \usepackage may only appear in the document
236      preamble, i.e., \MessageBreak
237      between \noexpand\documentclass and
238      \string\begin{document}.}%
239   \@gobble}
240 \@onlypreamble\usepackage
```

`\NeedsTeXFormat` Check that the document is running on the correct system.

```
241 \def\NeedsTeXFormat#1{%
242   \def\reserved@a{#1}%
243   \ifx\reserved@a\fmtname
244     \expandafter\@needsformat
245   \else
246     \@latex@error{This file needs format ‘\reserved@a’%
247       \MessageBreak but this is ‘\fmtname’}{%
248       The current input file will not be processed
249       further,\MessageBreak
250       because it was written for some other flavor of
251       TeX.\MessageBreak\@ehd}%
```

If the file is not meant to be processed by L^AT_EX 2_ε we stop inputting it, but we do not end the run. We just end inputting the current file.

```
252   \endinput \fi}
253 \@onlypreamble\NeedsTeXFormat
```

```

254 \def\@needsformat{%
255   \ifnextchar[%]
256     \@needsformat
257   {}}
258 \@onlypreamble\@needsformat

259 \def\@needsformat[#1]{%
260   \ifl@t@r\fmtversion{#1}{}%
261   {\@latex@warning@no@line
262     {You have requested release ‘#1’ of LaTeX,\MessageBreak
263       but only release ‘\fmtversion’ is available}}}%
264 \@onlypreamble\@needsformat

```

`\zap@space` `\zap@space foo`*space*`\empty` removes all spaces from `foo` that are not protected by `{ }` groups.

```

265 \def\zap@space#1 #2{%
266   #1%
267   \ifx#2\empty\else\expandafter\zap@space\fi
268   #2}

```

`\@fileswithoptions` The common part of `\documentclass` and `\usepackage`.

```

269 \def\@fileswithoptions#1{%
270   \ifnextchar[%]
271     {\@fileswithoptions#1}%
272     {\@fileswithoptions#1[]}%
273 \@onlypreamble\@fileswithoptions

274 \def\@fileswithoptions#1[#2]#3{%
275   \ifnextchar[%]
276     {\@fileswithoptions#1[#2]#3}%
277     {\@fileswithoptions#1[#2]#3[]}%
278 \@onlypreamble\@fileswithoptions

```

Then we do some work.

First of all, we define the global variables. Then we look to see if the file has already been loaded. If it has, we check that it was first loaded with at least the current options. If it has not, we add the current options to the package options, set the default version to be 0000/00/00, and load the file if we can find it. Then we check the version number.

Finally, we restore the old file name, reset the default option, and we set the catcode of `@`.

For classes, we can immediately process the file. For other types, `#2` could be a comma separated list, so loop through, processing each one separately.

```

279 \def\@fileswithoptions#1[#2]#3[#4]{%
280   \ifx#1\clsextension
281     \ifx@classoptionslist\relax
282       \xdef@classoptionslist{\zap@space#2 \@empty}%
283       \def\reserved@a{%
284         \@onefilewithoptions#3[#2] [#4]#1%
285         \@documentclasshook}%
286     \else
287       \def\reserved@a{%
288         \@onefilewithoptions#3[#2] [#4]#1}%
289     \fi
290   \else

```

build up a list of calls to `\@onefilewithoptions` (one for each package) without thrashing the parameter stack.

```

291   \def\reserved@b##1,{%
292     \ifx\@nil##1\relax\else
293       \ifx\relax##1\relax\else
294         \noexpand\@onefilewithoptions##1[#2] [#4]%

```

```

295     \noexpand\@pkgextension
296     \fi
297     \expandafter\reserved@b
298     \fi}%
299     \edef\reserved@a{\zap@space#3 \@empty}%
300     \edef\reserved@a{\expandafter\reserved@b\reserved@a,\@nil,}%
301     \fi
302     \reserved@a}
303 \@onlypreamble\@fileswith@ptions

    Have the main argument as #1, so we only need one \expandafter above.
304 \def\@onefilewithoptions#1[#2][#3]#4{%
305     \@pushfilename
306     \xdef\@currname{#1}%
307     \global\let\@currentt#4%
308     \expandafter\let\csname\@currname.\@currentt-h@k\endcsname\@empty
309     \let\CurrentOption\@empty
310     \@resetOptions
311     \makeatletter

    Grab everything in a macro, so the parameter stack is popped before any process-
    ing begins.
312     \def\reserved@a{%
313         \@ifl@aded\@currentt{#1}%
314         {\@ifOptions\@currentt{#1}{#2}{}%
315             {\@latex@error
316                 {Option clash for \@cls@pkg\space #1}%
317                 {The package #1 has already been loaded
318                     with options:\MessageBreak
319                     \space\space[\@optionlist{#1.\@currentt}]\MessageBreak
320                     There has now been an attempt to load it
321                     with options:\MessageBreak
322                     \space\space[#2]\MessageBreak
323                     Adding the global options:\MessageBreak
324                     \space\space
325                     \@optionlist{#1.\@currentt},#2\MessageBreak
326                     to your \noexpand\documentclass declaration may fix this.%
327                     \MessageBreak
328                     Try typing \space <return> \space to proceed.}}}%
329             {\@passOptions\@currentt{#2}{#1}%

330             \global\expandafter
331             \let\csname ver@\@currname.\@currentt\endcsname\@empty
332             \InputIfFileExists
333             {\@currname.\@currentt}%
334             {}%
335             {\@missingfileerror\@currname\@currentt}%

    \@unprocessedoptions will generate an error for each specified option in a pack-
    age unless a \ProcessOptions has appeared in the package file.
336     \let\@unprocessedoptions\@@unprocessedoptions
337     \csname\@currname.\@currentt-h@k\endcsname
338     \expandafter\let\csname\@currname.\@currentt-h@k\endcsname
339         \@undefined
340     \@unprocessedoptions}

341     \@ifl@ter\@currentt{#1}{#3}{}%
342     {\@latex@warning@no@line
343         {You have requested,\on@line,
344             version\MessageBreak
345             ‘#3’ of \@cls@pkg\space #1,\MessageBreak
346             but only version\MessageBreak
347             ‘\csname ver@#1.\@currentt\endcsname’\MessageBreak
348             is available}}}%

```

```

349 \ifx\@currentx\@clsextension\let\LoadClass\@twoloadclasserror\fi
350 \popfilename
351 \@reset@options}%
352 \reserved@a}
353 \@onlypreamble\@onefilewithoptions

```

`\@fileswith@pti@ns` Save the definition (for error checking).

```

354 \let\@fileswith@pti@ns\@fileswith@pti@ns
355 \@onlypreamble\@fileswith@pti@ns

```

`\@reset@options` Reset the default option, and clear lists of declared options.

```

356 \def\@reset@options{%
357 \global\ifx\@currentx\@clsextension
358 \let\default@ds\OptionNotUsed
359 \else
360 \let\default@ds\@unknownoptionerror
361 \fi
362 \global\let\ds@\@empty
363 \global\let\@declaredoptions\@empty}
364 \@onlypreamble\@reset@options

```

70.1 Hooks

Allow code do be saved to be executed at specific later times.

Save things in macros, I considered using toks registers, (and `\addto@hook` from the NFSS code, that would require stacking the contents in the case of required packages, so just generate a new macro for each package.

`\@begindocumenthook` Stuff to appear at the begining or end of the document.

```

\@enddocumenthook 365 \ifx\@begindocumenthook\@undefined
366 \let\@begindocumenthook\@empty
367 \fi
368 \let\@enddocumenthook\@empty

```

`\g@addto@macro` Globally add to the end of a macro.

```

369 \long\def\g@addto@macro#1#2{%
370 \begingroup
371 \toks@\expandafter{#1#2}%
372 \xdef#1{\the\toks@}%
373 \endgroup}

```

`\AtEndOfPackage` The access functions.

```

\AtEndOfClass 374 \def\AtEndOfPackage{%
\AtBeginDocument 375 \expandafter\g@addto@macro\csname\@currname.\@currentx-h@k\endcsname}
\AtEndDocument 376 \let\AtEndOfClass\AtEndOfPackage
377 \@onlypreamble\AtEndOfPackage
378 \@onlypreamble\AtEndOfClass

379 \def\AtBeginDocument{\g@addto@macro\@begindocumenthook}
380 \def\AtEndDocument{\g@addto@macro\@enddocumenthook}
381 \@onlypreamble\AtBeginDocument

```

`\@cls@pkg` The current file type.

```

382 \def\@cls@pkg{%
383 \ifx\@currentx\@clsextension
384 document class%
385 \else
386 package%
387 \fi}
388 \@onlypreamble\@cls@pkg

```

```

\@unknownoptionerror Bad option.

389 \def\@unknownoptionerror{%
390   \@latex@error
391   {Unknown option ‘\CurrentOption’ for \@cls@pkg\space‘\@currname’}%
392   {The option ‘\CurrentOption’ was not declared in
393   \@cls@pkg\space‘\@currname’, perhaps you\MessageBreak
394   misspelled its name.
395   Try typing \space <return>
396   \space to proceed.}}
397 \@onlypreamble\@unknownoptionerror

\@@unprocessedoptions Declare an error for each option, unless a \ProcessOptions occurred.

398 \def\@@unprocessedoptions{%
399   \ifx\@current\@pkgextension
400     \edef\@curroptions{\@optionlist{\@currname.\@current}}%
401     \@for\CurrentOption:=\@curroptions\do{%
402       \ifx\CurrentOption\@empty\else\@unknownoptionerror\fi}%
403   \fi}
404 \@onlypreamble\@unprocessedoptions
405 \@onlypreamble\@@unprocessedoptions

\@badrequireerror \RequirePackage or \LoadClass occurs in the options section.

406 \def\@badrequireerror#1[#2]#3[#4]{%
407   \@latex@error
408   {\noexpand\RequirePackage or \noexpand\LoadClass
409    in Options Section}%
410   {The \@cls@pkg\space ‘\@currname’ is defective.\MessageBreak
411    It attempts to load ‘#3’ in the options section, i.e.,\MessageBreak
412    between \noexpand\DeclareOption and \string\ProcessOptions.}}
413 \@onlypreamble\@badrequireerror

\@twoloadclasserror Two \LoadClass in a class.

414 \def\@twoloadclasserror{%
415   \@latex@error
416   {Two \noexpand\LoadClass commands}%
417   {You may only use one \noexpand\LoadClass in a class file}}
418 \@onlypreamble\@twoloadclasserror

\@twoclasseserror Two \documentclass or \documentstyle.

419 \def\@twoclasseserror#1#{%
420   \@latex@error
421   {Two \noexpand\documentclass or \noexpand\documentstyle commands}%
422   {The document may only declare one class.}\@gobble}
423 \@onlypreamble\@twoclasseserror

```

70.2 Providing shipment

```

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

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

\filecontents This environment implements inline files. The star-form does not write extra
\endfilecontents comments into the file.

425 \begingroup%
426 \catcode‘\*=11 %
427 \catcode‘^^M\active%
428 \catcode‘^^L\active\let^^L\relax%
429 \catcode‘^^I\active%

430 \gdef\filecontents{\@tempwattrue\filecontents}%
431 \gdef\filecontents*{\@tempwafalse\filecontents}%

```



```

432 \gdef\filecontents#1{%
433   \openin\@inputcheck#1 %
434   \ifeof\@inputcheck%
435     \@latex@warning@no@line%
436       {Writing file ‘\@currdir#1’}%

437   \chardef\reserved@c15 %
438   \ch@ck7\reserved@c\write%
439   \immediate\openout\reserved@c#1\relax%
440   \else%

441     \closein\@inputcheck%
442     \@latex@warning@no@line%
443       {File ‘#1’ already exists on the system.\MessageBreak%
444         Not generating it from this source}%
445     \let\write\@gobbletwo%
446     \let\closeout\@gobble%
447   \fi%
448   \if@tempwa%

449     \immediate\write\reserved@c{%
450       \@percentchar\@percentchar\space%
451       \expandafter\@gobble\string\LaTeXe file ‘#1’^^J%
452       \@percentchar\@percentchar\space generated by the %
453       ‘\@currenvir’ \expandafter\@gobblefour\string\newenvironment^^J%
454       \@percentchar\@percentchar\space from source ‘\jobname’ on %
455       \number\year/\two@digits\month/\two@digits\day.^^J%
456       \@percentchar\@percentchar}%
457   \fi%
458   \let\do\@makeother\dospecials%

459   \edef\E{\@backslashchar end\string{\@currenvir\string}}%
460   \edef\reserved@b{%
461     \def\noexpand\reserved@b%
462       #####1\E#####2\E#####3\relax}%
463   \reserved@b{%
464     \ifx\relax##3\relax%

There was no \end{filecontents}

465     \immediate\write\reserved@c{##1}%
466     \else%

There was a \end{filecontents}, so stop this time.

467     \edef^^M{\noexpand\end{\@currenvir}}%
468     \ifx\relax##1\relax%
469     \else%

Text before the \end, write it with a warning.

470       \@latex@warning{Writing text ‘##1’ before %
471         \string\end{\@currenvir}\MessageBreak as last line of #1}%
472       \immediate\write\reserved@c{##1}%
473     \fi%
474     \ifx\relax##2\relax%
475     \else%

Text after the \end, ignore it with a warning.

476       \@latex@warning{%
477         Ignoring text ‘##2’ after \string\end{\@currenvir}}%
478     \fi%
479   \fi%
480   ^^M}%

481   \catcode‘^^L\active%
482   \let\L\@undefined%
483   \def^^L{\@ifundefined L^^J^^J^^J}%

```

```

484 \catcode'\^^I\active%
485 \let\I\@undefined%
486 \def^^I{\@ifundefined I\space\space}%
487 \catcode'\^^M\active%
488 \edef^^M##1^^M{%
489 \noexpand\reserved@b##1\E\E\relax}}%
490 \endgroup%

491 \begingroup
492 \catcode'\=\catcode'\%
493 \catcode'\%=12
494 \catcode'\*=11
495 \gdef\@percentchar{%}
496 \gdef\endfilecontents{|
497 \immediate\closeout\reserved@c
498 \def\T##1##2##3{|
499 \ifx##1\@undefined\else
500 \@latex@warning@no@line{##2 has been converted to Blank ##3e}|
501 \fi}|
502 \T\L{Form Feed}{Lin}|
503 \T\I{Tab}{Spac}|
504 \immediate\write\@unused{}}
505 \global\let\endfilecontents*\endfilecontents
506 \@onlypreamble\filecontents
507 \@onlypreamble\endfilecontents
508 \@onlypreamble\filecontents*
509 \@onlypreamble\endfilecontents*
510 \endgroup
511 \@onlypreamble\filec@ntents

512 </2ekernel>

```

71 After Preamble

Finally we declare a package that allows all the commands declared above to be `\@onlypreamble` to be used after `\begin{document}`.

```

513 <*afterpreamble>
514 \NeedsTeXFormat{LaTeX2e}
515 \ProvidesPackage{pkgindoc}
516 [1994/10/20 v1.1 Package Interface in Document (DPC)]
517 \def\reserved@a#1\do\@classoptionslist#2\do\filec@ntents#3\relax{%
518 \gdef\@preamblecmds{#1#3}}
519 \expandafter\reserved@a\@preamblecmds\relax
520 </afterpreamble>

```

File M

lthyphen.dtx

This file contains the code for loading hyphenation patterns into L^AT_EX. Most of this will end up in a file called `hyphen.ltx`. If you wish to customize your L^AT_EX system in respect of hyphenation patterns, write a file `hyphen.cfg`. If this file exists, it will be loaded instead of `hyphen.ltx`. See the comments below for additional information.

To produce the printed version of this file the following code is used. It can be extracted with the DOCSTRIP program, or one can run this file directly through L^AT_EX 2_ε.

```
1 \<*driver>
2 \documentclass{ltxdoc}
3 \begin{document}
4 \DocInput{lthyphen.dtx}
5 \end{document}
6 \</driver>
```

The default file `hyphen.ltx` loads hyphenation patterns for US english. If you want to load additional or other hyphenation patterns, you should create a file `hyphen.cfg`. This is best done by starting from `hyphen.ltx`.

For backward compatibility, the default file, `hyphen.ltx`, first tries to load the file `hyphen.tex`. If this file exists, an information message is issued and the appropriate defaults for T_EX's internal parameters are set: `\language` is initialized to 0, and `\lefthyphenmin` and `\righthyphenmin` to 2 and 3, respectively, to disallow x- or -xx breaks.

```
7 \<*default>
8 \InputIfFileExists{hyphen.tex}%
9   {\message{Loading hyphenation patterns for US english.}}%
10   \language=0
11   \lefthyphenmin=2 \righthyphenmin=3 }%
```

Otherwise, since we cannot do anything without any hyphenation patterns, an error message is printed and the L^AT_EX run is terminated by invoking `\@@end` (which is the L^AT_EX 2_ε name for T_EX's `\end` primitive).

```
12   {\errhelp{The configuration for hyphenation is incorrectly
13             installed.^^J%
14             If you don't understand this error message you need
15             to seek^^Jexpert advice.}}%
16   \errmessage{OOPS! I can't find any hyphenation patterns for
17             US english.^^J \space Think of getting some or the
18             latex2e setup will never succeed}\@@end}
19 \</default>
```

The following example describes the possible contents of a file `hyphen.cfg` that will load both US English and German hyphenation patterns, making the former the default. It sets `\language` to 0 for the US patterns and to 1 for the German patterns. Then `\language` is set to 0 to make this the default and the default values of `\lefthyphenmin` and `\righthyphenmin` are set.

```
\language=0
\input hyphen % (or \input ushyphen1 if the file has been renamed)
\language=1
\input ghyph31
\language=0
\lefthyphenmin=2
\righthyphenmin=3
\endinput
```

Another possibility is to use the package `babel`, by Johannes Braams. That package is distributed with a suitable `hyphen.cfg` file.

File N

ltxfinal.dtx

72 Final settings

This section contains the final settings for L^AT_EX. It initialises some debugging and typesetting parameters, sets the default \catcodes and uc/lc codes, and inputs the hyphenation file.

72.1 Debugging

By default, L^AT_EX shows statistics:

```
1 \*2ekernel
2 \tracingstats1
```

72.2 Typesetting parameters

```
\@lowpenalty These are penalties used internally.
\@medpenalty 3 \newcount\@lowpenalty
\@highpenalty 4 \newcount\@medpenalty
5 \newcount\@highpenalty
```

The default values of the picture and \fbox parameters:

```
6 \unitlength = 1pt
7 \fboxsep = 3pt
8 \fboxrule = .4pt
```

The saved value of T_EX's \maxdepth:

```
9 \@maxdepth = \maxdepth
```

\vsize initialized because a \clearpage with \vsize < \topskip causes trouble.
\@colroom and \@colht also initialized because \vsize may be set to them if a
\clearpage is done before the \begin{document}

```
10 \vsize = 1000pt
11 \@colroom = \vsize
12 \@colht = \vsize
```

Initialise \textheight \textwidth and page style, to avoid internal errors if they are not set by the class.

```
13 \textheight=.5\maxdimen
14 \textwidth=\textheight
15 \ps@empty
```

72.3 Lccodes for hyphenation

We set things up so that hyphenation files can assume that the default (T1) lccodes are in use (at present this also sets up the uccodes). We temporarily define \reserved@a to apply \reserved@c to all the numbers in the range of its arguments.

```
16 \def\reserved@a#1#2{%
17   \@tempcnta#1\relax
18   \@tempcntb#2\relax
19   \reserved@b
20 }
21 \def\reserved@b{%
22   \ifnum\@tempcnta>\@tempcntb\else
23     \reserved@c\@tempcnta
24     \advance\@tempcnta\@ne
25     \expandafter\reserved@b
```

```

26 \fi
27 }

```

Depending on the T_EX version, we might not be allowed to do this for non-ASCII characters.

```

28 \def\reserved@c#1{%
29   \count@=#1\advance\count@ by -"20
30   \uccode#1=\count@
31   \lccode#1=#1
32 }
33 \reserved@a{'\a}{'\z}
34 \ifnum\inputlineno=\m@ne\else
35   \reserved@a{"A0}{\BC}
36   \reserved@a{"E0}{\FF}
37 \fi

```

The upper case characters need their `\uccode` and `\lccode` values set, and their `\sfcode` set to 999.

```

38 \def\reserved@c#1{%
39   \count@=#1\advance\count@ by "20
40   \uccode#1=#1
41   \lccode#1=\count@
42   \sfcode#1=999
43 }
44 \reserved@a{'\A}{'\Z}
45 \ifnum\inputlineno=\m@ne\else
46   \reserved@a{"80}{\9C}
47   \reserved@a{"C0}{\DF}
48 \fi

```

Well, it would be nice if that were correct, but unfortunately, the Cork encoding contains some odd slots whose `uccode` or `lccode` isn't quite what you'd expect.

```

49 \uccode'\^Y='I % dotless i
50 \lccode'\^Y='^Y % dotless i
51 \uccode'\^Z='J % dotless j, ae in OT1
52 \lccode'\^Z='^Z % dotless j, ae in OT1
53 \ifnum\inputlineno=\m@ne\else
54   \lccode'\^9d='i % dotted I
55   \uccode'\^9d='^9d % dotted I
56   \lccode'\^9e='^9e % d-bar
57   \uccode'\^9e='^d0 % d-bar
58 \fi

```

Finally here is one that helps hyphenation in the OT1 encoding.

```

59 \lccode'\^=[='^ % oe in OT1

```

And we also set the `\lccode` of `\-` and `\textcompwordmark` so that they do not prevent hyphenation in the remainder of the word (as suggested by Lars Helström).

```

60 \lccode'\- ='\- % default hyphen char
61 \lccode 127=127 % alternate hyphen char
62 \lccode 23 =23 % textcompwordmark in T1

```

72.4 Hyphenation

The following code will be compiled into the format file. It checks for the existence of `hyphen.cfg` in inputs that file if found. Otherwise it inputs `hyphen.ltx`. Note that these are loaded in *before* the `\catcodes` are set, so local hyphenation files can use 8-bit input.

We try to load the customized hyphenation description file.

```

63 \InputIfFileExists{hyphen.cfg}
64   {\typeout{=====^^J%
65     Local configuration file hyphen.cfg used^^J%

```

```

66          =====}%
67      \def\@addtofilelist##1{\xdef\@filelist{\@filelist,##1}}%
68      }
69      {\input{hyphen.ltx}}
70 \let\@addtofilelist\@gobble

```

72.5 Font loading

Fonts loaded during the formatting process might already have changed the `\font@submax` from 0pt to something higher. If so, we put out a bold warning.

```

71 % \changes{v1.1c}{2000/08/23}{Fix typo in warning}
72 \ifdim \font@submax >\z@
73   \@font@warning{Size substitutions with differences\MessageBreak
74     up to \font@submax\space have occurred.\MessageBreak
75     \MessageBreak
76     Please check the transcript file
77     carefully\MessageBreak
78     and redo the format generation if necessary!
79     \@gobbletwo}%
80   \errhelp{Only stopped, to give you time to
81     read the above message.}
82   \errmessage{}

```

We reset the macro. Otherwise every user will get a warning on every job.

```

83 \def\font@submax{0pt}
84 \fi

```

72.6 Input encoding

We temporarily define `\reserved@a` to apply `\reserved@c` to all the numbers in the range of its arguments.

```

85 \def\reserved@a#1#2{%
86   \@tempcnta#1\relax
87   \@tempcntb#2\relax
88   \reserved@b
89 }
90 \def\reserved@b{%
91   \ifnum\@tempcnta>\@tempcntb\else
92     \reserved@c\@tempcnta
93     \advance\@tempcnta\@ne
94     \expandafter\reserved@b
95   \fi
96 }

```

Set the special catcodes (although some of these are useless, since an error will have occurred if the catcodes have changed). Note that `^^J` has catcode ‘other’ for use in warning messages.

```

97 \catcode'\ =10
98 \catcode'\# =6
99 \catcode'\$ =3
100 \catcode'\% =14
101 \catcode'\& =4
102 \catcode'\ =0
103 \catcode'\^ =7
104 \catcode'\_ =8
105 \catcode'\{ =1
106 \catcode'\} =2
107 \catcode'\~ =13
108 \catcode'\@ =11
109 \catcode'\^^I =10
110 \catcode'\^^J =12
111 \catcode'\^^L =13

```

```

112 \catcode'\^M=5
Set the 'other' catcodes.
113 \def\reserved@c#1{\catcode#1=12\relax}
114 \reserved@c{'\!}
115 \reserved@c{'\"}
116 \reserved@a{'\' }{'\?}
117 \reserved@c{'\[]
118 \reserved@c{'\]}
119 \reserved@c{'\' }
120 \reserved@c{'\|}
Set the 'letter' catcodes.
121 \def\reserved@c#1{\catcode#1=11\relax}
122 \reserved@a{'\A}{'\Z}
123 \reserved@a{'\a}{'\z}
All the characters in the range 0–31 and 127–255 are illegal, except tab ( $\text{\textasciitilde{I}}$ ), nl
( $\text{\textasciitilde{J}}$ ), ff ( $\text{\textasciitilde{L}}$ ) and cr ( $\text{\textasciitilde{M}}$ ).
Now allow 8-bit characters, although their use in this way is strongly discour-
aged. See inputenc.dtx for a supported mechanism for 8-bit input.
124 \def\reserved@c#1{\catcode#1=15\relax}
125 \reserved@a{0}{'\^H}
126 \reserved@c{'\^K}
127 \reserved@a{'\^N}{31}
128 %\ifnum\inputlineno=\m@ne
129 \catcode"7F=15
130 %\else
131 % \reserved@a{"7F}{\textasciifull}
132 %\fi

```

72.7 Lccodes and uccodes

We now again set up the default (T1) uc/lccodes. The lower case characters need their `\uccode` and `\lccode` values set. Some of this is a repeat of the set-up before loading hyphenation files. Depending on the \TeX version, we might not be allowed to do this for non-ASCII characters.

```

133 \def\reserved@c#1{%
134 \count@=#1\advance\count@ by -"20
135 \uccode#1=\count@
136 \lccode#1=#1
137 }
138 \reserved@a{'\a}{'\z}
139 \ifnum\inputlineno=\m@ne\else
140 \reserved@a{"A0}{\textasciicircum{B}}
141 \reserved@a{"E0}{\textasciifull}
142 \fi

```

The upper case characters need their `\uccode` and `\lccode` values set, and their `\sfcode` set to 999.

```

143 \def\reserved@c#1{%
144 \count@=#1\advance\count@ by "20
145 \uccode#1=#1
146 \lccode#1=\count@
147 \sfcode#1=999
148 }
149 \reserved@a{'\A}{'\Z}
150 \ifnum\inputlineno=\m@ne\else
151 \reserved@a{"80}{\textasciicircum{9}}
152 \reserved@a{"C0}{\textasciifull}
153 \fi

```

Well, it would be nice if that were correct, but unfortunately, the Cork encoding contains some odd slots whose `\uccode` or `\lccode` isn't quite what you'd expect.

```

154 \uccode'\^Y='^I      % dotless i
155 \lccode'\^Y='^Y      % dotless i
156 \uccode'\^Z='^J      % dotless j, ae in OT1
157 \lccode'\^Z='^Z      % dotless j, ae in OT1
158 \ifnum\inputlineno=\m@ne\else
159   \lccode'\^9d='^i     % dotted I
160   \uccode'\^9d='^9d    % dotted I
161   \lccode'\^9e='^9e    % d-bar
162   \uccode'\^9e='^d0    % d-bar
163 \fi

```

Finally here is one that helps hyphenation in the OT1 encoding.

```

164 \lccode'\^=[='^[      % oe in OT1

```

`\MakeUppercase` And whilst we're doing things with uc/lc tables, here are two commands to upper- and lower-case a string.

`\MakeUppercase` *Note* that this implementation is subject to change! At the moment we're not providing any way to extend the list of uc/lc commands, since finding a good interface is difficult. These commands have some nasty features, such as uppercasing mathematics, environment names, labels, etc. A much better long-term solution is to use all-caps fonts, but these aren't generally available.

`\@uclclist`

```

165 \DeclareRobustCommand{\MakeUppercase}[1]{%
166   \def\i{I}\def\j{J}%
167   \def\reserved@a##1##2{\let##1##2\reserved@a}%
168   \expandafter\reserved@a\@uclclist\reserved@b{\reserved@b\@gobble}%
169   \protected@edef\reserved@a{\uppercase{#1}}%
170   \reserved@a
171 }%
172 \DeclareRobustCommand{\MakeLowercase}[1]{%
173   \def\reserved@a##1##2{\let##2##1\reserved@a}%
174   \expandafter\reserved@a\@uclclist\reserved@b{\reserved@b\@gobble}%
175   \protected@edef\reserved@a{\lowercase{#1}}%
176   \reserved@a
177 }%
178 \def\@uclclist{\oe\OE\o\O\ae\AE
179   \dh\DH\dj\DJ\l\L\ng\NG\ss\SS\th\TH}

```

The above code works, but has the nasty side-effect that if you say something like:

```

\markboth{\MakeUppercase\contentsname}
{\MakeUppercase\contentsname}

```

then the uppercasing is only done to the first letter of the contents name, since the mark expands out to:

```

\mark{\protect\MakeUppercase Table of Contents}
{\protect\MakeUppercase Table of Contents}

```

In order to get round this, we redefine `\MakeUppercase` and `\MakeLowercase` to grab their argument and brace it. This is a very low-level hack, and is *not* recommended practice! This is an instance of a general problem that makes it unsafe to grab arguments unbraced, and probably needs a more general solution. For the moment though, this hack will do:

```

180 \protected@edef\MakeUppercase#1{\MakeUppercase{#1}}
181 \protected@edef\MakeLowercase#1{\MakeLowercase{#1}}

```

72.8 Applying Patch files

Between major releases, small patches will be distributed in files `ltpatch.ltx` which must be added at this point.

```

182 \IfFileExists{ltpatch.ltx}
183 {\typeout{=====^^J%

```



```

184         Applying patch file ltpatch.ltx^^J%
185         =====}
186     \def\fmtversion@topatch{unknown}
187     \input{ltpatch.ltx}
188     \ifx\fmtversion\fmtversion@topatch
189         \ifx\patch@level\undefined
190             \typeout{^^J^^J^^J%
191                 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J%
192                 !! Patch file 'ltpatch.ltx' not suitable for this^^J%
193                 !! version of LaTeX.^^J^^J%
194                 !! Please check if initex found an old patch file:^^J%
195                 !! --- if so, rename it or delete it, and redo the^^J%
196                 !! initex run.^^J%
197                 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J}%
198         \batchmode \@@end
199     \else
The code below adds the 'patch level' string to the first \typeout in the startup
banner.
200     \def\fmtversion@topatch{0}%
201     \ifx\fmtversion@topatch\patch@level\else
202         \def\reserved@a\typeout##1##2\reserved@a{%
203             \typeout{##1 patch level \patch@level}##2}
204         \everyjob\expandafter\expandafter\expandafter{%
205             \expandafter\reserved@a\the\everyjob\reserved@a}
206         \let\reserved@a\relax
207         \the\everyjob
208     \fi
209 \fi
210 \else
211     \typeout{^^J^^J^^J%
212         !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J%
213         !! Patch file 'ltpatch.ltx' (for version <\fmtversion@topatch>)^^J%
214         !! is not suitable for version <\fmtversion> of LaTeX.^^J^^J%
215         !! Please check if initex found an old patch file:^^J%
216         !! --- if so, rename it or delete it, and redo the^^J%
217         !!     initex run.^^J%
218         !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!^^J}%
219     \batchmode \@@end
220 \fi
221 \let\fmtversion@topatch\relax
222 }{}
```

`\reserved@a` And just to make sure nobody relies on those definitions of `\reserved@b` and `\reserved@b` friends. These macros are reserved for use in the kernel. *Do not use them as general scratch macros.*

`\errhelp` Empty the error help message, which may have some rubbish:

```
234 \errhelp{}
```

72.10 Initialise file list

`\@providesfile` Initialise for use in the document. During `initex` a modified version has been used which leaves debugging information for `latexbug.tex`.

```
235 \def\@providesfile#1[#2]{%
236     \wlog{File: #1 #2}%
237     \expandafter\xdef\csname ver@#1\endcsname{#2}%
238     \endgroup}
```

`\@filelist` Reset `\@filelist` so files input while making the format are not listed. The list built up so far may take up a lot of memory and so it is moved to `\reserved@a` where it will be overwritten as soon as almost any \LaTeX command is issued in a class file. However the `latexbug.tex` program will be able to access this information and insert it into a bug report.

```
239 \let\@filelist\@gobble
240 \def\@addtofilelist#1{\xdef\@filelist{\@filelist,#1}}%
```

72.11 Dumping the format

Finally we make `@` into a letter, ensure the format will be in the ‘normal’ error mode, and dump everything into the format file.

```
241 \makeatother
242 \errorstopmode
243 \dump
244 \</2ekernel>
```

File O

ltpatch

Things we did wrong...

```
1 %%%
2 %%% Patch file for the LaTeX2e kernel dated 2009/09/24
3 %%% (2009/09/24)
4
5 \def\fmtversion@topatch{2009/09/24} % This patch will not work with
6                                     % any other release.
7
8 \def\patch@level{0}
9
10
11
12
13 %%%%%%%%%%%%%%%
14 \iffalse
15
16 \typeout{%
17 ^^J%
18 *****^^J%
19 ltpatch.ltx has fixed certain problems with the 'kernel' of LaTeX.^^J%
20 Certain other files in the LaTeX distribution have also been updated^^J%
21 since the last release (list correct as of 2009/09/24):^^J%
22 base/xxxxxxx.dtx.....(patch 1)^^J%
23 unpacked/yyyyyyy.cls.....(patch 1)^^J%
24 ^^J%
25 See the file patches.txt for more details.^^J%
26 *****}
27
28 \fi
29
30 \endinput
31
32
33
34
35
36
37
```

Change History

- 1985/11/04 ltmath.dtx LaTeX2.09
 General: produce warning message if line extends into margin. Doesn't warn about formula overprinting equation number. **215**
- 1989/04/10 ltfssbas.dtx v1.0a
 General: Starting with version numbers! `\ifmmode` added in `\math@group` **107**
- 1989/04/10 ltfssbas.dtx v1.0b
 General: `\preload@sizes` added. **107**
`\wrong@fontshape` changed to define substitution font/shape macro. **107**
- 1989/04/10 ltfssini.dtx v1.0a
 General: Starting with version numbers `\newif` for `\@tempswa` added since this switch is unknown at the time when this file is read in. (latex.tex is loaded later.) `\math@famname` changed to `\math@version`. **168**
- 1989/04/14 ltfssbas.dtx v1.0c
 General: More documentation added. **107**
- 1989/04/15 ltfssini.dtx v1.0b
 General: `\mathfontset` renamed to `\mathversion`. **168**
- 1989/04/19 ltfssbas.dtx v1.0d
 General: Even more doc. **107**
- 1989/04/21 ltfssbas.dtx v1.0e
 General: Documentation is fun! Parameters of `\define@mathalphabet` changed. **107**
- 1989/04/21 ltfssini.dtx v1.0c
 General: Changed to conform to fam.tex. **168**
- 1989/04/23 ltfssbas.dtx v1.0f
 General: % in `\getanddefinefonts` added. **107**
- 1989/04/26 ltfssini.dtx v1.0d
 General: `\xpt` added. **168**
- 1989/04/27 ltfssbas.dtx v1.0g
 General: Documentation revised. **107**
- 1989/04/27 ltfssini.dtx v1.0e
 General: Definitions of L^AT_EX symbols corrected. **168**
- 1989/04/29 ltfssbas.dtx v1.0h
 General: Documented problem with `\halign`, and `\noalign` **107**
`\mathversion`: Test if version defined added. **114**
- 1989/04/29 ltfssini.dtx v1.0i
 General: Removed the `\halign` `\noalign` correction (wasn't bugfree) **107**
- 1989/04/29 ltfssini.dtx v1.0f
 General: Corrections to L^AT_EX tabular env. added. **168**
- 1989/05/01 ltfssbas.dtx v1.0j
 General: Default for `\base-linestretch` added. **107**
- 1989/05/22 ltfssbas.dtx v1.0k
 General: Lines longer than 72 characters folded. **107**
- 1989/05/22 ltfssini.dtx v1.0g
 General: Lines shortened to 72 characters **168**
- 1989/09/14 ltfssbas.dtx v1.0m
 General: Global replacement: `\group` to `\mathgroup` **107**
`\mathversion`: Corrected typo: `\endscname` to `\endcsname`. . **114**
- 1989/11/07 ltfssini.dtx v1.0i
 General: All family, series, and shape names abbreviated. . . **168**
- 1989/11/08 ltfssbas.dtx v1.0o
 General: First parameter of `\define@mathalphabet` and `\define@mathgroup` changed from string to control sequence. . . **107**
- 1989/11/14 ltfssbas.dtx v1.0p
`\math@version`: Math version prefix 'mv@' added. **114**
- 1989/11/19 ltfssbas.dtx v1.0q
`\define@newfont`: Group added. **116**
`\wrong@fontshape`: Instead of calling `\family\default@family`, etc. we directly set `\f@family`, etc. **119**
- 1989/11/22 ltfssbas.dtx v1.0r
`\math@version`: `\def` → `\edef` for `\math@version`. **114**
- 1989/11/25 ltfssbas.dtx v1.0s
 General: All `\edef\font@name` changed to `\xdef\font@name`. Necessary after introduction of `\begingroup/\endgroup` in v1.0q. **107**
`extra//` → `+` in `\extra@def`. . **107**
- 1989/11/26 ltfssbas.dtx v1.0t
`\select@group`: `\bgroup/\egroup` changed to `\begin-group/\endgroup` to avoid empty Ord atom on math list. **120**
- 1989/12/02 ltfssini.dtx v1.1b
 General: `\rmmath` renamed to `\mathrm` **168**
- 1989/12/03 ltfssini.dtx v1.1c
 General: Some internal macros renamed to make them inaccessible. **168**
- 1989/12/05 ltfssbas.dtx v1.0u
`\addto@hook`: `\addto@hook` added. **123**

1989/12/05 ltfssstrc.dtx v1.0u fam.dtx	\size, \selectfont, and	
\every@math@size: Hook \every@size added.	\mathversion.	168
1989/12/13 ltfssstrc.dtx v1.0f	1990/02/16 ltfssbas.dtx v1.2g	
\use@mathgroup: \expandafter added before final \fi.	General: Support for changes of \baselineskip without changing the size.	107
1989/12/16 ltfssbas.dtx v1.1a	\math@version: \nomath added.	114
\select@group: \relax in front added.	1990/02/16 ltfssstrc.dtx v1.0i	
Now four arguments.	\selectfont: Changed \f@size to \lcl@currsiz (see fam file).	129
Redefinition of alphabet now simpler.	1990/02/18 ltfssstrc.dtx v1.0j	
Usage of '=' macro added. ...	General: Redefine unprotected version \p@selectfont instead of \selectfont.	128
1989/12/16 ltfssstrc.dtx v1.1a	1990/03/14 ltfssstrc.dtx v1.0k	
\selectfont: Changed order of calls.	General: Added code for TeX3. .	125
\use@mathgroup: Redefinition of alphabet now simpler.	\extract@font: Added code for TeX3.	128
Usage of '=' macro added. ...	\selectfont: Added code for TeX3.	129
1990/01/18 ltfssstrc.dtx v1.0h	1990/03/30 ltfssbas.dtx v1.2h	
General: \tracingfonts meaning changed.	\math@egroup: Changed to have one arg.	122
1990/01/20 ltfssbas.dtx v1.2a	1990/03/30 ltfssstrc.dtx v1.2h	
\math@bgroup: Def. placed in this file.	\use@mathgroup: Third argument removed (see \math@egroup).	133
\math@egroup: Def. placed in this file.	1990/04/01 ltfssbas.dtx v1.2i	
\select@group: Def for alph id changed.	General: Code added from tracefnt.dtx.	107
1990/01/21 ltfssbas.dtx v1.2b	Support for TeX3.	107
\select@group: Code moved to \use@mathgroup.	1990/04/01 ltfssstrc.dtx v1.0l	
1990/01/21 ltfssstrc.dtx v1.2b	General: Part of code moved to fam.dtx.	125
\use@mathgroup: Macro added to allow cleaner interface.	\tracingfonts: Check if \tracingfonts already defined. ..	126
1990/01/23 ltfssbas.dtx v1.2c	1990/04/01 ltfssstrc.dtx v1.0o	
General: \no@version@warning renamed to \no@alphabet@error.	\tracingfonts: Check if \tracingfonts defined removed again.	126
Macro \no@alphabet@help added	1990/04/02 ltfssini.dtx v1.1i	
\no@alphabet@error: Changed to error call	General: \input of files now handled by docstrip.	168
1990/01/25 ltfssini.dtx v1.1e	1990/04/05 ltfssstrc.dtx v1.0m	
\nfss@text: Macro added.	\selectfont: Call \tracingon only if \tracingfonts greater than 3.	128
1990/01/27 ltfssbas.dtx v1.2d	1990/05/05 ltfssstrc.dtx v1.0n	
\DeclarePreloadSizes: Font identifier set to \relax.	\selectfont: \tracingon with new syntax.	128
1990/01/28 ltfssbas.dtx v1.2e	1990/06/23 ltfssini.dtx v1.1k	
\mathgroup: \newfam let to \new@mathgroup.	\nfss@text: Changed to \mbox. .	170
1990/01/28 ltfssbas.dtx v1.2f	1990/06/24 ltfssbas.dtx v1.2j	
\define@newfont: Added call to \curr@fontshape macro to allow substitution.	\DeclarePreloadSizes: Missing percent added.	111
\wrong@fontshape: Warning message slightly changed.	1990/06/24 ltfssstrc.dtx v1.0o	
1990/01/28 ltfssini.dtx v1.2b	\baselinestretch: Moved to tracefnt.dtx.	131
General: Call to \@nomath added.	\getanddefine@fonts: \Adding tracing code.	134
1990/02/08 ltfssini.dtx v1.1g	\Macro moved from fam.dtx. .	134
General: Protected the commands \family, \series, \shape.	Adding debug code.	134

<code>\use@mathgroup</code> : Tracing code added.	133	1991/09/29 ltmath.dtx LaTeX2.09	<code>\@eqnnum</code> : RmS: <code>\reset@font</code> added.	214
1990/06/30 ltfsbas.dtx v1.2l		1991/09/29 ltsect.dtx LaTeX2.09	<code>\@dottedtocline</code> : (RmS) added <code>\reset@font</code> for page number	290
<code>\showhyphens</code> : Macro added.	123	1991/10/17 ltcntrl.dtx LaTeX2.09	<code>\@tfor</code> : (Rms) <code>\xdef</code> replaced by <code>\def</code> (See FMI's array.doc) . .	37
1990/06/30 ltfsstrc.dtx v1.0p		1991/10/25 ltbibl.dtx LaTeX2.09	<code>\@citex</code> : added <code>\reset@font</code> , suggested by Bernd Raichle.	308
<code>\use@mathgroup</code> : Added <code>\relax</code> after math group number.	134	1991/11/01 ltfloat.dtx LaTeX2.09	<code>\footnote</code> : (RmS) Added <code>\let\protect\noexpand</code> in <code>\footnote</code> , <code>\footnotemark</code> , and <code>\footnotetext</code> , since <code>\xdef</code> is used	303
1990/07/07 ltfsstrc.dtx v1.0q		1991/11/04 ltlists.dtx LaTeX2.09	<code>\makelabel</code> : (RmS) added default definition for <code>\makelabel</code> , to produce an error message. . .	229
<code>\getanddefine@fonts</code> : Group number added to tracing. . .	134	1991/11/04 ltplain.dtx RmS	General: Removed <code>\itemitem</code> since never needed/useful with L ^A T _E X.	19
<code>\math@egroup</code> : Tracing code added.	134	1991/11/06 ltbibl.dtx LaTeX2.09	<code>\@citex</code> : added code to remove a leading blank	308
<code>\use@mathgroup</code> : Group number added to tracing.	133	1991/11/13 ltbibl.dtx LaTeX2.09	<code>\@bibitem</code> : Changed counter <code>enumi</code> to <code>enumiv</code> , as it says in the comment above	308
1990/08/27 ltfsstrc.dtx 1.0r		1991/11/21 ltssini.dtx v1.1o	<code>\p@reset@font</code> : Added extra braces for robustness.	170
<code>\type@restoreinfo</code> : Some extra tracing info.	130		Changed to protected version of macro.	170
1990/08/27 ltfsstrc.dtx v1.0r		1991/11/22 ltfloat.dtx LaTeX2.09	<code>\footnote</code> : (RmS) Added <code>\let\protect\noexpand</code> in <code>\@xfootnote</code> , <code>\@xfootnotemark</code> , and <code>\@xfootnotetext</code>	303
<code>\getanddefine@fonts</code> : Correcting missing name after <code>\tracingon</code>	134	1991/11/22 ltlists.dtx LaTeX2.09	<code>\@item</code> : (RmS) Changed second call to <code>\makelabel</code> to <code>\unhbox\@tempboxa</code> . Avoids problems with side effects in <code>\makelabel</code> and is more efficient. .	229
1991/03/28 ltssini.dtx v1.1m		1991/11/27 ltfsbas.dtx v1.3a	General: All <code>\family</code> , <code>\shape</code> etc. renamed to <code>\fontfamily</code> etc. .	107
<code>\copyright</code> : Extra braces added. .	170	1991/11/27 ltssini.dtx v1.2a	General: All <code>\family</code> , <code>\shape</code> etc. renamed to <code>\fontfamily</code> etc. .	168
1991/03/30 ltssini.dtx v1.2g		1992/01/06 ltssini.dtx v1.2c	General: added <code>slitex</code> code	168
<code>\newfont</code> : Definition added.	169	1992/01/10 ltbibl.dtx LaTeX2.09	<code>\@bibitem</code> : Changed <code>\c@enumiv</code> to <code>\value of \@listctr</code>	304
<code>\symbol</code> : Definition added.	169			
1991/07/24 ltmiscen.dtx LaTeX2.09				
<code>\verbatim</code> : Added <code>\penalty\interlinepenalty</code> to definition of <code>\par</code> so that <code>\samepage</code> works	207			
1991/08/14 ltmath.dtx LaTeX2.09				
<code>\cases</code> : (RmS) inserted extra braces around entry for NFSS	212			
1991/08/14 ltpictur.dtx LaTeX2.09				
General: (RmS) inserted extra braces around entry for NFSS	263			
1991/08/14 ltthm.dtx LaTeX2.09				
<code>\@endtheorem</code> : Moved <code>\itshape</code> after <code>\item</code> to make it work with NFSS	281			
1991/08/26 ltssini.dtx v1.1n				
<code>\p@reset@font</code> : Macro introduced	170			
1991/08/26 ltmiscen.dtx LaTeX2.09				
<code>\verbatim</code> : <code>\@par</code> added	207			
1991/08/26 ltpictur.dtx LaTeX2.09				
<code>\endpicture</code> : (RmS & FMI) extra boxing level around <code>\@picbox</code> to guard against unboxing in math mode (proposed by John Hobby)	262			
1991/08/26 ltplain.dtx LaTeX2.09				
<code>\tracingall</code> : Added <code>\errorcontextlines=\maxdimen</code> , suggested by J. Schrod	20			
1991/09/29 ltboxes.dtx LaTeX2.09				
<code>\@mpfootnotetext</code> : (RmS) added <code>\reset@font</code>	239			
1991/09/29 ltfloat.dtx LaTeX2.09				
<code>\@footnotetext</code> : (RmS) added <code>\reset@font</code>	304			

- 1992/01/10 ltmath.dtx LaTeX2.09
`\equation`: RmS: put `\hbox` around
`\@eqnnum` to typeset the equation
number in text mode (as in
the `eqnarray` env.) 214
- 1992/01/10 ltthm.dtx LaTeX2.09
`\@othm`: (RmS) Check for existence
of theorem environment 281
- 1992/01/14 ltbibl.dtx LaTeX2.09
`\@biblabel`: removed `\hfill` . . . 310
- 1992/01/14 ltsect.dtx 0.0
`\@starttoc`: (RmS) added `\immediate`
to `\openout` as all `\write`
commands are also executed
`\immediate` 288
- 1992/02/26 ltbibl.dtx LaTeX2.09
`\@lbibitem`: Added `\hfill` to re-
store left-alignment of bibliog-
raphy labels in alpha style . . 308
- 1992/03/18 ltdefs.dtx LaTeX2.09
General: (RmS) changed input
channel from 0 to `\@inputcheck`
to avoid conflicts with other
channels allocated by `\newread` 24
- 1992/03/18 ltfloat.dtx LaTeX2.09
`\@xympar`: (RmS) added
`\global\@ignorefalse` 300
`\end@float`: (RmS) changed `\@es-`
`phack` to `\@Esphack` 296
- 1992/03/18 ltlists.dtx 0.0
General: RmS: added `\@nmbulist-`
`false` 226
- 1992/03/18 ltmiscen.dtx LaTeX2.09
`\begin`: Changed `\@ignoretrue`
to `\@ignorefalse` (as docu-
mented) 205
- 1992/03/21 ltssini.dtx v1.2d
General: Renamed `\text` to
`\nfss@text` to make it inter-
nal. 168
- 1992/05/12 ltssbas.dtx v1.3c
`\extract@alph@from@version`:
Macro added. 121
`\select@group`: Added call to `\ex-`
`tract@alph@from@version`. . 121
- 1992/07/26 ltssbas.dtx v1.9a
`\curr@fontshape`: 116
`\DeclareFontShape`: Introduced
`\DeclareFontShape` 108
`\define@newfont`: 116
`\math@fonts`: 120
`\select@group`: 120, 121
`\split@name`: Added splitting into
`\f@encoding`. 116
`\wrong@fontshape`: 119
- 1992/07/26 ltssstrc.dtx v2.0b
`\s@fct@`: 142
`\s@fct@sub`: 143
`\selectfont`: 129
`\try@simple@size`: 136, 137
`\try@size@range`: 139
`\use@mathgroup`: 134
- 1992/08/14 ltbibl.dtx LaTeX2.09
`\@citex`: added missing argument
braces around `\hbox`, found by
Ed Sznyter 308
- 1992/08/14 ltboxes.dtx LaTeX2.09
`\endminipage`: (RmS) replaced
`\vskip`-`\lastskip` by `\unskip`
(proposed by FMi) 239
- 1992/08/17 ltbibl.dtx LaTeX2.09
`\@citex`: simplified code for remov-
ing leading blanks in citation
key (proposed by Frank Jensen
and Kresten Krab Thorup) . . 308
- 1992/08/19 ltsect.dtx 0.0
`\@xsect`: (RmS) corrected bug:
stretch and shrink in argu-
ment to `\hskip` previously not
negated 286
- 1992/08/19 ltthm.dtx LaTeX2.09
`\@othm`: (RmS) Changed error mes-
sage to complain about unde-
fined counter 281
- 1992/08/20 ltssini.dtx v1.4b
`\@setsize`: Added `\@currsize`. . 169
- 1992/08/24 ltdefs.dtx LaTeX2.09
`\@ifnextchar`: (RmS) `\@ifnextchar`
didn't work if its first argument
was an equal sign. 32
- 1992/08/24 ltmiscen.dtx LaTeX2.09
`\begin`: Added code to `\begin` to
remember line number. Used by
`\@badend` to display position of
non-matching `\begin`. 205
`\verb`: Changed `\verb` and `\@sverb`
to work correctly in math mode 208
- 1992/08/25 ltsect.dtx LaTeX2.09
`\@sect`: (FMi) replaced explicit set-
ting of `\@svsec` by call to
`\@seccntformat` 285
- 1992/09/18 ltlists.dtx LaTeX2.09
General: (RmS) Added warning if
`\item` is used in math mode 227
- 1992/09/18 lttab.dtx LaTeX2.09
`\@array`: Changed `\par` to `\@empty`
to avoid starting new row e.g.
after `\hline` 251
- 1992/09/19 ltssstrc.dtx v2.0c
`\try@simple@size`: 136
- 1992/09/21 ltssini.dtx v1.4d
`\not@math@alphabet`: Macro de-
fined. 169
- 1992/09/22 ltssbas.dtx v1.91a
General: Introduced `\tf@size` for
math size. 107
- 1992/09/22 ltssstrc.dtx v2.1a
`\getanddefine@fonts`: Introduced
`\tf@size` for math size. 134
- 1992/11/13 ltssini.dtx v?
`\hexnumber@`: Made expandable. . 170
- 1992/11/23 ltcounts.dtx LaTeX2.09
`\stepcounter`: Replaced `{}` in
`\stepcounter` by `\begingroup`

- `\endgroup` to avoid adding an empty ord in math mode ... 104
- 1992/11/26 ltboxes.dtx LaTeX2.09
- `\@mpfootnotetext`: (RmS) added protection for `\edef` ... 239
- 1992/11/26 ltfloat.dtx LaTeX2.09
- `\@footnotetext`: (RmS) added protection for `\edef` ... 304
- `\footnote`: (RmS) Changed all to `'def'protect'noexpand'protect'noexpand` ... 303
- 1992/12/03 ltffsini.dtx v?
- `\hexnumber@`: Make it accept counters. ... 170
- 1993/03/08 preload.dtx v2.0b
- General: Added 12pt preloads .. 188
- 1993/03/18 ltffsbas.dtx v2.0c
- General: Changed all `\@tempdima` in `\@tempdimb` to avoid killing `\numberline` ... 107
- 1993/03/18 ltffstrc.dtx v2.1b
- General: Changed all `\@tempdima` in `\@tempdimb` to avoid killing `\numberline` ... 125
- Changed all `\@tempdimb` in `\@tempdimx` to avoid killing `\numberline` ... 125
- 1993/03/18 ltffstrc.dtx v2.1c
- `\DeclareSizeFunction`: Added all args to avoid blanks problems 139
- 1993/04/09 lterror.dtx v1.0e
- `\@latexerr`: Mention The Companion ... 42
- 1993/04/11 lterror.dtx v1.0f
- `\@latexerr`: Remove setting of `errorcontextlines` ... 42
- 1993/05/05 ltfnctcmd.dtx v2.0b
- General: Removed all LaTeX related cmds ... 191
- 1993/05/16 ltffsbas.dtx v2.0e
- `\showhyphens`: Use `\reset@font` 123
- 1993/07/16 ltffstrc.dtx v2.1h
- General: Changed layout of info messages ... 125
- 1993/07/17 ltoutenc.dtx 1.0d
- General: changed `\catcoding @` . 72
- 1993/08/03 ltmiscen.dtx LaTeX2.09
- `\enddocument`: Changed redefinition of `\global` to redefinition of `\@setckpt`. ... 203
- 1993/08/05 ltpictur.dtx LaTeX2.09
- `\circle`: (RmS) Added error message if `\circle` is used in math mode. ... 275
- 1993/08/05 ltsect.dtx LaTeX2.09
- `\@sect`: (RmS) Made sure that `\protect` works correctly in expansion of `\the counter` ... 285
- 1993/08/05 ltspc.dtx LaTeX2e
- `\@hspacer`: (RmS) Removed superfluous `\leavevmode` in `\@hspacer` and `\@hspacer`, as suggested by CAR. ... 57
- 1993/08/05 lttab.dtx latex2e
- `\tabular*`: Replaced `\expandafter\def` by `\@namedef`. 251
- 1993/08/06 ltbibl.dtx LaTeX2.09
- `\@citex`: Moved writing to .aux file in loop over citation keys so that leading blanks are removed there as well. ... 308
- 1993/08/13 ltoutenc.dtx 1.0f
- General: Protected against active @ sign. ... 72
- 1993/08/13 preload.dtx v2.0c
- General: Added `\relax` at end of font names. ... 189
- 1993/08/16 ltoutenc.dtx 1.0g
- General: Needs space after `\string` 72
- 1993/08/18 ltffsdcl.dtx v2.0e
- `\new@mathversion`: Exchanged names of encodings in warning message of `\SetSymbolFont`. 154
- 1993/09/02 ltffstrc.dtx v2.1i
- General: Corrected name of `sgen` size function. ... 125
- 1993/09/03 ltmiscen.dtx LaTeX2.09
- `\verbatim@nolig@list`: Replaced `\@noligs` by extensible list . 208
- 1993/09/07 ltmiscen.dtx LaTeX2.09
- `\verb@balance@group`: (RmS) Changed definition of `\verb` so that it detects a missing second delimiter. ... 208
- 1993/09/08 ltmiscen.dtx LaTeX2.09
- `\enddocument`: Added warning in case of undefined references. 203
- 1993/09/15 ltffsbas.dtx v2.0g
- `\DeclareFontEncoding`: Corrected: `\default@T` to `\default@M`. . 110
- 1993/09/15 ltffstrc.dtx v2.1j
- General: Corrected spelling of `\noexpand`. ... 125
- 1993/09/19 lterror.dtx LaTeX2.09
- `\@invalidchar`: (RmS) Error message for invalid input characters. ... 45
- 1993/11/02 ltmath.dtx LaTeX2.09
- General: RmS: Corrected description of `\@eqnset`, moved `\@eqnset` accordingly and removed extra `\tabskip` assignment. ... 215
- 1993/11/03 ltmath.dtx LaTeX2e
- General: RmS: Initialized `\everycr` to empty ... 215
- 1993/11/03 ltpictur.dtx LaTeX2.09
- General: (RmS) changed `\halign` to `\ialign` to initialize `\tabskip` and `\everycr` ... 263
- 1993/11/11 ltffsini.dtx v2.1a
- `\normalfont`: Macro added 170

- 1993/11/11 ltfssstrc.dtx v2.2a
 General: Option concept added for LaTeX2e 125
- 1993/11/14 ltclass.dtx v0.2a
 \current: Name changed from \currentextension 367
 \fileswithoptions: Moved resetting of \defaultds, \ds@ and \declaredoptions here, from the end of \ProcessOptions. 374
 \resetoptions: macro added .. 375
 \AtEndDocument: Included extension in the generated macro name for package and class hooks. 375
 \documentstyle: Added \RequirePackage \unusedoptionlist stuff. 371
 \g@addto@macro: Made global .. 375
 \NeedsTeXFormat: made more robust for alternative syntax for other formats. 372
 \ProcessOptions*: Optimise 'empty option' code. 370
 Stop adding the global option list inside class files. 370
- 1993/11/15 ltclass.dtx v0.2b
 \documentstyle: Modified to match \ProcessOption* ... 371
 \ProcessOptions*: Star form added. 370
- 1993/11/17 ltclass.dtx v0.2c
 \@fileswith@ptions: Macro added 375
 \@badrequireerror: Macro added 376
 \fileswithoptions: Added trap for two \LoadClass commands. 375
 \twoloadclasserror: Macro added 376
 \CurrentOption: Name changed from \curroption 367
 \DeclareOption*: Error checking added 369
 \NeedsTeXFormat: Name changed from \NeedsFormat 372
 \ProcessOptions*: restoring \@fileswith@ptions added. 370
- 1993/11/18 ltclass.dtx v0.2d
 \documentstyle: Modified \RequirePackage stuff. 371
 \ExecuteOptions: Use \CurrentOption not \reserved@a .. 371
 \NeedsTeXFormat: \fmtname \fmtversion not \@... .. 372
- 1993/11/21 ltfiles.dtx LaTeX2e
 \missingfileerror: Stop infinite looping on \@er@ext 66
- 1993/11/21 ltmiscen.dtx v0.9a
 \verbatim: use \verbatim@font instead of \tt 207
 \verb: Use \verbatim@font instead of \tt. 208
 \verbatim@font: Macro added .. 208
- 1993/11/22 ltclass.dtx v0.2f
 \fileswithoptions: Made the default [] not [\@unknownversion] 373
 Made the initial version [] not [\@unknownversion] 374
 \ifclasslater: Added //00 so parsing never produces a runaway argument. 368
 General: \@unknownversion removed 378
- 1993/11/22 ltdefs.dtx LaTeX2e
 \@minus: Macro added 23
 \@plus: Macro added 23
 \CheckCommand: Macro added ... 28
 \providecommand: Macro added . 28
- 1993/11/22 lterror.dtx LaTeX2e
 \c@errorcontextlines: Macro added 42
- 1993/11/22 ltfiles.dtx LaTeX2e
 \listfiles: Removed checking for \@unknownversion 67
- 1993/11/22 ltlength.dtx LaTeX2e
 \@settodim: Macro added 106
 \@settopoint: Macro added 106
 \settodepth: Macro added 106
 \settoheight: Macro added 106
- 1993/11/22 ltlogos.dtx LaTeX2e
 \LaTeXe: Macro added 59
- 1993/11/23 ltclass.dtx v0.2g
 \@use@option: Name changed from \@executeoption 371
 General: Various macros now moved to latex.tex. 366
 Warnings and errors now directly coded. 366
- 1993/11/23 ltdefs.dtx LaTeX2e
 \@argdef: Macro added 25
 \ifundefined: Redefined to remove a trailing \fi 32
 \@newcommand: Macro added 25
 \@newenv: Macro interface changed 27
 \@xargdef: Macro interface changed 25
 \@yargdef: Avoid \@?@? token .. 26
 Macro interface changed 26
 \newcommand: Macro reimplemented and extended 25
 \renewcommand: Macro reimplemented and extended 26
 \renewenvironment: Macro reimplemented and extended 27
 \two@digits: Macro added 22
- 1993/11/23 ltoutput.dtx v0.1a
 \paperheight: Register added .. 324
 \paperwidth: Register added ... 324
- 1993/11/23 ltoutput.dtx v0.1c
 \enlargepage: Command added 351
 \kludgeins: Insert added 351
 \makecol: Command changed .. 332
 \@specialoutput: Command changed 328

<code>\enlargethispage*</code> : Commands added	351	<code>\minipage</code> : Redefined to support extra optional arguments . . .	238
1993/11/24 ltfntcmd.dtx v2.1a		<code>\newsavebox</code> : Pass the whole of arg 1 to <code>\ifdefinable</code>	235
<code>\maybeic@</code> : Use <code>\t@st@ic</code>	195	<code>\parbox</code> : Redefined to support extra optional arguments	237
<code>\t@st@ic</code> : Macro added	195	<code>\raisebox</code> : redefined to support <code>\height</code>	240
1993/11/24 ltssini.dtx v2.1a		<code>\sbox</code> : color support	235
General: Removed <code>\xpt</code> stuff . . .	170	extra group	235
1993/11/24 ltlogos.dtx LaTeX2e		<code>\set@color</code> : color support	234
<code>\LaTeX</code> : Macro changed	59	macro added	234
1993/11/28 ltclass.dtx v0.2h		1993/12/03 ltclass.dtx v0.2i	
<code>\@twoclasseserror</code> : Macro added	376	<code>\@cls@pkg</code> : Name changed to avoid clash with output routine. . .	375
General: Assorted commands now in the kernel removed.	366	General: <code>\@onlypreamble</code> : Many commands declared.	366
Directory syntax checking moved to <code>dircheck.dtx</code>	366	Removed obsolete <code>\@documentclass</code>	366
Primitive filenames now terminated by space not <code>\relax</code> . .	366	1993/12/03 lterror.dtx v1.0b	
<code>\endfilecontents</code> : Don't globally allocate a write stream (always use 15)	376	<code>\@latexerr</code> : Set <code>\c@errorcontextlines</code> to -1	42
1993/11/28 ltfiles.dtx LaTeX2e		1993/12/03 ltssini.dtx v2.1a	
<code>\@missingfileerror</code> : Use filename parser from <code>dircheck</code>	66	General: update for LaTeX2e . . .	168
1993/11/29 ltoutput.dtx v1.0b		1993/12/04 ltfiles.dtx v0.9b	
<code>\@makecol</code> : <code>\@makespecialcolbox</code> added	332	<code>\@iinput</code> : Macro reimplemented .	66
<code>\@makespecialcolbox</code> : Command added	333	<code>\@input</code> : Macro reimplemented .	66
1993/11/29 ltplain.dtx LaTeX2e		<code>\IfFileExists</code> : Macro added . . .	65
General: All accents in decimals; suggested by Paul Taylor	19	<code>\input</code> : Macro reimplemented .	66
1993/11/30 ltoutput.dtx v1.0c		<code>\InputIfFileExists</code> : Macro added	66
<code>\@tracemessage</code> : Commands added	352	1993/12/05 ltfloat.dtx LaTeX2e	
1993/12/01 fontdef.dtx v2.1a		<code>\@dblfloatplacement</code> : Command changed	297
General: Update for LaTeX2e . . .	173	<code>\@xfloat</code> : Command changed . .	294
1993/12/01 ltoutput.dtx v1.0e		1993/12/05 ltoutput.dtx v1.0f	
<code>\@reinserts</code> : Command added .	333	<code>\@addtobot</code> : Command changed .	341
1993/12/03 ltboxes.dtx v0.1a		<code>\@addtocurcol</code> : Command changed	342
<code>\@argsbox</code> : macro removed	240	<code>\@addtodblcol</code> : Command changed	346
<code>\@begin@tempboxa</code> : macro added	233	<code>\@addtonextcol</code> : Command changed	345
<code>\@end@tempboxa</code> : macro added . .	234	<code>\@addtotoporbot</code> : Command changed	342
<code>\@iirsbox</code> : redefined to support <code>\height</code>	240	<code>\@boxfpsbit</code> : Command added .	354
<code>\@imakebox</code> : macro modified . . .	234	<code>\@flcheckspace</code> : Command added	356
<code>\@irsbox</code> : redefined to support <code>\height</code>	240	<code>\@flsetnum</code> : Command added . .	355
<code>\@isavebox</code> : color support	235	<code>\@flsettextmin</code> : Command added	355
extra group	235	<code>\@flstop</code> : Commands added . . .	352
<code>\@isavepicbox</code> : extra group	235	<code>\@flupdates</code> : Command added .	356
<code>\@makebox</code> : default changed from x to c	233	<code>\@fpsadddefault</code> : Command added	353
<code>\@makepicbox</code> : macro modified . .	234	<code>\@getfpsbit</code> : Command added .	354
<code>\@savebox</code> : default c not x	235	<code>\@opcol</code> : Command changed . . .	331
<code>\bm@b</code> : macros added	234	Hook added	331
<code>\endlrbox</code> : macro added	235	<code>\@outputpage</code> : Command changed	335
<code>\fbox</code> : extra group	236	<code>\@resetfps</code> : Command added .	354
<code>\lrbox</code> : color support	235	<code>\@setfloattypecounts</code> : Command added	353
macro added	235	<code>\@setfpsbit</code> : Command added .	354
<code>\makebox</code> : modified	233	<code>\@shipoutsetup</code> : Command added	335
<code>\mbox</code> : extra group	233		

<code>\@startcolumn:</code> Command	1993/12/09 ltfiles.dtx v0.9e
changed 338	<code>\document:</code> Hook added 62
<code>\@startdblcolumn:</code> Command	1993/12/09 ltmiscen.dtx v0.9e
changed 338	<code>\enddocument:</code> Hook added 203
<code>\@testfp:</code> Command added 354	1993/12/10 ltoutenc.dtx v1.2
<code>\@textfloatsheight:</code> Commands	General: Added source code for
added 353	tlenc.sty. 69
<code>\@topnewpage:</code> Commands	1993/12/11 ltfnctcmd.dtx v3.0a
changed 326	General: Complete reworking of all
<code>\@tryfcolumn:</code> Command changed 339	text commands, using just one
<code>\@writesetup:</code> <code>\@startpagehook</code>	creator function 191
added 335	italic correction now put in front
<code>\output:</code> Command changed . . . 328	of penalty before glue 191
1993/12/06 ltclass.dtx v0.2k	newcommands replaced by defs 191
<code>\ExecuteOptions:</code> Preserve <code>\Cur-</code>	<code>\fontswitch</code> command cor-
<code>rentOption.</code> 371	rected and changed 191
1993/12/06 ltoutput.dtx v1.0f	<code>\DeclareTextFontCommand:</code> Macro
<code>\@specialoutput:</code> Unboxing of 255	changed 193
added to rescue writes 328	<code>\emph:</code> Macro changed 194
1993/12/06 ltoutput.dtx v1.0g	<code>\fix@penalty:</code> Macro added 195
<code>\@topnewpage:</code> <code>\@floatplacement</code>	<code>\maybe@ic:</code> Macro name changed 195
placement bug fixed 326	<code>\maybe@ic@:</code> Macro and name
1993/12/07 ltclass.dtx v0.2l	changed 195
<code>\ProvidesFile:</code> Macro added . . . 369	<code>\sw@slant:</code> Macro changed 195
1993/12/07 ltclass.dtx v0.2m	<code>\textup:</code> Macros changed 193
<code>\@fileswithoptions:</code> Reset <code>\Cur-</code>	1993/12/11 ltmath.dtx v0.9g
<code>rentOption</code> 374	General: Added a group around
1993/12/07 ltoutenc.dtx 1.1	the first argument of <code>\frac</code> to
General: Protected all special char-	prevent changes (for example
acters with <code>\string.</code> 72	font changes) from modifying
1993/12/07 ltoutenc.dtx v1.1	the contents of the second ar-
General: Made all character num-	gument. 215
bers decimal. 69	1993/12/11 ltoutenc.dtx v1.2a
Removed a lot of equal signs and	General: Corrected for tlenc,
the like. 69	math. 69
1993/12/08 ltboxes.dtx v0.1b	1993/12/11 ltsect.dtx LaTeX2e
<code>\@begin@tempboxa:</code> Extra braces	<code>\@author:</code> Added default 282
for color support (braces re-	<code>\@title:</code> Added default 282
moved from other macros) . . . 233	1993/12/11 ltxref.dtx LaTeX2e
<code>\@irsbox:</code> fix typo 240	<code>\@setref:</code> Macro added 200
<code>\@parboxto:</code> <code>\endgraf</code> added	<code>\pageref:</code> Macro reimplemented . 200
due to extra group in <code>\@be-</code>	<code>\ref:</code> Macro reimplemented 200
<code>gin@tempboxa</code> 237	1993/12/12 ltoutput.dtx v1.0h
<code>\lrbox:</code> move <code>\@endpefalse</code> out of	<code>\@cflb:</code> boxmaxdepth setting
the inner group 235	moved 337
1993/12/08 ltfnctcmd.dtx v2.1b	defs changed to lets 337
General: Macros <code>\rm</code> , <code>\bf</code> and <code>\sf</code>	<code>\@cflt:</code> name changed 337
moved to classes.dtx 197	<code>\@docclearpage:</code> defs changed to
1993/12/08 ltlists.dtx LaTeX2e	lets 331
<code>\@item:</code> use <code>\sbox</code> to support	<code>\@makecol:</code> defs changed to lets . 332
colour 229	<code>\@resetfyps:</code> Warnings added:
1993/12/08 ltspc.dtx LaTeX2e	minimal 354
<code>\@bsphack:</code> Command reimple-	<code>\@startdblcolumn:</code> defs changed to
mented 52	lets 339
Command reimplemented; late	<code>\@topnewpage:</code> braces removed . . 326
birthday present for Chris . . . 52	<code>\@tracemessage:</code> Commands
<code>\@vbsphack:</code> Command added . . . 54	changed 352
1993/12/09 ltboxes.dtx v0.1c	<code>\@tryfcolumn:</code> defs changed to lets 339
<code>\@irsbox:</code> fix another typo 240	1993/12/13 ltclass.dtx v0.2o
1993/12/09 ltclass.dtx v0.2n	General: Removed setting <code>\er-</code>
<code>\documentstyle:</code> input 209 com-	<code>rorcontextlines</code> (now in la-
patibility file. 371	tex.tex) 366

- `\documentstyle`: compatibility file now latex209.sty. 371
- `\usepackage`: Fixed error handling 372
- 1993/12/13 ltdirchk.dtx v0.2a
 - General: on the ‘docstrip’ pass, do not check openin path 8
 - `\IfFileExists`: Removed interactive prompting for current directory syntax 7
 - `\strip@prefix`: modified, name changed from `\stripmeaning`. . 3
- 1993/12/13 ltlists.dtx latex2e
 - `\trivlist`: Initialised `\@itemlabel` 226
- 1993/12/13 ltmiscen.dtx v0.9h
 - `\@noligs`: Readdded `\@noligs` . . . 209
 - `\@verbatim`: Readdded `\@noligs` . 207
 - Removed optional argument of `\item` 207
 - `center`: Removed optional argument of `\item` 206
 - `flushleft`: Removed optional argument of `\item` 206
 - `flushright`: Removed optional argument of `\item` 206
- 1993/12/13 ltoutenc.dtx v1.2b
 - General: Corrected file name in driver code. 69
- 1993/12/13 lttab.dtx latex2e
 - `\tabbing`: Removed optional argument of `\item` 246
- 1993/12/14 ltoutput.dtx v1.0i
 - General: Section added to declare all parameters 360
- 1993/12/15 ltboxes.dtx v0.1d
 - `\@iminipage`: Changed default from ‘c’ to ‘s’ 238
 - `\@iparbox`: Changed default from ‘c’ to ‘s’ 237
 - `\minipage`: Changed default from ‘c’ to ‘s’ 238
 - extra space removed. 238
 - `\parbox`: Changed default from ‘c’ to ‘s’ 237
- 1993/12/15 ltclass.dtx v0.2p
 - General: Removed extra ‘s’ from `\@warnings` 366
- 1993/12/16 ltlogos.dtx LaTeX2e
 - `\LaTeXe`: Extended logo by DPC 59
- 1993/12/16 ltmath.dtx v0.9i
 - `\@eqnocr`: use `\refstepcounter` instead of shortcut 216
 - General: use `\refstepcounter` instead of shortcut 215
- 1993/12/16 ltmiscen.dtx v0.9i
 - General: `\literal` added 209
- 1993/12/16 ltpage.dtx LaTeX2e
 - `\mark`: Init `\mark` at begin document 312
- 1993/12/16 ltspc.dtx LaTeX2e
 - `\@bsphack`: Corrected optimisation :-) 52
- 1993/12/16 lttab.dtx latex2e
 - `\@xhline`: Measure from middle of vertical rules 258
- 1993/12/17 ltclass.dtx v0.2q
 - `\@documentclasshook`: Macro added 366
 - `\@fileswithoptions`: Add `\@compatibility` hook 373
 - `\documentstyle`: Match Alan’s new code. 371
- 1993/12/17 ltoutenc.dtx 1.3
 - General: Added this section 72
 - Removed all the hackery for use in `\DeclareFontEncoding`, and redid everything using `\DeclareTextFoo`. 81, 82
 - Removed the catcode hackery, since the file is only read as a package in the preamble, and removed all the messages on the screen, which just confuse users. Replaced them by the appropriate `\ProvidesPackage` commands. Added XXXenc. 72
- 1993/12/17 ltoutenc.dtx v1.3
 - General: Added `\EncodingSpecificAccent`, `\EncodingSpecificAccentedLetter` and `\EncodingSpecificCommand`. . . . 69
 - Made Rokicki’s encoding a proper encoding scheme rather than a variant of OT1. 69
- 1993/12/17 ltoutput.dtx v1.0j
 - `\@opcol`: Hook removed 331
 - `\@specialoutput`: Page room test added 328
 - `\@topnewpage`: check for vsize too small added 326
 - Page room test added 327
 - `\@tracemessage`: tracefloatvals made a document command 352
 - `\@writesetup`: —and then removed 335
- 1993/12/17 ltpage.dtx LaTeX2e
 - `\mark`: Removed init `\mark` at begin document, since it doesn’t work. 312
 - `\rightmark`: Stopgap solution to mark `\leftmark` and `\rightmark` work without initializing mark until the problem is solved. 312
- 1993/12/18 ltoutenc.dtx 1.3b
 - General: Fixed typos with `\ProvidesPackage` lines. Added the `\NeedsTeXFormat` line. Added the last argument to `\DeclareEncoding`. Moved the use of the encodings to after their declaration. 72

- Replaced the missing last argument to `\DeclareFontEncoding`. 81, 82
- 1993/12/18 ltoutenc.dtx 1.3c
General: Rewrote for the new syntax of `\EncodingSpecific`. 81, 82
Split `\EncodingSpecificAccent` up into `\EncodingSpecific` and `\DeclareAccent`. 72
- 1993/12/18 ltoutenc.dtx v1.3a
General: Replaced OT3 by XXX 69
- 1993/12/18 ltoutenc.dtx v1.3b
General: Corrected typos. 69
Replaced the missing last argument to `\DeclareFontEncoding`. 69
- 1993/12/18 ltoutenc.dtx v1.3c
General: A new syntax, separating accent-definitions from encoding-specific definitions, and allowing encoding-specific `\chardef`, `\let`, etc. 69
Rewrote for the new syntax of `\EncodingSpecific`. 69
- 1993/12/18 ltoutenc.dtx v1.3d
General: Some T1 stuff had drifted into the OT1 file. 69
- 1993/12/18 ltpage.dtx LaTeX2e
`\sloppy`: Added `\emergencystretch`. 313
- 1993/12/19 ltclass.dtx v0.2r
`\endfilecontents`: Different message when ignoring a file . . . 376
- 1993/12/19 ltfntcmd.dtx v3.0b
General: `\pdef` comand added . 191
Added by ASAJ. 197
Made `\@newfontswitch` produce an error if command already exists, and added `\@renewfontswitch`, ASAJ 191
Other tidying 191
Some more tidying done 191
Untidying added, so this is now a TEMPORARY version. . . 191
Wording changes by CAR. . . 197
`\DeclareOldFontCommand`: Corrected and tidied 197
`\DeclareTextFontCommand`: Corrected and tidied 193
- 1993/12/19 ltspace.dtx LaTeX2e
`\@bsphack`: There seem to be problems with selfmade birthday presents 53
- 1993/12/20 ltdefs.dtx LaTeX2e
`\@reargdef`: Kept old version of `\@reargdef`, for array.sty . . . 26
- 1993/12/20 ltfiles.dtx v0.9m
`\@obsoletefile`: Added this command, removed `@oldfilewarning`. 67
- 1994/01/05 fontdef.dtx v2.1d
General: Removed nf prefix from file names. 175
- 1994/01/13 ltmath.dtx v0.9o
`\@eqnocr`: correcting 0.9i 216
General: correcting 0.9i 215
- 1994/01/14 ltdirchk.dtx v0.2d
`\IfFileExists`: Close the texsys.aux output stream . . . 8
- 1994/01/15 ltfiles.dtx v0.9o
`\document`: move `\@preamblecmds` after document hook 63
- 1994/01/17 ltclass.dtx v0.2s
`\@fileswithoptions`: Modify to reduce parameter stack usage 373, 374
General: Added many more `\@on-lypreamble` commands . . . 366
Wrapped long lines to column 72 366
- 1994/01/17 ltfiles.dtx LaTeX2e
`\listfiles`: New Version, adds 'tex' if needed, and lines up columns 67
- 1994/01/17 ltfssbas.dtx v2.1a
General: New math font setup . . 107
`\curr@math@size`: New math font setup 115
`\everydisplay`: New math font setup 115
`\everymath`: New math font setup 115
`\frozen@everydisplay`: New math font setup 115
`\frozen@everymath`: New math font setup 115
`\math@version`: New math font setup 114
- 1994/01/17 ltfssini.dtx v2.1e
`\not@math@alphabet`: Message changed 169
- 1994/01/17 ltfssstrc.dtx v2.3a
General: New math font setup . . 125
`\check@mathfonts`: New math font setup 132
`\glb@currsize`: New math font setup 130
`\restglb@settings`: New math font setup 133
- 1994/01/18 ltbibl.dtx LaTeX2e
`\bibliography`: Use `\@input@` so include files are listed. . . . 309
- 1994/01/18 ltclass.dtx v0.2t
`\@ifclassloaded`: Fix typo
`\@pkgetension`. 368
- 1994/01/18 ltfiles.dtx v0.9p
`\@iffilenamepath`: Macro added . . 65
`\@input`: do not use a different definition for `\input@path`. . . . 66
`\@input@`: Macro added 66
`\IfFileExists`: New Definition . 65
`\include`: Use `\@input@` so include files are listed. 64

<code>\InputIfFileExists</code> : New Definition	66	1994/01/26 ltfssstrc.dtx v2.3c	
1994/01/18 ltfssini.dtx v2.1f		<code>\check@mathfonts</code> : Correct trace info placement	132
<code>\not@math@alphabet</code> : Message corrected	169	<code>\restgbl@settings</code> : Correct trace info placement	133
1994/01/18 ltmiscen.dtx v0.9p		1994/01/27 ltfntcmd.dtx v3.1a	
<code>\verbatim</code> : Add <code>\global\@inlabelfalse</code>	207	<code>\nocorrlist</code> : Only <code>.</code> , used as default for cm fonts	196
Only add <code>\penalty</code> if in hmode	207	1994/01/29 ltclass.dtx v0.2v	
1994/01/19 fontdef.dtx v2.1e		<code>\@unprocessedoptions</code> : Macro added.	376
General: Added missing setting for symbols in bold version.	177	<code>\@fileswithoptions</code> : All options raise error if no <code>\ProcessOptions</code> appears	374
1994/01/19 ltdirchk.dtx v0.2e		1994/01/31 ltclass.dtx v0.2w	
<code>\IfFileExists</code> : name changed from <code>\test</code>	7	<code>\g@addto@macro</code> : Use toks register to avoid ‘hash’ problems	375
<code>\input@path</code> : No longer check that an empty group is in the path	8	1994/01/31 ltfiles.dtx v0.9t	
<code>\strip@prefix</code> : name changed from <code>\strip@meaning</code> , to match NFSS.	3	<code>\document</code> : set <code>\@normalsize</code> or <code>\normalsize</code> if necessary	62
1994/01/19 ltmath.dtx v1.0n classes		1994/01/31 ltfntcmd.dtx v3.1b	
<code>\mathindent</code> : Deferred setting of <code>\mathindent</code>	217	General: <code>\@normalsize</code> no longer defined	191
1994/01/20 ltdirchk.dtx v0.2f		1994/02/01 ltpage.dtx LaTeX2e	
General: <code>\@copytexsys</code> and the <code>texsys.new</code> file removed	7	<code>\pagestyle</code> : (DPC) Modify to get nicer error message	311
Modify all of <code>ltxcheck</code>	10	<code>\thispagestyle</code> : (DPC) Modify to get nicer error message	311
<code>\IfFileExists</code> : <code>\@copytexsys</code> removed	7	1994/02/02 ltclass.dtx v0.2x	
1994/01/21 ltclass.dtx v0.2u		<code>\@fileswithoptions</code> : Only run the hook and options check if the file was loaded.	374
<code>\documentstyle</code> : compatibility file now <code>latex209.def</code>	371	1994/02/03 ltoutput.dtx v1.0k	
1994/01/21 ltdirchk.dtx v0.2g		<code>\@makespecialcolbox</code> : correct mistakes in the documentation	334
General: Improve documentation, reorganise <code>docstrip</code> module	1	1994/02/07 ltclass.dtx v0.2y	
<code>\filename@parse</code> : Minor changes, and add Mac version (<code>:</code>)	9	<code>\@fileswithoptions</code> : Run <code>\@compatibility</code> on the first class to start (not the first to finish)	373
<code>\today</code> : Name changed from <code>\stamp</code> , to save memory	7	<code>\ifclasswith</code> : Add extra <code>,s</code> so ‘two’ is not matched with ‘twocolumn’	368
1994/01/21 ltfloat.dtx LaTeX2e		<code>\ProcessOptions*</code> : Add extra <code>,s</code> so ‘two’ is not matched with ‘twocolumn’	370
<code>\@xfloat</code> : Added missing percent characters.	294	1994/02/07 ltfssbas.dtx v2.1c	
1994/01/21 ltmiscen.dtx v0.9s		<code>\DeclareFontEncoding</code> : revert catcode settings earlier	109
<code>\verbatim@font</code> : Removed unnecessary category code hackery.	208	<code>\DeclareFontShape</code> : revert catcode settings earlier	108
1994/01/24 ltdirchk.dtx v0.2h		1994/02/08 ltoutput.dtx v1.0k	
<code>\IfFileExists</code> : Stop testing once <code>texsys.aux</code> has been found	7	<code>\@makespecialcolbox</code> : box-maxdepth setting added	334
1994/01/24 ltpage.dtx LaTeX2e		boxmaxdepth setting removed	333
<code>\pagestyle</code> : (DPC) Complain if <code>pagestyle</code> is undefined.	311	General: Documentation and tasks tidied.	314
1994/01/25 ltdirchk.dtx v0.2i		1994/02/10 ltclass.dtx v0.2z	
General: Protect against looping on <code>\@input</code> and <code>\@end</code>	2	<code>\@documentclasshook</code> : Changed the name from <code>\@compatibility</code> to <code>\@documentclasshook</code> , and added the check for	
1994/01/25 ltfssbas.dtx v2.1b			
<code>\math@version</code> : Corrections for math setup	114		
1994/01/25 ltmath.dtx LaTeX2e			
<code>\bordermatrix</code> : Removed			
<code>\p@renwd</code>	212		

- whether `\@normalsize` has been defined. ASAJ. 366
- `\@fileswithoptions:` Renamed `\@compatibility` to `\@documentclasshook`. ASAJ. 373
- 1994/02/10 `ltfssbas.dtx` v2.1d
- `\addto@hook:` Made `\addto@hook` long. 123
- 1994/02/10 `ltfsscmp.dtx` v2.1d
- `\scan@fontshape:` scan away stuff after pt 146
- 1994/02/22 `ltfssini.dtx` v2.1g
- General: Correct error message . . 171
- 1994/02/24 `ltfssbas.dtx` v2.1e
- `\DeclareFontShape:` Separate restoration of catcodes for fd cmds 108
- `\define@newfont:` Separate restoration of catcodes for fd cmds 117
- `\nfss@catcodes:` Separate restoration of catcodes for fd cmds . . 118
- 1994/02/25 `ltldirchk.dtx` v0.2j
- General: Remove need for drv file . 1
- 1994/03/01 `ltldirchk.dtx` v0.2k
- General: Add unstripped module, so that `ldircheck.dtx` may be used with `initex` 1
- 1994/03/02 `ltboxes.dtx` v0.1e
- General: Add 2kernel module . . 233
- Remove need for drv file 233
- 1994/03/02 `ltclass.dtx` v0.3a
- General: Remove need for driver file 366
- 1994/03/03 `ltboxes.dtx` v0.1f
- `\@irsbox:` Replaced a missing `\else` 240
- 1994/03/04 `ltfloat.dtx` v1.0a
- General: Initial version, split from `latex.dtx` 291
- 1994/03/04 `ltsect.dtx` v1.0a
- General: Initial version, split from `latex.dtx` 282
- 1994/03/04 `lftab.dtx` v1.0a
- General: Initial version, split from `latex.dtx` 241
- 1994/03/04 `ltvers.dtx` v1.0a
- General: Initial version, split from `latex.dtx` 21
- 1994/03/07 `ltboxes.dtx` v0.1a
- `\@mpfootnotetext:` Extra group for colour 239
- 1994/03/07 `ltboxes.dtx` v1.0a
- General: Unify format with other Kernel files 233
- 1994/03/07 `ltdefns.dtx` v1.0a
- `\@@italiccorr:` Macro added . . . 23
- 1994/03/07 `ltfiles.dtx` v1.0a
- General: Initial version, split from `latex.dtx` 60
- Long lines wrapped to 72 columns 60
- 1994/03/07 `ltfinal.dtx` v0.1a
- General: Add code from the old `dump.dtx` 384
- Initial version, split from `latex.dtx` 380
- move code here from `lhyphen.dtx` 381
- Remove oldcomments environment 380
- use `\InputIfFileExists` not `\IfFileExists` 381
- 1994/03/07 `ltfloat.dtx` v1.0a
- `\@endfloatbox:` (DPC) Extra group for colour 297
- `\@footnotetext:` (DPC) Extra group for colour 304
- `\@xfloat:` (DPC) Extra group for colour 295
- 1994/03/07 `lthyphen.dtx` v0.1c
- General: move the 2kernel code to `ltfinal.dtx` 379
- 1994/03/07 `ltnlength.dtx` v1.0a
- `\@settodim:` (DPC) Extra group for colour 106
- 1994/03/07 `ltlists.dtx` v1.0a
- General: Initial version, split from `latex.dtx` 219
- Long lines wrapped to 72 columns 219
- 1994/03/07 `ltpage.dtx` v1.0a
- General: Initial version, split from `ltherest.dtx` 311
- 1994/03/07 `ltpictur.dtx` v0.1a
- General: Initial version, split from `latex.dtx` 260
- Long lines wrapped to 72 columns 260
- 1994/03/07 `ltsect.dtx` v1.0a
- `\@hangfrom:` (DPC)Extra groups for colour 287
- 1994/03/07 `lftab.dtx` v1.0a
- General: Long lines wrapped to 72 columns 241
- 1994/03/08 `ltclass.dtx` v0.3b
- General: Modify driver code into ‘new style’ 366
- 1994/03/08 `ltldirchk.dtx` v1.0a
- General: Reorganise driver module into ‘new style’ 1
- 1994/03/08 `ltplain.dtx` v1.0a
- General: Remove need for a driver file. 11
- 1994/03/10 `ltfssbas.dtx` v2.2f
- `\math@egroup:` Changed `\begin@group/\endgroup` to `\bgroup/\egroup`. 122
- 1994/03/11 `ltfssdcl.dtx` v2.1b
- `\DeclareSymbolFontAlphabet@:` Added check against use of alphabet switch outside of math mode. 166

- `\SetMathAlphabet@`: Changed parameter template in temporary macro to catch check add below. 159
- 1994/03/12 ltclass.dtx v0.3c
 - `\@fileswithoptions`: Do not use `\@pr@videpackage` to avoid typeout 374
 - General: Change name from docclass to ltclass 366
 - `\ProvidesFile`: Add `\wlog` 369
 - `\ProvidesPackage`: Add `\wlog` . . . 368
 - use `\@gtempa` 368
- 1994/03/12 ltdefs.dtx v1.0b
 - `\@reargdef`: New defn, in terms of `\@yargdef` 26
 - `\@yargdef`: Name changed from `\XXX@argdef` 26
- 1994/03/12 ltldirchk.dtx v1.0b
 - General: Change name from `dircheck.dtx` 1
 - Minor edits to the typeouts in `ltxcheck` 1
- 1994/03/12 ltfloat.dtx v1.0b
 - `\@savemarbox`: (DPC) Extra group for colour 299
 - `\@xympar`: (DPC) Extra bgroup for colour 300
- 1994/03/12 ltplain.dtx v1.0b
 - General: Name changed from `lplain`. The end of an era 11
- 1994/03/12 ltplain.dtx v1.0e
 - General: Replaced remaining width, height, depth by L^AT_EX macro names to save tokens. . . 11
- 1994/03/13 ltctrl.dtx v1.0c
 - `\@tf@r`: (DPC) Add `\@tf@r` so a single group is correctly treated. 37
- 1994/03/13 ltfiles.dtx LaTeX2e
 - `\@addtofilelist`: Macro added . . 67
 - `\listfiles`: Reset `\@addtofilelist` at begin document 67
- 1994/03/13 ltfiles.dtx v0.3b
 - `\InputIfFileExists`: Use new cmd `\@addtofilelist` 66
- 1994/03/13 ltssbas.dtx v2.1g
 - General: add 2kernel module to omit repeated code 107
- 1994/03/13 ltssdcl.dtx v2.1c
 - General: add 2kernel module to omit repeated code 149
- 1994/03/14 ltboxes.dtx v1.0b
 - `\@isavebox`: Use `\color@setgroup` 235
 - `\@isavepicbox`: Use `\color@setgroup` 235
 - `\color@begingroup`: macro added for colour support 234
 - `\color@endgroup`: macro added for colour support 234
 - `\lrbox`: Use `\color@setgroup` . . 235
- `\sbox`: Use `\color@setgroup` . . . 235
- 1994/03/14 ltfloat.dtx 1.0c
 - `\@xympar`: (DPC) Use `\color@begingroup` 300
- 1994/03/14 ltfloat.dtx v1.0c
 - `\@endfloatbox`: (DPC) Use `\color@endgroup` 297
 - `\@footnotetext`: (DPC) Use `\color@begingroup`, add `\endgraf` 304
 - `\@savemarbox`: (DPC) Use `\color@begingroup` 299
 - `\@xfloat`: (DPC) Use `\color@begingroup` 295
- 1994/03/15 ltfiles.dtx LaTeX2e
 - `\@missingfileerror`: Quit on x or X just like a real error 66
- 1994/03/15 ltfmtcmd.dtx v3.2a
 - General: Adapted to mass formatting 191
 - Changed `\/` to `\@@italiccorr` 191
 - Removed `\@renewfontswitch` . 191
 - Removed defs of short-forms and all sizes except `\normalize` . 191
- 1994/03/15 ltoutput.dtx v1.0l
 - `\@addtocurcol`: Changed `\addvspace` to `\vskip` 344
 - `\@combinedblfloats`: Removed `boxmaxdepth` setting. 338
 - `\@makecol`: `\maxdepth` changed to `\@maxdepth` 332
 - Removed `boxmaxdepth` setting. 333
 - `\@makespecialcolbox`: Removed `boxmaxdepth` setting. 334
 - `\@topnewpage`: Corrected and amended warning message . . 327
 - Warning added: it should be improved 327
 - General: Added some warnings when page gets full of top floats. 314
 - Driver added and further tidying. 314
 - Removed duplicated code and corrected docstrip options. . . 314
 - Some `boxmaxdepth` settings removed. 314
- 1994/03/16 ltclass.dtx v0.3f
 - General: Add `pkgindoc` package . 378
- 1994/03/16 ltfiles.dtx LaTeX2e
 - `\listfiles`: Move this code directly into `\document` 67
- 1994/03/16 ltfiles.dtx v1.0c
 - `\document`: (DPC) directly add file list settings 63
- 1994/03/16 ltmiscen.dtx v1.0b
 - `\@verbatim`: Remove `\global\@inlabelfalse` again. 207
- 1994/03/28 ltalloc.dtx v1.0d
 - General: Redefinition of ‘new’ allocations removed. 34

1994/03/28 ltdirchk.dtx v1.0d		<code>\stepcounter</code> : Use <code>\addtocounter</code> to have name checked	104
General: Improve documentation	1		
1994/03/28 ltterror.dtx v1.0d		1994/04/09 ltthm.dtx v1.0b	
<code>\invalidchar</code> : (DPC) Comment out (use <code>catcode15</code> instead)	45	<code>\othm</code> : Use standard counter error message (FMi)	281
General: Remove test for <code>\inputlineno</code> undefined.	42	1994/04/11 ltclass.dtx v0.3g	
1994/03/28 ltfiles.dtx v1.0d		<code>\endfilecontents</code> : Add star form, dont write <code>\endinput</code> at the end of the file.	376
<code>\document</code> : (DPC) Use <code>\normal-size</code> not <code>\@normalsize</code>	62	<code>\ProvidesFile</code> : Protect against weird catcodes.	369
(DPC) remove <code>\@normalsize</code> check	62	1994/04/11 ltfsbas.dtx v2.1h	
1994/03/28 ltfloat.dtx v1.0b		General: Added <code>\defaultscriptratio</code> and <code>\defaultscriptscriptratio</code> . ASAJ.	107
<code>\caption</code> : Use <code>\normalsize</code> not <code>\@normalsize</code>	293	<code>\defaultscriptratio</code> : Macro added	122
General: Split further from <code>ltherest.dtx</code>	291	<code>\defaultscriptscriptratio</code> : Macro added	122
1994/03/28 ltlists.dtx v1.0b		1994/04/12 ltboxes.dtx v1.0c	
General: Improve documentation	219	General: Remove <code>\@acci</code> , now defined in <code>ltplain.dtx</code>	237
1994/03/28 ltmiscen.dtx v1.0c		Remove <code>\@dischyph</code> , now defined in <code>ltinit.dtx</code>	237
1994/03/28 ltplain.dtx v1.0c		1994/04/12 ltdefs.dtx v1.0g	
<code>\newtoks</code> : Remove some <code>\outer</code> declarations.	13	<code>\@dischyph</code> : Define <code>\@dischyph</code> , was previously in <code>ltboxes.dtx</code>	23
1994/03/28 ltsect.dtx v1.0b		1994/04/12 ltplain.dtx v1.0d	
General: Split further from <code>ltherest.dtx</code>	282	General: Define <code>\@acci</code>	19
1994/03/28 lttab.dtx v1.0b		1994/04/12 ltvers.dtx v1.0b	
General: Improve documentation	241	General: Have version info generated automatically.	21
1994/03/28 ltthm.dtx v1.0a		1994/04/14 ltfnctcmd.dtx v3.2b	
General: Initial version, split from <code>latex.dtx</code>	279	General: Macros renamed to non-private forms, JB	191
1994/03/29 ltcounts.dtx v1.0c		<code>\DeclareOldFontCommand</code> : Renamed from <code>\@newfontswitch</code>	196
General: Create file from parts of <code>ltmiscen</code> and <code>ltherest</code>	103	1994/04/15 ltboxes.dtx v1.0d	
1994/03/29 ltlength.dtx v1.0c		<code>\isavebox</code> : Added missing precent character.	235
General: Create file <code>lctntlen</code> from parts of <code>ltmiscen</code> and <code>ltherest</code>	106	1994/04/17 ltcounts.dtx v1.0e	
1994/03/29 ltmiscen.dtx v1.0d		<code>\@newctr</code> : Use <code>\@nocounterr</code> instead of <code>\@nocnterr</code>	104
General: Remove counter macros to <code>lctntlen</code>	202	<code>\addtocounter</code> : Use <code>\@nocounterr</code> instead of <code>\@nocnterr</code>	104
1994/03/29 ltpageno.dtx v1.0c		<code>\setcounter</code> : Use <code>\@nocounterr</code> instead of <code>\@nocnterr</code>	104
General: Create file <code>lctntlen</code> from parts of <code>ltmiscen</code> and <code>ltherest</code>	199	1994/04/17 ltterror.dtx v1.0h	
1994/03/31 ltbibl.dtx v1.0a		<code>\@nocounterr</code> : New name for error message, old error message (without arg) kept	43
General: Initial version of <code>ltdxbib.dtx</code> , split from <code>ltherest.dtx</code>	307	1994/04/17 ltthm.dtx v1.0c	
1994/03/31 ltidxglo.dtx v1.0a		<code>\othm</code> : Use new std counter error message (FMi)	281
General: Initial version of <code>ltdxbib.dtx</code> , split from <code>ltherest.dtx</code>	305	1994/04/18 ltfinal.dtx v0.1b	
1994/04/09 ltcounts.dtx v1.0d		General: Initialise <code>\textheight</code> , <code>\textwidth</code> and page style	380
<code>\@newctr</code> : <code>\@nocnterr</code> now has counter name argument	104	1994/04/18 ltfloat.dtx v1.0d	
<code>\addtocounter</code> : <code>\@nocnterr</code> now has counter name argument	104	<code>\@footnotetext</code> : (DPC) Remove Colour support	304
<code>\setcounter</code> : <code>\@nocnterr</code> now has counter name argument	104	<code>\@savemarbox</code> : (DPC) Remove Colour support	299

- 1994/04/18 ltssbas.dtx v2.1i
 General: Macro `\no@alphabet@help` removed again 107
`\calculate@math@sizes`: Changed message to log only 122
`\no@alphabet@error`: Use std LaTeX error macro 107
- 1994/04/18 ltssdcl.dtx ???
`\DeclareMathAlphabet`: Pass correct arg (2 not 3) 157
- 1994/04/18 ltssdcl.dtx v2.1d
 General: Removed surplus `\no@alphabet@error` (see fam.dtx) 149
- 1994/04/18 ltssstrc.dtx v2.3d
 General: Changed to new error/warning scheme 125
`\font@submax`: Changed dimen to macro 140
`\fontsubfuzz`: Changed dimen to macro 140
`\subst@size`: `\font@submax` and `\fontsubfuzz` now macros .. 141
- 1994/04/19 ltpage.dtx v1.0b
 General: Improve documentation 311
- 1994/04/20 ltfntcmd.dtx v3.3a
 General: Documentation up-dated 191
 New implementation of `\nocorr` 191
`\check@nocorr@`: Macros added 194
`\maybe@ic@`: `\nocorr` etc removed from list of tokens to check, leaving only punctuation characters 195
- 1994/04/20 ltmiscen.dtx v1.0e
`\enddocument`: Changed logic for producing warning messages 204
- 1994/04/21 ltboxes.dtx v1.0e
`\@iiiminipage`: Extra `\bgroup` for colour 238
`\@mpfootnotetext`: Extra `\endgraf` for colour 239
`\endminipage`: Extra `\egroup` for colour 239
- 1994/04/21 ltfinal.dtx v0.1c
 General: Added comments, set the catcodes of 128–255. 380
- 1994/04/22 ltssini.dtx v2.1g
`\not@math@alphabet`: Message changed again 169
- 1994/04/23 ltfinal.dtx v0.1d
 General: Check that `\font@submax` is still zero 380
- 1994/04/24 ltoutput.dtx v1.0m
`\@resetthfps`: Number 2 changed to `\tw@` 354
 Warning changed 354
`\@specialoutput`: Message changed to give more info and ‘top’ removed 328
`\@topnewpage`: Message changed to give more info 327
- Warning message removed as it will be generated later 327
- General: Changed `\@normalsize` to `\normalsize`. 314
 Corrected unverb commands in documentation. 314
 Removed some long lines and other aesthetic changes. 314
 Warning messages changed/corrected. 314
- 1994/04/24 ltpictur.dtx v0.1b
 General: Removed surplus spaces after `\hbox to` in several cases 260
- 1994/04/25 ltclass.dtx v0.3h
 General: Removed spurious extra ‘.’s at the end of error messages 366
- 1994/04/25 ltfloat.dtx v1.0e
`\@largefloatcheck`: Changed warning message to give more info 297
 Command added 297
 General: Changed warning messages 291
 Removed obsolete tracing code 291
- 1994/04/27 ltssstrc.dtx v2.3e
 General: Corrected item that was forgotten in last change. 125
- 1994/04/28 lterror.dtx v1.0j
`\@inmatherr`: Macro added 45
- 1994/04/28 lterror.dtx v1.1c
`\@inmatherr`: Replaced `\noexpand` with `\protect`. 45
- 1994/04/28 ltssdcl.dtx v2.1e
 General: Removed all `\uppercase` in hex num parsing macros . 149
- 1994/04/28 ltlists.dtx v1.0c
 General: Replaced `\@ltxnomath` by `\@inmatherr` 227
- 1994/04/28 ltpictur.dtx v0.1c
 General: bezier curves added ... 276
`\multiput`: (DPC) Ignore spaces between)(..... 262
 (DPC) Macro added 262
`\picture`: (DPC) Ignore spaces before (..... 261
- 1994/04/28 ltplain.dtx v1.0g
 General: Turn off overfull box tracing in log 16
- 1994/04/29 ltclass.dtx v1.0a
 General: Change version number to 1 (no other change) 366
- 1994/04/29 ltmiscen.dtx v1.0f
`\@verbatim`: `\leavevmode` added 207
 Change to `\everypar` added .. 208
- 1994/04/29 ltoutenc.dtx 1.4a
 General: Removed `\EncodingSpecific`. Renamed all the commands. Added `\DeclareTextGlyph` and `\UndeclareTextCommand`. 72

Removed Rokicki's OT1 variant encoding. Moved the driver to the top.	72	Renamed the commands, removed the <code>\EncodingSpecific</code> command. Turned all slots into decimal. Added <code>\a</code>	69
1994/04/30 ltfntcmd.dtx v3.3b		1994/05/02 ltcntrl.dtx v1.0l	
General: Documentation up-dated and tidied	191	<code>\@break@tfor</code> : Macro added (from ltfiles.dtx)	37
Prefix frag@ changed to frag in <code>\@protecteddef</code>	191	1994/05/02 ltfiles.dtx v1.0f	
Title changed	191	<code>\@iffileonpath</code> : <code>\@break@loop</code> renamed to <code>\@break@tfor</code>	65
Warning changed to info message in <code>\@protecteddef</code>	191	<code>\@obsoletefile</code> : Make <code>\@on-lypreamble</code>	67
1994/04/30 ltoutput.dtx v1.0n		1994/05/02 ltfinal.dtx v0.1e	
<code>\@activechar@info</code> : <code>\@activechar@warning</code> changed to <code>\@activechar@info</code>	335	General: Added setting the 'letter' catcodes.	383
<code>\@combinedblfloats</code> : Removed rule in topnewpage case	338	Added setting the 'other' catcodes.	383
<code>\@emptycol</code> : Empty column action added: <code>\@emptycol</code>	326	Added setting the special catcodes.	382
<code>\@flsetnum</code> : Rogue space removed	355	Made slot 127 illegal	383
<code>\@specialoutput</code> : Cut-off point changed to <code>2\baselineskip</code>	328	Set all the catcodes	380
Empty column action added: <code>\@emptycol</code>	328	1994/05/02 ltfinal.dtx v0.1f	
Extra empty column added for twocolumn case	328	General: Set the catcode of control-J.	382
Extra empty column added for twocolumn case (wrong, see below)	328	1994/05/02 ltmiscen.dtx v1.0g	
<code>\@topnewpage</code> : Added setting of <code>\col@number</code>	326	General: Changed 91 to 1991 and moved some bits	202
Cut-off point changed to <code>3\baselineskip</code>	327	1994/05/02 ltoutput.dtx v1.0o	
Empty column action added: <code>\@emptycol</code>	327	<code>\@resetfps</code> : Code shortened	354
Message changed for Frank	327	General: Code of <code>\@resetfps</code> shortened.	314
General: <code>\@activechar@warning</code> changed to an info message. . . .	314	1994/05/03 ltbibl.dtx v1.0b	
Added <code>\col@number</code>	314	<code>\nocite</code> : Make <code>\nocite</code> issue a warning for an undefined citation key.	309
Documentation tidied.	314	1994/05/03 ltfinal.dtx v0.1f	
Empty column action added. . . .	314	General: Set the catcode of control-J to be 'other', for use in messages.	380
Fixed bug from <code>\dblfigrule</code> with <code>\@topnewpage</code>	314	1994/05/03 ltfloat.dtx v1.0f	
Full of floats action improved. . .	314	General: (CAR) Added <code>\@largefloatcheck</code>	291
<code>\col@number</code> : Added <code>\col@number</code>	324	Removed unnecessary braces from arguments of <code>\@ifnextchar</code>	291
<code>\onecolumn</code> : Added setting of <code>\col@number</code>	326	<code>\end@dblfloat</code> : <code>\@largefloatcheck</code> added	296
1994/05/01 ltterror.dtx v1.0k		<code>\end@float</code> : (CAR) Added <code>\@largefloatcheck</code>	296
<code>\@latexerr</code> : (CAR) Added draft <code>\@latexinfo</code>	42	1994/05/03 ltfssdcl.dtx v2.1f	
1994/05/01 ltoutenc.dtx 1.4a		General: Renamed <code>\@DeclareMathDelimiter</code> to <code>\@DeclareMathDelimiter</code>	149
General: Added the <code>\a</code> command. . . .	78	1994/05/03 ltlists.dtx v1.0d	
Added the <code>\SaveAtCatcode</code> and <code>\RestoreAtCatcode</code> commands.	81	<code>\@item</code> : <code>\hskip</code> changed to <code>\kern</code>	228
Removed the uc/lc table settings, since the T1 uc/lc table is now the default.	86	General: Removed superfluous braces	227
Rewrote for the new syntax.	81, 82	1994/05/03 ltmiscen.dtx v1.0h	
1994/05/01 ltoutenc.dtx v1.4a		<code>\@centercr</code> : <code>\@badcrerr</code> replaced by <code>\@nolnerr</code>	206
General: Removed Rokicki's encoding.	69		

- 1994/05/03 lttab.dtx v1.0d
`\endpbox`: Use `\@finalstrut` based on depth of `\@arstrutbox` 259
- 1994/05/04 ltclass.dtx v1.0b
`\NeedsTeXFormat`: Changed wording of the warning 373
- 1994/05/04 lterror.dtx v1.0m
`\@badcrerr`: Error message removed 45
- 1994/05/05 ltbibl.dtx v1.0c
`\@citex`: Set switch for warning and end of run. 308
`\nocite`: Do not write page number in `\nocite` warning message. 309
Set switch for warning and end of run. 309
- 1994/05/05 ltfinal.dtx v0.1g
General: Added empty `errhelp`. .. 380
`\errhelp`: Set error help empty. . 386
- 1994/05/05 ltfntcmd.dtx v3.3c
`\@math@egroup`: Corrected `\@fontswitch` and added saved versions 197
General: Corrected `\@fontswitch` 191
- 1994/05/05 ltmiscen.dtx v1.0i
General: Removed braces from `ifnextchar` and `ifstar` arguments 202
- 1994/05/07 lttab.dtx v1.0c
`\@maxtab`: Changed `\@firsttab` to `\chardef` 245
Changed `\@maxtab` to `\chardef` 245
General: Removed definition of `\+` 241
Removed surplus braces from `\@ifnextchar` constructs ... 241
- 1994/05/08 ltfntcmd.dtx v3.3d
General: Removed `\@undefinedfonterror` 191
`\normalsize`: Removed `\@undefinedfonterror` 197
- 1994/05/09 ltfntcmd.dtx v3.3f
General: Replaced all `\next` by `\@let@token` and undo change 3.3e, whatever that was. ... 191
- 1994/05/10 ltdefs.dtx v1.0n
General: (ASAJ) Added `\DeclareProtectedCommand`. 22
Added `\DeclareProtectedCommand` 29
Added `\makeatletter` and `\makeatother` ASAJ. 33
Removed braces around `\@ifundefined` argument. ASAJ. ... 27
- 1994/05/10 lterror.dtx v1.0n
`\@latexerr`: (ASAJ) Added extra blank lines to `\@latexerr`. ... 42
- 1994/05/10 ltmiscen.dtx v1.0j
`\@sverb`: Slight change in error message text. 208
- 1994/05/11 ltboxes.dtx v1.0f
`\@begin@tempboxa`: Use new `\color@setgroup` concept. .. 233
`\@iiiminipage`: Use new `\color@setgroup` concept. .. 238
`\@mpfootnotetext`: Use new `\color@setgroup` concept. .. 239
Use new `\normalcolor` and `\@finalstrut`. 239
General: Superfluous braces removed from several commands 233
`\color@setgroup`: macro added for colour support 234
`\endminipage`: Use new `\color@setgroup` concept. .. 239
- 1994/05/11 ltclass.dtx v1.0c
`\endfilecontents`: Add checks for form feed and tab 376
- 1994/05/11 ltdirchk.dtx v1.0e
General: Add `\ProvidesFile` as used in fd files. 3
- 1994/05/11 lterror.dtx v1.0o
`\@latexerr`: (ASAJ) Removed one of the extra blank lines to `\@latexerr`. 42
- 1994/05/11 ltlogos.dtx v1.0o
`\LaTeX`: Use `\DeclareProtectedCommand`. ASAJ. 59
`\LaTeXe`: Use `\DeclareProtectedCommand`. ASAJ. 59
- 1994/05/11 ltoutenc.dtx 1.5a
General: Made T1 and OT1 generate packages rather than def files. Renamed the ‘package’ module to ‘teststy’. 72
- 1994/05/11 ltoutenc.dtx v1.5a
General: Reimplemented `\DeclareTextCommand` using `\@changed@cmd` and `\DeclareProtectedCommand`. 72
Renamed the commands again. Made the encoding part of the command syntax. Added the `\DeclareTextCommand` interface. Used `\DeclareProtectedCommand`. 69
`\DeclareTextAccent`: Reimplemented using `\DeclareTextCommand`. 74
- 1994/05/11 ltspace.dtx v1.0o
`\,`: Use `\DeclareRobustCommand`. ASAJ. 57
`\hspace`: Use `\DeclareRobustCommand`. ASAJ. 57
- 1994/05/12 ltboxes.dtx v1.0g
`\@finalstrut`: macro added 240
`\fbox`: New definition, merged with `\framebox` 236
`\framebox`: Merged `\fbox` and `\framebox` 236
`\normalcolor`: macro added for colour support 234
- 1994/05/12 ltdefs.dtx v1.0p
General: (ASAJ) Fixed a bug with

- `\relax` which was using `\@gobble` before defining it. 22
- Fixed a bug with `\relax` which was using `\@gobble` before defining it. 29
- 1994/05/12 ltfsbas.dtx v2.1j
 - General: New `baselinestretch` concept 107
 - Replaced hand-protected commands by `\DeclareRobustCommand` defs 107
 - `\f@linespread`: New macro 114
 - `\fontencoding`: Use `\DeclareRobustCommand`. 112
 - `\fontfamily`: Use `\DeclareRobustCommand`. 113
 - `\fontseries`: Use `\DeclareRobustCommand`. 113
 - `\fontshape`: Use `\DeclareRobustCommand`. 113
 - `\fontsize`: Redefined to use `\set@fontsize` 114
 - `\linespread`: New macro 113
 - `\mathversion`: Use `\DeclareRobustCommand`. 114
- 1994/05/12 ltfsdcl.dtx v2.1g
 - General: Allow `\relax` as undefined command 149
 - Allow `\relax`'ed cmds to be declared 149
- 1994/05/12 ltfsini.dtx v2.1i
 - General: Moved `\fontencoding` to fam.dtx 168
 - Moved `\fontfamily` to fam.dtx 168
 - Moved `\fontseries` to fam.dtx 168
 - Moved `\fontshape` to fam.dtx 168
 - Moved `\fontsize` to fam.dtx 168
 - Moved `\mathversion` to fam.dtx 168
 - Moved `\selectfont` to tracefnt.dtx 168
- 1994/05/12 ltfsstrc.dtx v2.3f
 - `\selectfont`: Use `\DeclareRobustCommand` 128
- 1994/05/12 ltoutenc.dtx 1.5a
 - General: Removed the `\SaveAtCatcode` and `\RestoreAtCatcode` commands. 81
 - Rewrote for the new syntax. 81, 82
- 1994/05/12 ltoutput.dtx v1.0p
 - `\@writsetup`: `\normalcoloradded` 335
 - General: `\normalcoloradded` in various places (DPC). 314
- 1994/05/13 ltboxes.dtx v1.0h
 - `\@arrayparboxrestore`: New accent system, use `\let` not `\def` 238
- 1994/05/13 ltcounts.dtx v1.0f
 - General: Removed `\@lalph` 105
 - Removed `\@ialph` 105
- 1994/05/13 ltdefs.dtx v1.0q
 - General: (ASAJ) Renamed `\DeclareProtectedCommand` to `\DeclareRobustCommand`. Removed `\@if@short@command`. 22
 - (ASAJ) Replaces `\space` by `'` in `\csname`. 22
 - Renamed `\DeclareProtectedCommand` to `\DeclareRobustCommand`. Removed `\@if@short@command`. Moved to after the definition of `\@gobble`. 29
- 1994/05/13 ltdefs.dtx v1.0r
 - General: (ASAJ) Added logging message to `\DeclareProtectedCommand`. 22
 - Added logging message to `\DeclareProtectedCommand`. 29
- 1994/05/13 ltdefs.dtx v1.0s
 - General: (ASAJ) Added `\@backslashchar`. 22
 - (ASAJ) Coded `\@ifdefinable` more efficiently. 22
 - Coded more efficiently, thanks to FMi. 27
- 1994/05/13 ltfiles.dtx LaTeX2e
 - `\listfiles`: Stop `\listfiles` being run twice 67
- 1994/05/13 ltfiles.dtx v1.0g
 - `\document`: Added execution of `\every@size` 62
- 1994/05/13 ltfinal.dtx v0.1h
 - General: Added package `otlenc`, and defined `\@acci`, `\@accii` and `\@acciii`. 380
- 1994/05/13 ltfinal.dtx v1.0h
 - General: Added output enc stuff 384
- 1994/05/13 ltfloat.dtx v1.0g
 - `\@footnotetext`: (DPC) Add new style colour support: `\normalcolor` 304
 - (DPC) Use `\@finalstrut` 304
 - `\@xfloat`: (DPC) Use `\normalcolor` 295
- 1994/05/13 ltfontcmd.dtx v3.3g
 - General: Replaced `\@protecteddef` by `\DeclareRobustCommand` 191
- 1994/05/13 ltfsbas.dtx v2.1k
 - General: Remove file identification 'typeout' 107
- 1994/05/13 ltfsbas.dtx v2.1l
 - `\DeclareFontEncoding`: Init encoding change command 110
 - `\define@newfont`: Use `\@input@` for fd files 117
- 1994/05/13 ltfsdcl.dtx v2.1h
 - General: Removed file identification typeout 149
- 1994/05/13 ltfsini.dtx v2.1j
 - General: Removed file identification typeout 168
- 1994/05/13 ltfsstrc.dtx v2.3g
 - General: Removed typeouts as `\ProvidesPackage` writes to

- log. 125
- 1994/05/13 ltoutenc.dtx v1.5b
General: Added `\{`, `\}` and `\$`. . . 69
Renamed `\DeclareProtectedCommand` to `\DeclareRobustCommand`. 69
Replaces `\space` by ‘ ’ in `\csname`. 69
- 1994/05/13 ltpictur.dtx v0.1d
General: Removed surplus braces from `\@if..` constructions . . 260
- 1994/05/13 lttab.dtx v1.0d
`\@contfield`: Colour support . . . 246
`\@startfield`: Colour support . . 246
`\@stopfield`: Colour support . . . 246
`\a`: moved to ltoutenc 245
- 1994/05/14 fontdef.dtx v2.1f
General: Removed .def files. . . . 175
- 1994/05/14 ltfssbas.dtx v2.1m
`\enc@update`: Macro added 113
- 1994/05/14 ltfssbas.dtx v2.1n
General: Set defaults for all `\f@...` 114
`\DeclareErrorFont`: Don’t set `\f@encoding` 118
`\DeclareFontEncoding`: Log if encoding is redeclared 110
Only init enc change cmd when new encoding 110
- 1994/05/14 ltfssini.dtx v2.1k
General: Init error font just before checking for fontdef.cfg 171
`\p@reset@font`: Remove surplus braces 170
- 1994/05/14 ltfsstrc.dtx v2.3h
`\selectfont`: Added `\enc@update` 129
- 1994/05/14 ltoutenc.dtx 1.5d
General: Moved the driver to the top. 72
- 1994/05/14 ltoutenc.dtx v1.5c
General: Added the fontenc package 93
Added the fontenc package. . . 69
Fixed a bug which caused an infinite loop if `\f@encoding` was incorrectly set. 69, 72
Moved fontsmpl to its own dtx file. 69
- 1994/05/14 ltoutenc.dtx v1.5d
General: Rewrote `\DeclareTextCommand` to define its argument to use the current encoding by default, rather than the encoding provided to `\DeclareTextCommand`. 69, 72
Tidied up the documentation. . 69
- 1994/05/14 ltoutenc.dtx v1.5e
General: Replaced `\ENC@cmd` by `\ENC-cmd`. 69
- 1994/05/15 ltfssbas.dtx v2.1o
General: encoding cmds changed to enc-cmd 107
- 1994/05/16 ltalloc.dtx v1.1a
General: (ASAJ) Split from ltinit.dtx. 34
- 1994/05/16 ltcntrl.dtx v1.0a
General: (ASAJ) Split from ltinit.dtx. 35
- 1994/05/16 ltdefns.dtx v1.1a
General: (ASAJ) Split from ltinit.dtx. 22
- 1994/05/16 lterror.dtx v1.1a
General: (ASAJ) Completely new error interface. 38
(ASAJ) Split from ltinit.dtx. . 38
- 1994/05/16 ltfinl.dtx v1.0i
General: moved output enc stuff to lfonts 384
- 1994/05/16 ltfssbas.dtx v2.1p
`\fontsize`: Pass `\baselinestretch` not `\f@linespread` 114
`\linespread`: Remove surplus braces 113
- 1994/05/16 ltfssini.dtx v2.1m
`\@acciii`: Define saved versions of accents 172
- 1994/05/16 ltlogos.dtx v1.1a
General: (ASAJ) Split from ltinit.dtx. 59
- 1994/05/16 ltmath.dtx v1.0k
`\ensuremath`: Use `\DeclareRobustCommand` and add extra braces in math mode 216
- 1994/05/16 ltoutenc.dtx 1.5h
General: `\pounds` was still using u rather than ui shape. 81
- 1994/05/16 ltoutenc.dtx v1.5f
General: enc files now have uc encoding name parts (FMi) 69
Revert code so that the encoding given is used in `\DeclareTextCommand` (FMi) 69
- 1994/05/16 ltoutenc.dtx v1.5g
General: Made fontenc.sty use the new mixed-case encoding files. 69
Removed the lowercasing of the filename. 93
- 1994/05/16 ltoutenc.dtx v1.5h
General: Added `\NG`, `\ng`, `\TH`, `\th`, `\DH`, `\dh`, `\DJ` and `\dj`. 69
Added `\r` (ring accent) and `\k` (ogonek) accents. 69
Fixed a bug with `\pounds`. . . 69
Removed `\P` from the OT1 definitions file. 69
- 1994/05/16 ltoutenc.dtx v1.5i
General: Fixed a bug with `\d`. . . 69
- 1994/05/16 ltoutput.dtx v1.0q
`\@writsetup`: Changed setting of accents (FMi): with the new encoding setup they can use `\let`. It could also use the new internal commands? 336

General: Changed setting of accents (FMi).	314	1994/05/18 ltlogos.dtx v1.1b	
1994/05/16 ltpar.dtx v1.1a		General: (ASAJ) Added the \TeX logo.	59
General: (ASAJ) Split from ltinit.dtx.	46	(ASAJ) Made the $\LaTeX 2_{\epsilon}$ logo use the text font ‘2’ rather than the math font ‘2’.	59
1994/05/16 ltplain.dtx v1.0h		1994/05/18 ltoutenc.dtx v1.5k	
General: Comment out encoding specific commands	19	General: Made dotted-i produce ‘i’.	69
Remove $\backslash @acci$ and friends again	19	Removed braces from $\backslash pounds$ and $\backslash dollar$	69
Remove unnecessary def for $\backslash item$	19	Replaced $\backslash defaultencoding$ with $\backslash encodingdefault$	69
$\backslash loop$: Use Kabelschacht method	18	1994/05/19 ltbibl.dtx v1.1a	
$\backslash m@th$: Remove unnecessary space	18	General: Initial version of ltbibl.dtx, split from ltidxbib.dtx	307
1994/05/16 ltspace.dtx v1.1a		1994/05/19 ltcounts.dtx v1.1a	
General: (ASAJ) Split from ltinit.dtx.	48	General: Extracted file from ltcntlen.	103
1994/05/17 ltclass.dtx v1.0e		1994/05/19 ltdefns.dtx v1.1d	
$\backslash @use@option$: Execute option after removing from list, not before	371	General: (RmS) Added definitions for $\backslash @namedef$ and $\backslash @nameuse$ again.	22
1994/05/17 ltdefns.dtx 1.1b		1994/05/19 ltfinal.dtx v0.1k	
General: (ASAJ) Added the $\backslash @protect@... $ commands.	30	General: Removed $\backslash makeat... $	380
1994/05/17 ltdefns.dtx v1.1b		1994/05/19 ltidxglo.dtx v1.1a	
General: (ASAJ) Added definitions for protect.	22	General: Initial version of ltidxglo.dtx, split from ltidxbib.dtx	305
(ASAJ) Removed warnings and logging to lterror.dtx.	22	1994/05/19 ltlength.dtx v1.1a	
Added the discussion of protected commands, defined the values that $\backslash protect$ should have.	29	General: Extract file ltlength from ltcntlen.	106
1994/05/17 ltdefns.dtx v1.1c		1994/05/19 ltpageno.dtx v1.1a	
General: (ASAJ) Redid definitions for protect.	22	General: Extract file ltpageno from ltcntlen.	198
1994/05/17 lterror.dtx v1.1b		1994/05/19 ltplain.dtx v0.1k ltfinal	
General: (ASAJ) Moved error stuff from ltdefns.dtx.	38	$\backslash showoutput$: used $\backslash maxdimen$ not 99999	20
1994/05/17 ltffssini.dtx v2.1n		$\backslash showoverfull$: used $\backslash @ne$ not 1	20
$\backslash copyright$: Really add extra braces	170	1994/05/19 ltxref.dtx v1.1a	
$\backslash nfss@text$: Added braces to allow use in subscripts	170	General: Extract file ltxref from ltcntlen.	199
1994/05/17 ltmath.dtx v1.0i		1994/05/1g fontdef.dtx v2.1g	
General: Replaced $\backslash let$ by $\backslash gdef$, for indirect definition.	214	General: Removed $\backslash DeclareFontEncoding$ for ot1 and t1 and input .def files instead	175
1994/05/17 ltoutenc.dtx v1.5j		1994/05/2 ltdefns.dtx v1.1f	
General: Added braces to $\backslash pounds$ so it works as a subscript.	69	$\backslash renewcommand$: Removed surplus $\backslash space$ in error	26
1994/05/18 ltdefns.dtx 1.1c		$\backslash renewenvironment$: Removed surplus $\backslash space$ in error	27
General: (ASAJ) Renamed the commands, and removed one which is no longer needed.	30	1994/05/20 ltdefns.dtx v1.1e	
1994/05/18 ltdefns.dtx v1.1c		General: Changed command name from $\backslash @checkcommand$ to $\backslash CheckCommand$	22
General: Redid the discussion and definitions, in line with the proposed new setting of $\backslash protect$ in the output routine.	29	$\backslash CheckCommand$: Changed name from $\backslash @checkcommand$ to $\backslash CheckCommand$	28
1994/05/18 ltfinal.dtx v0.1j		1994/05/20 lterror.dtx v1.1c	
General: Corrected the lccode for d-bar.	380	General: (ASAJ) Added $\backslash @la-tex@info@no@line$	38
		(ASAJ) Added missing full stops.	38

- (ASAJ) Fixed a bug with `\oin-matherr`. 38
- 1994/05/20 ltfinal.dtx v0.1l
General: Use new font warning commands 382
- 1994/05/20 ltfloat.dtx v1.0h
`\@endfloatbox`: Restore outer value of `@nobreak` switch. . . 297
- 1994/05/20 ltfntcmd.dtx v3.3h
General: Use new error commands 191
- 1994/05/20 ltfsbas.dtx v2.1q
General: Use new error commands 107
- 1994/05/20 ltfsstrc.dtx v2.3i
General: Use new error command names 125
- 1994/05/20 ltmiscen.dtx v1.0l
`\@writefile`: Added correct setting of `\protect`. 204
- 1994/05/20 ltmiscen.dtx v1.0m
General: Use new warning commands 202
- 1994/05/20 ltoutput.dtx v1.0s
`\@writsetup`: Added setting of `\protect` during `\shipout`. . 335
General: Added setting of `\protect` during `\shipout`. 314
- 1994/05/20 ltpage.dtx v1.0d
`\markright`: Changed setting for `\protect`. 312
- 1994/05/20 ltsect.dtx v1.0c
General: Correct setting of `\protect`. 289
`\addcontentsline`: Correct setting of `\protect`. 289
- 1994/05/21 ltbibl.dtx v1.1b
General: Use new warning commands 307
- 1994/05/21 lterror.dtx v1.1d
General: (ASAJ) Made the error commands robust. 38
- 1994/05/21 ltfiles.dtx v1.0h
General: Use new error commands 60
- 1994/05/21 ltlists.dtx v1.0f
General: Use new error commands 219
- 1994/05/21 ltmiscen.dtx v1.0n
General: Use new error commands 202
- 1994/05/21 ltsect.dtx v1.0d
General: Use new error commands 282
- 1994/05/21 lttab.dtx v1.0f
General: Use new error commands 241
- 1994/05/21 ltxref.dtx v1.1b
General: Use new warning commands 199
`\newlabel`: Use new warning commands 200
- 1994/05/22 ltclass.dtx v1.0f
General: Use new warning and error commands 363
- 1994/05/22 ltdefns.dtx v1.1f
General: Use new warning and error cmds 22
- 1994/05/22 lterror.dtx v1.1e
General: (ASAJ) Replaced `bgroup` by `begingroup` in error messages, to stop extra mathords creeping into math mode. . . 38
- 1994/05/22 lterror.dtx v1.2a
General: (ASAJ) Made `\GenericError`, `\GenericWarning` and `\GenericInfo` robust. 38
(ASAJ) Replaced `\@generic@message` and `\@generic@error` by `\GenericError`, `\GenericWarning` and `\GenericInfo`. 38
(ASAJ) Replaced `\` and tilde by `\MessageBreak` and `\space`. . 38
(ASAJ) Replaces `\string` by `\protect` in some messages. . 38
- 1994/05/22 lterror.dtx v1.2d
`\GenericError`: (DPC) Alternative version added for old TeXs . . 38
(DPC) New version using long command name. 38
- 1994/05/22 ltfloat.dtx v1.0i
General: Use new warning commands 291
- 1994/05/22 ltoutput.dtx v1.0t
General: Changed warnings and infos to new commands. 314
- 1994/05/22 ltpictur.dtx v0.1e
General: Use new warning cmds . 260
- 1994/05/23 ltclass.dtx v1.0h
`\NeedsTeXFormat`: Don't stop completely when format is wrong 372
`\usepackage`: Remove argument if possible 372
- 1994/05/23 ltdirchk.dtx v1.0f
General: Document `\@TeXversion` 1
- 1994/05/23 ltfsstrc.dtx v2.3j
General: Removed def of `\f@warn@break` 139
- 1994/05/23 ltoutput.dtx v1.0u
`\@activechar@info`: Added `\MessageBreak` 335
`\@writsetup`: Changed resetting of `\protect` after shipout to use `\aftergroup` 335
General: Added `\MessageBreak`. . 314
Changed resetting of `\protect` after shipout. 314
- 1994/05/24 lterror.dtx v1.2e
`\@latex@info@no@line`: Macro added 41
- 1994/05/24 lterror.dtx v1.2f
General: (DPC) wrap long lines . 38
- 1994/05/24 ltfntcmd.dtx v3.3i
General: Tidying and typos fixed 191
- 1994/05/24 ltmiscen.dtx v1.0q
`\@currentvline`: Use `\@empty` as outer default 205
- 1994/05/25 ltdirchk.dtx v1.0g
`\filename@parse`: Mac parser had " typo for : 9

- 1994/05/25 ltfontcmd.dtx v3.3j
 General: Insertion of `\aftergroups` to implement `\nocorr` moved to the end of the group 191
`\check@icr`: Macros added 194
`\check@nocorr@`: Insertion of `\aftergroups` moved and defaults set up for efficiency 194
`\DeclareTextFontCommand`: `\expandafter` inserted 193
 Insertion of `\aftergroups` moved 193
- 1994/05/25 ltoutput.dtx v1.0v
 General: Extra documentation. . . 314
- 1994/05/25 ltsect.dtx v1.0e
`\@dottedtocline`: Put braces around argument 4 (the actual toc entry) to avoid font (and possibly other) changes leaking out to the leaders. 290
- 1994/05/25 ltthm.dtx v1.0c
 General: Modify documentation . . 279
- 1994/05/25 ltvers.dtx v1.0d
 General: Remove PRELIMINARY TEST RELEASE from startup banner (spring is here) 21
- 1994/05/25 ltxref.dtx v1.1c
 General: Modify documentation . . 199
- 1994/05/26 ltfiles.dtx LaTeX2e
`\@missingfileerror`: Modify message format 66
- 1994/05/26 ltlogos.dtx v1.1c
 General: Remove `\SLiTeX` logo . . 59
- 1994/05/26 ltplain.dtx v1.1m
`\iterate`: (CAR) added `\long` . . 18
`\underbar`: (CAR/FMi) changed to use box `\tw@` 19
- 1994/05/26 ltplain.dtx v1.1p
`\underbar`: (DPC) changed to use `\sbox` 19
- 1994/05/26/16 ltmiscen.dtx v1.0r
 General: `\literal` removed 209
- 1994/05/29 ltssdcl.dtx v2.1j
 General: Use new error commands 149
- 1994/05/31 ltfinal.dtx v1.0n
 General: Renamed `lthyphen.*` to `lthyphen.*`. 380
- 1994/06/01 ltboxes.dtx v1.0i
`\@framebox`: Macro added. 236
`\@iframebox`: New version, so `\width` is correct in `\framebox` 236
`\fbox`: New version, using `\@framebox` 236
`\framebox`: New version, so `\width` is correct in `\framebox` 236
- 1994/06/01 ltlogos.dtx v1.1d
`\LaTeX`: Add `\m@th` to force math size calculations 59
- 1994/06/01 ltoutput.dtx v1.0w
 General: Tidied up typesetting. . . 314
- 1994/06/08 ltfinal.dtx v1.0m
 General: Add patch file system . . 384
- 1994/06/09 ltfinal.dtx v1.0n
 General: For T_EX2, do not set codes for higher half of character table. 381, 383
- 1994/06/09 ltfontcmd.dtx v3.3k
 General: Tidying and typos fixed in documentation 191
- 1994/06/18 ltfontcmd.dtx v3.3l
 General: Added check for empty text 191
`\check@nocorr@`: Added check for empty text 194
- 1994/06/22 ltfontcmd.dtx v3.3m
 General: Removed space from `\nfss@text` 191
 Renamed `\check@nocorr` 191
`\check@nocorr@`: Renamed `\check@nocorr` to `\text@command` to improve `\long` error message 194
`\DeclareTextFontCommand`: Removed space from `\nfss@text` 193
- 1994/06/22 ltmath.dtx v1.2t classes
`\mathindent`: Set `\mathindent` at the end of the class instead of at begin document 217
- 1994/07/20 ltlogos.dtx v1.1e
`\LaTeX`: Save a few tokens 59
`\LaTeXe`: Save a few tokens 59
- 1994/07/20 ltpage.dtx v1.0h
`\sloppy`: Save a few tokens 313
- 1994/09/16 ltssbas.dtx v2.1s
`\nfss@catcodes`: Reset [and] as well, just in case 118
- 1994/10/07 ltoutenc.dtx v1.5l
 General: Moved the ogonek accent. 69
- 1994/10/11 ltdirchk.dtx v1.0h
`\@TeXversion`: Check for TeX3.14 10
 General: Modify all of `ltxcheck` again 10
- 1994/10/12 ltsect.dtx v1.0f
 General: Doc. typos 282
- 1994/10/14 fontdef.dtx v2.2a
 General: New coding 173
- 1994/10/14 ltssini.dtx v2.2a
 General: New coding for cfg files . 168
- 1994/10/14 ltmiscen.dtx v1.0s
 General: Move math to other file 202
- 1994/10/14 ltplain.dtx v1.1a
 General: Moved code to other files. 11
- 1994/10/15 ltssbas.dtx v2.1t
`\extract@alph@from@version`: Warn if math alpha is used outside math 122
- 1994/10/18 ltboxes.dtx v1.0j
`\@framebox`: `\leavevmode` added 236
`\@iframebox`: `\leavevmode` moved to `\@framebox` 236
`\@parboxto`: Macro added to remove misuse of `\@empty` . . . 237
 General: stuff from `ltpatch` done . 233
`\fbox`: `\long` added 236
`\mbox`: `\long` added 233

- `\sbox: \long` added 235
- 1994/10/18 `ltclass.dtx` v1.0j
 - General: Move `\listfiles` to `ltfiles.dtx` 378
- 1994/10/18 `ltdefns.dtx` v1.2a
 - `\@star@or@long`: macro added .. 24
 - General: Add extra test for `\endgraf` 22
 - Add star-forms for all commands 22
 - `\renew@environment`: reset end command 27
- 1994/10/18 `ltfiles.dtx` v1.0i
 - `\listfiles`: code moved here from `ltclass` 67
- 1994/10/18 `ltoutenc.dtx` v1.5l
 - General: Added new definitions of `\patterns` and `\hyphenation`. 78
- 1994/10/18 `ltoutenc.dtx` v1.5m
 - General: Added new definitions of `\patterns` and `\hyphenation`. 69
- 1994/10/18 `ltsect.dtx` v1.0g
 - `\@dottedtocline`: Added `\normalcolor` for page number 290
 - General: Added `\normalcolor` .. 282
- 1994/10/19 `ltfssbas.dtx` v2.1t
 - `\DeclareFontEncoding`: Add missing `\relax`. 109
- 1994/10/23 `ltfssstrc.dtx` v23.k
 - `\every@math@size`: Renamed to `\every@math@size` 131
- 1994/10/23 `ltmath.dtx` v1.0l
 - `\@eqnnum`: Added `\normalcolor` since `\eqno` introduces a subgroup of the displayed math group 214
 - `\ensuremath`: Remove extra braces: but see p 168 of Leslie's book 216
- 1994/10/24 `ltboxes.dtx` v1.0k
 - `\fbox`: Inner braces added (to fix latex/1061) 236
- 1994/10/25 `fontdef.dtx` v2.2c
 - General: Added `OMSenc.def` ... 175
- 1994/10/25 `ltboxes.dtx` v1.0l
 - `\@isavepicbox`: missing percent (moved from `ltpatch`) 235
- 1994/10/25 `ltdefns.dtx` v1.2b
 - General: Documentation improvements 22
- 1994/10/25 `ltoutenc.dtx` 1.6a
 - General: Added `\textdollar`, `\textlbrace`, `\textrbrace`, `\textsterling`, `\textunderline`. 82
 - Removed `\textlbrace`, `\textrbrace`, `\textunderline` to give them their proper names. ... 82
- 1994/10/25 `ltoutenc.dtx` v1.6a
 - General: Added `\ProvideTextCommand`, `\UseTextSymbol`, `\UseTextAccent`, `\DeclareTextSymbolDefault`, `\DeclareTextAccentDefault`, `\DeclareTextCommandDefault`, and `\ProvideTextCommandDefault`. 69
 - Added the `\Provide` commands, and the default definitions. ... 72
 - Added the defaults. 79
 - Added the files `OTlenc.def`, `Tlenc.def` and `OMSenc.def`. ... 78
 - Added the OMS encoding. ... 86
- 1994/10/27 `ltoutenc.dtx` 1.6b
 - General: Added `\textasciicircum` `\textasciitilde` `\textbackslash` `\textbar` `\textbraceleft` `\textbraceright` `\textcompwordmark` `\textemdash` `\textendash` `\textexclamdown` `\textgreater` `\texthyphenchar` `\textthyphen` `\textless` `\textquestiondown` `\textquotedblleft` `\textquotedblright` `\textquotedblleft` `\textquotedblright` `\textunderscore` `\textvisiblespace` 82
 - Added: `\textemdash` `\textexclamdown` `\texthyphenchar` `\textthyphen` `\textquestiondown` `\textquotedblleft` `\textquotedblright` `\textquotedblleft` `\textquotedblright` 81
- 1994/10/27 `ltoutenc.dtx` v1.5d
 - General: Rewrote `\DeclareTextSymbol` to define its argument to use the current encoding by default, to fit with `\DeclareTextCommand`. 72
- 1994/10/27 `ltoutenc.dtx` v1.6b
 - General: Added `\textbackslash`. 86
 - Added more defaults for OT1. 79
 - Removed the `enc.def` files 69
 - Removed the files `OTlenc.def`, `Tlenc.def` and `OMSenc.def`. ... 78
 - Renamed `\textlbrace` to `\textbraceleft` and `\textrbrace` to `\textbraceright`. ... 86
- 1994/10/29 `ltmath.dtx` 1.0m
 - General: ASAJ: Added `\DeclareMathOperator`. 210
 - ASAJ: Tidied up documentation. 214
- 1994/10/29 `ltmath.dtx` v1.0m
 - General: ASAJ: Added `\mathellipsis`, `\mathdollar` and `\mathsterling`. 214
 - ASAJ: Removed `\dag`, `\ddag`. . 214
 - ASAJ: Renamed `\S` and `\P` to `\mathsection` and `\mathparagraph` and made them `\mathchardefs`. 214

- 1994/10/29 ltoutenc.dtx v1.6c
 General: Added commands like
 `\dots` for use in text and math. 79
 Renamed `\P`, `\S`, `\dag` and `\ddag`
 to `\textparagraph`, `\text-`
 `section`, `\textdagger` and
 `\textdaggerdbl`. 69
- 1994/10/30 ltdefns.dtx v1.2c
 `\@onelevel@sanitize`: Macro
 added 33
 General: (CAR)`\@onelevel@sanitize`
 added 22
- 1994/10/30 ltdefns.dtx v1.2f
 General: (DPC)`\newwrite`'s moved
 to `ltfiles` 22
- 1994/10/30 ltmath.dtx v1.0n
 General: ASAJ: Moved the new
 commands to `ltoutenc`. 214
- 1994/10/30 ltoutenc.dtx v1.6d
 General: Added `\DeclareTextCom-`
 `positeCommand`. 69
 Added `\textcircled`. 69, 80, 86
 Added `\t`. 80
 Added math commands. 69
 Added OML encoding. 69, 80
 Added the OML encoding. 87
 Made `\textless` and
 `\textgreater` come from
 OML. 80
 Moved math commands here
 from `ltmath`. 81
 Removed `\textregistered`. 80
 Rewrote `\copyright` to use
 `\textcircled`. 80
- 1994/10/31 fontdef.dtx v2.2d
 General: Added `OMLenc.def` ... 175
- 1994/10/31 fontdef.dtx v2.2e
 General: ... and moved further
 down 175
- 1994/10/31 ltfloat.dtx v1.1a
 `\@dblfloat`: Major changes since
 two-column and one-column
 cases merged 294
 `\@dblflset`: Macro added 294
 Major changes to parameter
 parsing, setting of local vari-
 ables, etc; two-column and one-
 column cases merged; space
 hacks moved 294
 `\@endfloatbox`: (DPC/CAR) Ex-
 tra box added to remove colour
 resetting from `vmode` 297
 `\@floatboxreset`: Macro added 295
 `\@footnotetext`: (DPC/CAR)
 Move colour setting to output
 routine 304
 `\@savemarbox`: (DPC/CAR) Extra
 box added for colour 299
 `\@setfps`: Macro added 294
 `\@xdblfloat`: Macros removed:
 `\@dbflt`, `\@xdblfloat` 297
- `\@xfloat`: (DPC/CAR) Extra box
 added to remove colour reset-
 ting from `vmode` 295
 Major changes, removing set-
 ting of local variables, space
 hacks etc; two-column and one-
 column cases merged 294
 Reset hook added 295
- `\@xympar`: (DPC/CAR) Extra box
 added since needed for floats 300
`\fps@dbl`: Macro added 294
- 1994/10/31 ltoutput.dtx v1.1a
 `\@makecol`: (DPC/CAR) Colour re-
 setting moved to here 332
 `\@topnewpage`: (DPC/CAR) Extra
 box added to remove colour re-
 setting from `vmode` 326
 (DPC/CAR) Use `\color@begingroup`
 for colour 326
 (DPC/CAR) Use `\normalcolor` 326
- 1994/11/02 ltoutenc.dtx v1.6d
 General: Wrapped lines longer than
 70 characters. 69
- 1994/11/03 ltclass.dtx v1.0k
 General: Move `\@missingfileer-`
 `ror` to `ltfiles` 366
- 1994/11/03 ltdirchk.dtx v1.0i
 General: Generate an error if `la-`
 `tex.ltx` not used with `clean ini-`
 `tex` 1
- 1994/11/03 ltfiles.dtx v1.0j
 `\@missingfileerror`: Move here
 from `ltclass` 66
- 1994/11/04 ltboxes.dtx v1.0m
 `\@mpfootnotetext`: Added `\pro-`
 `tected@edef`. ASAJ. 239
- 1994/11/04 ltdefns.dtx v1.2e
 General: Added `\set@display@protect`
 to `\typeout`. ASAJ. 22
 Added commands for setting and
 restoring `\protect`. ASAJ. 31
 Rewrote protected short com-
 mands using `\x@protect`.
 ASAJ. 30
- 1994/11/04 lterror.dtx v1.2g
 General: Added `\set@display@protect`
 to `\Generic*` commands.
 ASAJ. 38
- 1994/11/04 ltfiles.dtx v1.0k
 `\nofiles`: Added setting of `\pro-`
 `tected@write`, `\makeindex` and
 `\makeglossary` to `\nofiles`.
 ASAJ. 63
 `\protected@write`: Macro added
 ASAJ. 64
- 1994/11/04 ltfloat.dtx v1.1b
 `\@footnotetext`: (ASAJ) Added
 `\protected@edef`. 304
 `\footnotemark`: Added `\pro-`
 `tected@xdef` to `\foot-`
 `notemark`. 304

- 1994/11/04 ltidxglo.dtx v1.1b
`\wrglossary`: Added `\protected@write` to `\wrglossary`. 306
`\wrindex`: Added `\protected@write` to `\wrindex`. 306
General: Removed `\if@filesw` from `\makeindex`. 305
`\makeglossary`: Removed `\if@filesw` from `\makeglossary`. 306
- 1994/11/04 ltmiscen.dtx v1.0t
`\writefile`: Removed setting of `\protect`. ASAJ. 204
- 1994/11/04 ltoutenc.dtx v1.6f
General: Added `_`. 80
Added `\mathunderscore`. 81
- 1994/11/04 ltpage.dtx v1.0e
`\markright`: Added `\@unexpandable@protect`. ASAJ. 312
- 1994/11/04 ltsect.dtx 1.0h
`\sect`: (ASAJ) Added `\protected@edef`. 285
General: (ASAJ) Added `\protected@xdef` to `\thanks`. 282
- 1994/11/04 ltsect.dtx v1.0h
General: Added `\protected@write` to `\addtocontents`. ASAJ. 289
`\addcontentsline`: Added `\protected@write` to `\addcontentsline`. ASAJ. 289
- 1994/11/04 lttab.dtx v1.0h
`\mkpream`: (ASAJ) Added `\@unexpandable@protect` to `\mkpream`. 256
`\multicolumn`: (ASAJ) added `\set@typeset@protect`. 253
- 1994/11/04 ltxref.dtx v1.1d
`\label`: (ASAJ) Added `\protected@write`. 200
`\refstepcounter`: (ASAJ) Added `\protected@edef`. 200
- 1994/11/05 ltboxes.dtx v1.0n
`\@mpfootnotetext`: Colour resetting for footnotes moved to `\endminipage`: as for main page. 239
`\color@endbox`: macro added for colour support 234
`\color@hbox`: macro added for colour support 234
`\endminipage`: Colour resetting for footnotes moved to here: as for main page. 239
- 1994/11/05 ltboxes.dtx v1.0o
`\@mpfootnotetext`: Colour groups restored here. 239
- 1994/11/05 ltfloat.dtx v1.1c
`\@dblflset`: Add compatibility with old version of `\xfloat`. 294
`\endfloatbox`: Use new `\color@hbox` concept. 297
- `\@footnotetext`: Removed `\normalcolor` (again) 304
`\@savemarbox`: Use new `\color@hbox` concept. 299
`\setfps`: Add compatibility with old version of `\xfloat`. 294
`\xfloat`: Add compatibility with old version of `\xfloat`: but the arguments, provided at ex-orbitant cost, are now completely ignored 294
Use new `\color@hbox` concept. 295
`\xympar`: Use new `\color@hbox` concept. 300
- 1994/11/05 ltoutenc.dtx v1.6g
General: Added setting of `\@typeset@protect` to `\patterns` and `\hyphenation`. 78
- 1994/11/05 ltoutput.dtx v1.1b
`\@topnewpage`: Use new `\color@hbox` concept. 326
`\@writesetup`: Change protect settings for new-style, protect-free aux-files. 335
Use new `\color@hbox` concept. 335
- 1994/11/05 ltoutput.dtx v1.1c
`\@begindvi`: Added macro 337
`\@begindvibox`: Added macro 324
`\@writesetup`: Add new `\AtBeginDvi` concept 335
`\AtBeginDvi`: Added macro 324
- 1994/11/06 ltfssbas.dtx v2.1u
`\cf@encoding`: New macro 114
`\DeclareFixedFont`: Renamed `\every@size` to `\every@math@size`. 108
- 1994/11/06 ltfssini.dtx v2.2b
`\@setsize`: Use `\@typeset@protect` 169
- 1994/11/06 ltfsstrc.dtx v2.3k
`\glb@currsz`: New implementation 130
`\try@simples`: New implementation 140
`\try@size@substitution`: New implementation 140
`\tryis@simple`: New implementation 140
- 1994/11/07 fontdef.dtx v2.2f
General: (DPC) Add `\DeclareMathSizes` declarations 177
(DPC) Updated to use `\ProvidesFile` 175
- 1994/11/07 ltfiles.dtx v1.0l
`\@unused`: move here from `ltdefs`, remove duplicate `\@mainaux` 61
- 1994/11/07 ltfiles.dtx v1.0m
`\document`: Renamed `\every@size` to `\every@math@size`. 62
- 1994/11/07 preload.dtx v2.1e
General: (DPC) Updated to use `\ProvidesFile` 188

1994/11/09 ltboxes.dtx v1.0p	General: Removed old definition of <code>\@testfp</code>	314
<code>\@finalstrut</code> : Revert <code>\finalstrut</code> to 2.09 equivalent (from lt-patch)	1994/11/14 ltspc.dtx v1.2d	
General: more colour changes.	<code>\:</code> (DPC) Macro modified	51
1994/11/09 ltssbas.dtx v2.1v	1994/11/14 lttab.dtx v1.0i	
<code>\@vpt</code> : (DPC) macros added, from setsize.dtx	<code>\tabularnewline</code> : (DPC) Macro added	252
(DPC) reduce save stack usage latex/1742	1994/11/16 fontdef.dtx v2.2h	
1994/11/10 ltbibl.dtx v1.1c	General: (DPC) Removed <code>\{</code> and <code>\}</code>	175
General: Fix <code>\nocite{}</code>	1994/11/17 ltboxes.dtx v1.0q	
<code>\nocite</code> : Fix <code>\nocite{}</code>	General: <code>\@tempa</code> to <code>\reserved@a</code>	233
1994/11/10 ltmath.dtx v1.2v classes	1994/11/17 ltclass.dtx v1.0l	
<code>eqnarray</code> : Added value of <code>\parskip</code> to <code>\abovedisplayskip</code> to compensate for negative <code>\topsep</code>	General: <code>\@tempa</code> to <code>\reserved@a</code>	363
1994/11/10 ltoutput.dtx v1.1e	1994/11/17 ltcntrl.dtx v1.0b	
<code>\@writersetup</code> : Modify <code>\protect</code> setting	General: <code>\@tempa</code> to <code>\reserved@a</code>	35
1994/11/10 ltplain.dtx v1.1b	1994/11/17 ltdefns.dtx v1.0g	
General: (CAR) added patch to <code>\loop</code>	General: <code>\@tempa</code> to <code>\reserved@a</code>	22
<code>\iterate</code> : (CAR) added extra <code>\relax</code>	1994/11/17 ltdirchk.dtx v1.0j	
1994/11/11 ltspc.dtx v1.2a	General: <code>\@tempa</code> to <code>\reserved@a</code>	1
<code>\:</code> (DPC) Make robust	1994/11/17 lterror.dtx v1.2h	
1994/11/12 ltfmtcmd.dtx v3.3o	General: <code>\@tempa</code> to <code>\reserved@a</code>	38
<code>\normalsize</code> : Added <code>\MessageBreak</code>	1994/11/17 ltfiles.dtx v1.0n	
1994/11/12 ltlists.dtx v1.2b ltspc	General: <code>\@tempa</code> to <code>\reserved@a</code>	60
<code>\endtrivlist</code> : Changed order of tests to make <code>\@noitemerror</code> correct: end of an era.	1994/11/17 ltfinal.dtx v1.0o	
1994/11/12 ltmiscen.dtx v1.0u	General: <code>\@tempa</code> to <code>\reserved@a</code>	380
<code>center</code> : Changed end macro to <code>\def</code> : safer and consistent	1994/11/17 ltfloat.dtx v1.1e	
<code>flushleft</code> : Changed end macro to <code>\def</code> : safer and consistent	General: <code>\@tempa</code> to <code>\reserved@a</code>	291
<code>flushright</code> : Changed end macro to <code>\def</code> : safer and consistent	1994/11/17 ltfmtcmd.dtx v3.3p	
1994/11/12 ltplain.dtx v1.1c	General: <code>\@tempa</code> to <code>\reserved@a</code>	191
General: Comment out more encoding specific commands	1994/11/17 ltssbas.dtx v2.1w	
1994/11/12 ltspc.dtx v1.2b	General: <code>\@tempa</code> to <code>\reserved@a</code>	107
<code>\addpenalty</code> : Corrected error message	1994/11/17 ltssdcl.dtx v2.1m	
<code>\addvspace</code> : Corrected error message	General: <code>\@tempa</code> to <code>\reserved@a</code>	149
1994/11/13 ltspc.dtx v1.2c	1994/11/17 ltssstrc.dtx v2.3l	
<code>\addpenalty</code> : Recorrected error message	General: <code>\@tempa</code> to <code>\reserved@a</code>	125
<code>\addvspace</code> : Recorrected error message	1994/11/17 ltmath.dtx v1.0o	
1994/11/14 ltoutput.dtx v1.1f	General: <code>\@tempa</code> to <code>\reserved@a</code>	210
<code>\@beginvdi</code> : Use normal box register: why a box?	1994/11/17 ltmiscen.dtx v1.0v	
<code>\@beginvibox</code> : Use normal box register: why a box?	General: <code>\@tempa</code> to <code>\reserved@a</code>	202
<code>\@writersetup</code> : Modify new <code>\AtBeginDvi</code> concept	1994/11/17 ltoutenc.dtx v1.6h	
	General: (DPC) <code>\@tempa</code> to <code>\reserved@a</code>	69
	1994/11/17 ltoutput.dtx v1.1h	
	General: <code>\@tempa</code> to <code>\reserved@a</code>	314
	1994/11/17 ltpictur.dtx v1.0f	
	General: <code>\@tempa</code> to <code>\reserved@a</code>	260
	1994/11/17 ltsect.dtx v1.0i	
	General: <code>\@tempa</code> to <code>\reserved@a</code>	282
	1994/11/17 lttab.dtx v1.0j	
	General: <code>\@tempa</code> to <code>\reserved@a</code>	241
	1994/11/18 ltboxes.dtx v1.0r	
	<code>\color@vbox</code> : macro added for colour support	234
	1994/11/18 ltfinal.dtx v1.0n	
	General: re-allow slots 127–255	383
	1994/11/18 ltssbas.dtx v2.1x	
	General: (DPC) use <code>\reserved@f</code> not <code>\next</code>	107
	1994/11/18 ltssdcl.dtx v2.1m	
	<code>\DeclareMathDelimiter</code> : (DPC) <code>\expandafter</code> instead of <code>\next</code>	161

- 1994/11/18 ltfsstrc.dtx v2.3m
 General: `\next` to `\reserved@f` . 125
- 1994/11/18 ltmath.dtx v1.0p
`\phantom`: (DPC) colour support 211
 (DPC) use `\expandafter` instead of `\next` 211
`\prime@s`: (DPC) use `\@let@token` instead of `\next` and `\expandafter` instead of `\nxt` . . 213
`\smash`: (DPC) colour support . . 212
 (DPC) use `\expandafter` instead of `\next` 212
- 1994/11/21 ltfloat.dtx v1.1f
`\endfloatbox`: Added reset of minipage flag 297
 Corrected position of `\outer@nobreak` 297
`\@marginparreset`: Macro added 299
`\@savemarbox`: Added `\@setminipage` etc 299
 Added resetting of size and font 299
 Changed to `\color@vbox` 299
 Use `\@setnobreak` etc 299
`\@setminipage`: Macro added . . . 296
`\@setnobreak`: Macro added 296
`\xfloat`: Added `\@setminipage` 295
 Added resetting of size and font 295
 Changed to `\color@vbox` so that large floats overflow at the bottom 295
 Missing percents reinserted after 4, 8: these are not numbers. 294
 Use `\@setnobreak` 295
`\@xympar`: Changed to `\color@vbox` 300
- 1994/11/21 ltoutput.dtx v1.1i
`\@addtocurcol`: Added `\if@nobreak` test before float box 344
`\@specialoutput`: Added `\if@nobreak` test 330
`\@topnewpage`: Changed to `\color@vbox` 326
- 1994/11/22 ltfsdcl.dtx v2.1o
 General: wrap long lines 149
- 1994/11/22 ltoutenc.dtx v1.6i
 General: Corrected `\dots` so that there's no kerning in monowidth fonts. 69
 Corrected typo with `\mathunderscore`. 69
 Fixed empty accents. Again. . . 69
- 1994/11/24 ltdefns.dtx v1.2h
`\@newenv`: Added test for `\endgraf` 27
- 1994/11/25 ltplain.dtx v1.1f
 General: (DPC) Comment out lots of obsolete code 11
- 1994/11/26 ltfloat.dtx v1.1b
`\footnote`: (ASAJ) Added `\protected@xdef`. 303
- 1994/11/28 ltctrl.dtx v1.0c
 General: Documentation improvements 35
- 1994/11/30 ltfiles.dtx v1.0o
`\@dofilelist`: Macro added 68
`\listfiles`: Use `\@dofilelist` . . 67
`\nofiles`: There is no `\@gobblethree`. 63
- 1994/11/30 ltssbas.dtx v2.1y
`\fontshape`: Use `\@current@cmd` in `\@enc@update`. ASAJ. 113
- 1994/11/30 ltmath.dtx 1.0q
 General: ASAJ: `\DeclareMathOperator` moved to `AMSTeX`. 210
- 1994/11/30 ltmiscen.dtx v1.0w
`\enddocument`: (DPC) Do warnings even for `\nofiles` 203
 (DPC) Use `\@dofilelist` 203
- 1994/11/30 ltoutenc.dtx 1.7a
 General: Redefined `\a` for the new scheme. 78
- 1994/11/30 ltoutenc.dtx v1.6g
 General: Removed new definitions of `\patterns` and `\hyphenation`, since encoding-specific commands now expand in the mouth. 78
- 1994/11/30 ltoutenc.dtx v1.7a
 General: Added new code for encoding-specific commands. These now expand in the mouth, which means that ligaturing and kerning can happen. 69
 Always load the `enc.def` file, so that the default encoding for the commands will change. . . 93
 Redefined `\@changed@cmd` to expand in the mouth. 72
 Removed `\@changed@x@mouth` since `\@changed@x` now expands in the mouth. 72
 Rewrote `\@text@composite` so it allows an empty argument, or an argument containing lots of commands. 74
- 1994/12/01 ltfinal.dtx v1.0p
 General: Renamed `lthyphen.*` to `hyphen.*`. 380
- 1994/12/01 lthyphen.dtx v1.0g
 General: Rename `lthyphen.ltx/cfg` to `hyphen.ltx/cfg` 379
- 1994/12/01 ltplain.dtx v1.1g
 General: (DPC) More doc changes 11
- 1994/12/02 fontdef.dtx v2.2i
 General: Commented out `\ldots`. ASAJ. 173
- 1994/12/02 ltssini.dtx v2.2c
`\copyright`: `\copyright` is now in `ltoutenc`. ASAJ 170
- 1994/12/02 ltlists.dtx v1.0e
`\@trivlist`: `RmS`: Added check for looping 226
- 1994/12/02 ltoutenc.dtx 1.7b
 General: Redefined `\a` properly. . 78

- 1994/12/02 ltoutenc.dtx v1.7b
 General: Fixed a bug with `\a`. . . 69
- 1994/12/04 lthyphen.dtx v1.0h
 General: Documentation edits for /1989 379
- 1994/12/05 ltoutenc.dtx v1.7c
 General: Added braces to `\textcircled`. 69
- 1994/12/06 ltssbas.dtx v2.1z
`\DeclareFontEncoding`: use `\nfss@catcodes` 109
`\nfss@catcodes`: Added tab char as well 118
- 1994/12/08 ltoutenc.dtx v1.7d
 General: Added `\null` and `\sh@ft` to `\b` and `\d`. 69
- 1994/12/08 lttab.dtx v1.0k
`\@array`: Add `\tabularnewline` . 251
`\tabularnewline`: (DPC) Made it `\relax` 252
- 1994/12/09 ltbibl.dtx v1.1d
`\bibliographystyle`: (DPC) Allow use in preamble. 309
- 1994/12/10 ltfloat.dtx v1.1g
`\@dblfloat`: Old version reinstated temporarily 294
`\@dblflset`: Macro removed temporarily 294
 Old version reinstated temporarily 294
`\@setfps`: Macro removed temporarily 294
`\@xdblfloat`: Macros reinserted temporarily 297
`\@xfloat`: Old version reinstated temporarily 294
 Sanitisation added temporarily 294
 General: Some temps reinserted temporarily 291
`\fps@dbl`: Macro removed temporarily 294
- 1994/12/10 ltfntcmd.dtx v3.3q
`\@math@egroup`: Don't read arguments 197
`\check@nocorr@`: Use `\space` command for comparison 194
- 1994/12/10 ltssdcl.dtx v2.1p
`\document@select@group`: Surround with braces (add fourth arg) 152
`\select@group`: Surround with braces (add fourth arg) . . . 151
- 1994/12/10 ltoutenc.dtx v1.7e
 General: Added documentation for the OML encoding. 69
 Replaced width with `\@width` and ditto height in vrules. . . 69
- 1994/12/14 ltoutenc.dtx v1.7f
 General: Added braces to `\copyright` so it works unbraced in subscripts. 69
- Added check for math mode in `\@changed@cmd`. 69
- Commented out `\textasciicircum`, `\textasciitilde`, `\textbackslash`, `\textbar`, `\textgreater`, `\texthyphenchar`, `\texthyphen` and `\textless` to save memory. 69
- 1995/01/12 ltmath.dtx v1.2y classes
`\@eqnnum`: Added `\normalcolor` . 216
- 1995/03/03 ltoutenc.dtx 1.7g
 General: Corrected an error in documentation referring to the tabular rather than the tabbing environment. 78
- 1995/04/02 ltfntcmd.dtx v3.3r
`\@math@egroup`: Read them again to be able to add `\relax`. . . 197
- 1995/04/02 ltssdcl.dtx v2.1q
`\document@select@group`: fix problem for pr/1275 152
`\select@group`: fix problem for pr/1275 151
`\set@mathdelimiter`: fix pr/1329 164
- 1995/04/02 ltssini.dtx v2.2d
`\not@math@alphabet`: add `\noexpand` to second part of message 169
- 1995/04/21 ltclass.dtx v1.0m
`\DeclareOption*`: Made long /1498 369
`\endfilecontents`: Close input check stream: latex/1487 . . . 376
- 1995/04/21 ltfinal.dtx v1.0q
 General: Allow initial patch level 0 385
- 1995/04/21 ltoutenc.dtx v1.7h
 General: Added `\null` `\k` latex/1274 69
- 1995/04/22 ltfiles.dtx v1.0p
`\includeonly`: Allow blanks in argument 64
- 1995/04/22 ltmiscen.dtx v1.0x
 General: Removed extra def of `\@gobble` 202
- 1995/04/23 ltsect.dtx v1.0j
`\addcontentsline`: Use `\contentsline` internally. 289
- 1995/04/24 ltbibl.dtx v1.1e
`\@citex`: Add `\mbox` to undefined case: latex/1239. 308
- 1995/04/24 ltbibl.dtx v1.1f
`\bibcite`: Make `\@onlypreamble` /1388. 308
- 1995/04/24 ltcntrl.dtx v1.0d
`\@for`: Dont expand second argument with `\edef`: /1317 (DPC) 37
- 1995/04/24 ltoutput.dtx v1.1j
`\@tracemessage`: Do not add to kernel unless 'trace' specified 352
- 1995/04/24 ltoutput.dtx v1.1l
`\@begindvibox`: Add `\vbox` latex/1392 324

<code>\@writsetup</code> : Reset <code>\latex</code> /1451 (DPC)	336	1995/05/06 <code>ltsect.dtx</code> 1.0n	
1995/04/24 <code>ltpage.dtx</code> v1.0f		<code>\@secCNTformat</code> : Use <code>\quad</code> instead of <code>\hspace</code>	286
<code>\fussy</code> : reset <code>\emergencystretch</code> <code>latex</code> /1344	313	<code>\@sect</code> : Added <code>\relax</code> after <code>\@secCNTformat</code> just in case	285
1995/04/24 <code>ltplain.dtx</code> v1.1h		1995/05/07 <code>ltboxes.dtx</code> v1.0t	
<code>\newtoks</code> : Remove remaining <code>\outer</code> declarations.	13	General: Use <code>\hb@xt@</code>	233
1995/04/24 <code>ltxref.dtx</code> v1.1e		1995/05/07 <code>ltdefns.dtx</code> v1.2k	
<code>\newlabel</code> : Make <code>\@onlypreamble</code> for /1388.	200	<code>\hb@xt@</code> : Macro added	23
1995/04/25 <code>ltdefns.dtx</code> v1.2i		1995/05/07 <code>ltmath.dtx</code> v1.0r	
<code>\@checkc</code> : Make <code>\long</code> for <code>latex</code> /1346	29	General: Use <code>\hb@xt@</code>	210
<code>\new@environment</code> : Parse arguments slowly but safely /1507	27	1995/05/07 <code>ltoutput.dtx</code> v1.1m	
1995/04/25 <code>ltfiles.dtx</code> v1.0q		General: Use <code>\hb@xt@</code>	314
<code>\document</code> : Removed execution of <code>\every@size</code> <code>latex</code> /1407	62	1995/05/07 <code>ltpictur.dtx</code> v1.0g	
1995/04/25 <code>ltsect.dtx</code> v1.0k		General: Use <code>\hb@xt@</code>	260
<code>\@dottedtocline</code> : Added <code>\hbox</code> around dots.	290	1995/05/07 <code>ltplain.dtx</code> v1.1j	
1995/04/27 <code>ltboxes.dtx</code> v1.0s		General: Use <code>\hb@xt@</code>	11
<code>\@frameb@x</code> : Move <code>\leavevmode</code> for <code>graphics</code> /1512	236	1995/05/07 <code>ltsect.dtx</code> v1.0o	
<code>\@ifframebox</code> : Move <code>\leavevmode</code> for <code>graphics</code> /1512	236	General: Use <code>\hb@xt@</code>	282
<code>\@iirsbox</code> : Move <code>\leavevmode</code> for <code>graphics</code> /1512	240	1995/05/07 <code>lttab.dtx</code> v1.0l	
<code>\@irsbox</code> : Move <code>\leavevmode</code> for <code>graphics</code> /1512	240	General: Use <code>\hb@xt@</code>	241
<code>\fbox</code> : Move <code>\leavevmode</code> for <code>graphics</code> /1512	236	1995/05/08 <code>ltbibl.dtx</code> v1.1g	
<code>\raisebox</code> : Move <code>\leavevmode</code> for <code>graphics</code> /1512	240	<code>\@citex</code> : Use <code>\@firstofone</code>	308
1995/04/27 <code>ltfiles.dtx</code> v1.0r		<code>\bibitem</code> : Removed unnecessary braces	308
<code>\document</code> : Added <code>\global</code> to support groups in hook	63	<code>\nocite</code> : Use <code>\@firstofone</code>	309
1995/04/27 <code>ltmiscen.dtx</code> v1.0y		1995/05/08 <code>ltdefns.dtx</code> v1.2k	
<code>\enddocument</code> : <code>\@checkend</code> moved after hook	203	<code>\typein</code> : Use <code>\@firstofone</code>	24
1995/04/27 <code>ltplain.dtx</code> v1.1i		1995/05/08 <code>ltdefns.dtx</code> v1.2l	
General: Move <code>\hang</code> and <code>\textindent</code> to <code>latex209.def</code>	19	<code>\typein</code> : Remove unnecessary braces	24
1995/04/29 <code>ltntrl.dtx</code> v1.0e		Replace <code>\def</code> by <code>\let</code>	24
General: Moved init of <code>\protect</code> to <code>ltdefns.dtx</code>	37	1995/05/08 <code>ltsfstrc.dtx</code> v2.3n	
Removed unused defs for <code>\@setprotect</code> and <code>\@resetprotect</code>	37	<code>\ifnot@nil</code> : Use <code>\@firstofone</code>	135
1995/04/29 <code>ltdefns.dtx</code> v1.2j		1995/05/11 <code>fontdef.dtx</code> v2.2j	
<code>\protect</code> : Init <code>\protect</code> here	31	General: Updates to some plain macros	173
1995/04/29 <code>ltpar.dtx</code> v1.1b		1995/05/12 <code>ltclass.dtx</code> v1.0n	
General: (TO) Comments cleanup.	46	<code>\DeclareOption*</code> : Use <code>\toks@</code> to remove need to double hash /1557	369
1995/05/02 <code>ltsect.dtx</code> v1.0l		1995/05/12 <code>ltfloat.dtx</code> v1.1h	
<code>\@dottedtocline</code> : Don't reset to <code>\rmfamily</code>	290	<code>\@footnotemark</code> : Add <code>\nobreak</code> to allow hyphenation. <code>latex</code> /1605	304
1995/05/03 <code>ltsect.dtx</code> v1.0m		1995/05/12 <code>ltpictur.dtx</code> v1.0h	
General: TO: Promoted documentation to <code>doc.sty</code> standard	282	<code>\pictur@</code> : Macro added for <code>latex</code> /1355	261
		1995/05/12 <code>ltvers.dtx</code> v1.0e	
		General: Add autoload <code>docstrip</code> guards	21
		Check for format older than 1 year	21
		1995/05/13 <code>ltsfstrc.dtx</code> v2.3o	
		General: Use single hash mark in <code>\DeclareOption</code>	126
		1995/05/16 <code>ltfloat.dtx</code> v1.1i	
		<code>\@makefnmark</code> : Now use <code>\textsuperscript</code>	303
		<code>\textsuperscript</code> : Command added./pr1503	303
		<code>\thefootnote</code> : Streamlined parts of code.	303

1995/05/17 ltboxes.dtx v1.0u	1995/05/22 lttab.dtx v1.1a
\@irsbox: Removed surplus braces 240	General: Support autoloading feature 241
1995/05/17 ltclass.dtx v1.0o	1995/05/23 ltssini.dtx v2.2e
\g@addto@macro: Make long for latex/1522 375	\newfont: Font assignment made local again. 169
1995/05/17 ltlists.dtx v1.0g	1995/05/24 ltdefns.dtx v1.1l
\@item: Removed surplus braces . 229	\newif: (DPC) New implementation 28
\@nbitem: Removed surplus braces 229	1995/05/24 ltdefns.dtx v1.2m
\enumerate: Use \thr@@ and remove surplus braces 230	\typein: (DPC) New implementation 24
\itemize: Use \thr@@ 231	1995/05/24 ltfloat.dtx v1.1l
1995/05/18 ltfloat.dtx v1.1j	\@textsuperscript: Command added. 303
\@makefnmark: Added \normalfont. 303	General: Moved definition of \footins and \footnoterule from ltplain. 303
\thempfootnote: Added \itshape. 303	\textsuperscript: Use \@textsuperscript 303
1995/05/19 ltpictur.dtx v1.1a	1995/05/24 ltssbas.dtx v3.0a
General: Support autoloading feature 260	General: (DPC) Make file from previous file, fam.dtx 1995/05/20 v2.2d 107
1995/05/20 ltcounts.dtx v1.1b	\mathgroup: (DPC) No need to redefine \newfam as not outer . 108
\@definecounter: Streamlined code 104	1995/05/24 ltsscmp.dtx v3.0a
\@fnsymbol: Allowing both text and math 105	General: (DPC) Make file from previous file, fam.dtx 1995/05/20 v2.2d 145
\fnsymbol: Streamlined code ... 105	1995/05/24 ltssdcl.dtx v3.0a
1995/05/20 ltcounts.dtx v1.1c	General: (DPC) Make file from previous file, latint.dtx 1995/05/21 v2.1t 149
\@definecounter: And do it right 104	1995/05/24 ltssini.dtx v3.0a
1995/05/20 ltfloat.dtx v1.1k	General: (DPC) Make file from previous file, lfonts.dtx 1995/05/23 v2.2e 168
\@makefnmark: Moved \normalfont back and use \@textsuperscript 303	\cal: (DPC) Remove definition . 172
Moved \normalfont to \textsuperscript 303	\mit: (DPC) Remove definition . 172
\textsuperscript: Use \normalfont. 303	1995/05/24 ltssstrc.dtx v3.0a
1995/05/21 ltssdcl.dtx v2.1t	General: (DPC) Make file from previous file, tracefnt 1995/05/16 v2.3o 125
\DeclareMathRadical: Allow for undefined cs names 164	1995/05/24 ltssstrc.dtx v3.0b
1995/05/21 ltlists.dtx v1.0f	General: (DPC) Fix \ProvidesFile usage 125
General: Moved to doc.sty standard 219	1995/05/25 ltclass.dtx v1.0p
1995/05/21 ltmath.dtx v1.0r	\endfilecontents: Delete \filecontents after preamble 376
\@sqrt: Use \sqrtsign 215	1995/05/25 ltfiles.dtx v1.0s
General: Remove \mathhexbox from this file 213	\document: Added check for \topskip zero 63
Update some plain macros ... 210	1995/05/25 ltfiles.dtx v1.0t
\lefteqn: Use \rlap 216	\@iffileonpath: (CAR) added \long 65
\root: Use \sqrtsign instead of \sqrt 211	\document: Corrected typo 63
1995/05/21 ltoutenc.dtx v1.7h	\IfFileExists: (CAR) added \long 65
\@inmathwarn: Added several \@onlypreamble 73	\InputIfFileExists: (CAR) added \long 66
1995/05/21 ltoutenc.dtx v1.7j	\nofiles: (CAR) added \long .. 63
General: Updated some plain macros 81	
1995/05/21 ltplain.dtx v1.1j	
General: Moved some code to other files 11	
1995/05/22 ltplain.dtx v1.1k	
General: Definitions of \footins and \footnoterule moved to ltfloat. 20	

<code>\protected@write:</code> (CAR) added <code>\long</code> 64	1995/06/09 <code>ltoutenc.dtx</code> v1.7l
1995/05/25 <code>ltfloat.dtx</code> v1.1m	<code>\DeclareTextComposite:</code> Rewrote <code>\DeclareTextComposite</code> to de- fine the composite as a no- argument command rather than a two-argument command. . . 75
<code>\@savemarbox:</code> (CAR) Resettings moved to hook 299	1995/06/11 <code>ltspace.dtx</code> v1.2g
<code>\@xfloat:</code> (CAR) Resettings moved to hook 295	<code>\restorecr:</code> (CAR) <code>\relax</code> added to stop silent eating of *. 58
1995/05/25 <code>ltlists.dtx</code> v1.0i	1995/06/13 <code>ltfinal.dtx</code> v1.0t
<code>\endtrivlist:</code> Macros moved from <code>ltspace.dtx</code> 227	General: Add patch level string more carefully 385
1995/05/25 <code>ltmath.dtx</code> v1.3c classes	Call <code>\errorstopmode</code> 386
<code>\@eqnnum:</code> replace <code>\reset@font\rmfamily</code> with <code>\normalfont</code> (PR 1578) 216	1995/06/13 <code>ltpictur.dtx</code> v1.1b
1995/05/25 <code>ltspace.dtx</code> v1.2f	General: Use <code>\ProvidesFile</code> in au- toload 260
<code>\@vbsphack:</code> (CAR) not used so ‘re- moved’. 54	1995/06/14 <code>lttab.dtx</code> v1.1b
<code>\@vspacer:</code> (CAR) <code>\@restorepar</code> added to avoid possible infinite tail recursion caused by a typo in the argument. 55	General: Use <code>\ProvidesFile</code> in au- toload 241
(CAR) macros modified to be more efficient 55	1995/06/15 <code>ltfssbas.dtx</code> v3.0c
General: Macros moved to <code>ltlists.dtx</code> 48	General: (DPC) minor documenta- tion changes 107
1995/05/26 <code>ltdefns.dtx</code> v1.2n	1995/06/15 <code>ltfsscmp.dtx</code> v3.0b
<code>\@gobblefour:</code> (CAR) Added <code>\longs</code> 29	General: (DPC) minor documenta- tion edits 145
1995/05/26 <code>ltmath.dtx</code> v1.0s	1995/06/15 <code>ltfssdcl.dtx</code> v3.0b
<code>\@eqnnum:</code> Removed <code>\rmfamily</code> (PR 1578), replaced <code>\re- set@font</code> with <code>\normalfont</code> 214	General: (DPC) minor documenta- tion changes 149
1995/05/26 <code>ltpage.dtx</code> v1.0g	1995/06/19 <code>ltbibl.dtx</code> v1.1h
<code>\ps@plain:</code> removed <code>\rmfamily</code> (PR 1578) 312	<code>\bibcite:</code> Call <code>\@newl@bel</code> so re- peated keys produce better warning. 308
1995/05/27 <code>ltfssbas.dtx</code> v3.0b	1995/06/19 <code>ltclass.dtx</code> v1.0q
<code>\mathgroup:</code> (FMi) But a need to define <code>\new@mathgroup</code> 108	<code>\documentclass:</code> Dont redefine <code>\usepackage</code> in compat mode for /1634 371
1995/06/05 <code>fontdef.dtx</code> v2.2k	1995/06/19 <code>ltxref.dtx</code> v1.1e
General: Moved math commands from <code>ltoutenc.dtx</code> 186	<code>\newlabel:</code> Use <code>\@newl@bel</code> to share code with <code>\bibcite</code> .. 200
1995/06/05 <code>ltfinal.dtx</code> v1.0r	1995/06/28 <code>ltfssini.dtx</code> v3.0b
General: Added <code>\MakeUppercase</code> and <code>\MakeLowercase</code> 380	General: (DPC) Fix documentation typos 168
1995/06/05 <code>ltoutenc.dtx</code> v1.7k	1995/06/28 <code>ltmath.dtx</code> v1.0t
<code>\@inmathwarn:</code> Removed <code>\pro- tected@cmd</code> and replaced with explicit <code>\noexpand</code> 73	General: minor doc edits 210
General: Allowed <code>\Provide- TextCommandDefault</code> after the preamble. 74	1995/07/02 <code>ltplain.dtx</code> v1.1n
Commented out <code>\textless</code> and <code>\textgreater</code> 80	General: Removed surplus ‘by’ and ‘=’ in various places 11
Moved math commands to font- def.dtx. 81	<code>\offinterlineskip:</code> Replaced 1000 by <code>\@m</code> 18
Save some tokens in <code>\textvis- iblespace</code> and <code>\textunder- score</code> 80	<code>\showoutput:</code> Use <code>\showoverfull</code> to save space 20
1995/06/06 <code>ltfinal.dtx</code> v1.0s	<code>\tracingall:</code> Use <code>\showoutput</code> to save space 20
General: Made <code>\MakeUppercase</code> and <code>\MakeLowercase</code> brace their argument. 380	1995/07/03 <code>ltdefns.dtx</code> v1.2o
	<code>\set@typeset@protect:</code> Use <code>\@typeset@protect</code> for init .. 31
	1995/07/03 <code>ltfntcmd.dtx</code> v3.3s
	<code>\t@st@ic:</code> Use clean interface for jump 195
	1995/07/05 <code>ltfntcmd.dtx</code> v3.3s
	<code>\t@st@ic:</code> Renamed from <code>\test@next</code> 195

1995/07/05 ltspace.dtx v1.2h		
\@gnewline: Use \break	52	
\@no@pgbk: Macro replaces \@pgbk and \@nopgbk	51	
\nopagebreak: Reimplemented both using \@no@pgbk	50	
1995/07/09 ltcntrl.dtx v1.0f		
\@iforloop: Reimplemented using Kabelschacht method	37	
\@iwhiledim: Reimplemented using Kabelschacht method	36	
\@iwhilenum: Reimplemented using Kabelschacht method	36	
\@iwhilesw: Reimplemented using Kabelschacht method	36	
\@tfor: Reimplemented using Ka- belschacht method	37	
1995/07/09 ltlists.dtx v1.0j		
enumerate: Use \expandafter . .	230	
itemize: Use \expandafter . . .	231	
1995/07/12 ltpictur.dtx v1.1d		
General: allow 2e commands in 209 mode. latex/1737	260	
1995/07/13 ltdefs.dtx v1.0p		
General: Updates to documenta- tion	22	
1995/07/13 ltfiles.dtx v1.0u		
General: Updates to docu	60	
1995/07/13 ltfssbas.dtx v3.0d		
\@defaultsubs: macro added . .	120	
\@defaultsubs: macro added . . .	120	
General: minor documentation changes	107	
\wrong@fontshape: Change a macro not a switch to flag de- fault font substitutions	119	
1995/07/13 ltmiscen.dtx v1.0z		
\@centercr: Use \nobreak	206	
\@writefile: Added missing per- cent and use \relax in the THEN case	204	
\@xobeysp: Use \nobreak	207	
General: Improve Documentation	202	
\enddocument: Set \@setckpt to \@gobbletwo instead of defining it by hand	203	
Sorten redefinition of \bible and \newlabel	203	
Use \@defaultsubs instead of switch	204	
1995/07/14 ltbibl.dtx v1.1i		
\bible: Remove \@onlypreamble so still defined in new \enddoc- ument	308	
1995/07/14 ltxref.dtx v1.1g		
\newlabel: Remove \@onlypream- ble so still defined in new \end- document	200	
1995/07/19 ltfssini.dtx v3.0d		
General: (DPC) TeX2 support . .	171	
1995/07/20 ltboxes.dtx v1.0v		
\@isavebox: Use \sbox	235	
\@isavepicbox: Use \sbox	235	
1995/07/21 ltoutput.dtx v1.1o		
\@writsetup: Command added . .	335	
New, experimental, versions: need in-lining	335	
1995/08/09 ltmath.dtx v1.0u		
General: Added code for class op- tions leqno and fleqn	216	
1995/08/11 ltlength.dtx v1.1b		
General: Doc typos fixed for la- tex/753	106	
1995/08/16 ltcntrl.dtx v1.0g		
\@break@tfor: Made long	37	
\@forloop: Made defs long	37	
\@fornoop: Made defs long	37	
\@iforloop: Made defs long	37	
\@iwhiledim: Made defs long . . .	36	
Removed \@whilenoop	36	
\@iwhilenum: Made defs long . . .	36	
Removed \@whilenoop	36	
\@iwhilesw: Removed \@whileswnoop	36	
\@tfor: Made defs long	37	
1995/08/16 ltfiles.dtx v1.0v		
\document: set \@maxdepth	63	
set \do globally	63	
set \topskip globally	63	
1995/08/24 ltfssbas.dtx v3.0f		
General: Added autoload code . .	107	
1995/08/24 ltfssrc.dtx v3.0c		
General: Macro \gobble@font@spec removed	135	
\tryis@simple:	141	
1995/08/25 ltoutput.dtx v1.1p		
General: Support autoloading fea- ture (FMi).	314	
1995/09/01 lterror.dtx v1.2i		
General: Add autoload support . .	38	
1995/09/01 ltplain.dtx v1.1m		
\empty: Use \let to save space . .	17	
\I: Use \let to save space	17	
1995/09/14 ltplain.dtx v1.1o		
General: Moved \multispan to lt- tab.dtx	11	
1995/09/14 lttab.dtx v1.1c		
\cline: (DPC) New implementa- tion	259	
1995/09/15 ltfssini.dtx v3.0e		
General: (DPC) Modify TeX2 mes- sage	171	
1995/09/19 ltmiscen.dtx v1.1a		
\verb: Put \@noligs after \verba- tim@font where it belongs. . .	208	
1995/10/01 ltfiles.dtx LaTeX2e		
\@addtofilelist: Macro added . .	67	
1995/10/02 ltdefs.dtx v1.2q		
\@autoload: Macro added	33	
\@if: Add \@autoglobal in autoload version	28	
\@ifnch: Use \@let@token for in- ternal/924, save \reserved@e .	32	
\@ifnextchar: Use \@let@token .	32	

<code>\@newenv</code> : Add <code>\aut@global</code> in autoload version	28	1995/10/11 ltoutput.dtx v1.1r	
<code>\@protected@testopt</code> : Macro added	25	<code>\clearpage</code> : Added a check so that it does not lose the argument of <code>\twocolumn[...]</code>	325
<code>\@testopt</code> : Macro added	25	1995/10/16 ltbibl.dtx v1.1j	
<code>\@xargdef</code> : Add <code>\aut@global</code> in autoload version	25	<code>\cite</code> : (DPC) Make robust	308
New implementation, using <code>\@test@opt</code>	25	1995/10/16 ltboxes.dtx v1.0w	
<code>\@yargd@f</code> : Add <code>\aut@global</code> in autoload version	26	General: Clarify makebox description	233
<code>\aut@global</code> : Macro added	33	1995/10/16 ltdefs.dtx v1.2u	
<code>\newif</code> : Add <code>\aut@global</code> in autoload version	28	<code>\@ifstar</code> : (DPC) New implementation, for /1910	33
<code>\renew@environment</code> : Add <code>\aut@global</code> in autoload version	27	<code>\new@command</code> : (DPC) Use <code>\@testopt /1911</code>	25
1995/10/02 ltplain.dtx v1.1p		<code>\new@environment</code> : (DPC) Use <code>\@testopt /1911</code>	27
General: Move <code>\newif</code> to ltdefs .	14	<code>\typein</code> : (DPC) Use <code>\@testopt /1911</code>	24
1995/10/03 fontdef.dtx v2.2l		1995/10/16 ltssini.dtx v3.0f	
General: <code>\@@sqrt</code> from patch file for /1701	173	<code>\p@reset@font</code> : Added <code>\relax</code> after <code>\usefont</code> , as the latter eats up spaces.	170
1995/10/03 ltdefs.dtx v1.2r		1995/10/16 ltmath.dtx v1.0y	
<code>\typein</code> : Add missing <code>\@typein</code> for /1710 (from patch file)	24	<code>\@yeqncr</code> : (DPC) Use <code>\@testopt /1911</code>	215
1995/10/03 ltpictur.dtx v1.1e		<code>\sqrt</code> : (DPC) Make robust /1808	215
General: New autoload code . . .	260	1995/10/16 ltspace.dtx v1.2j	
1995/10/04 ltssbas.dtx v3.0g		<code>\nolinebreak</code> : (DPC) Use <code>\@testopt /1911</code>	51
General: Modify autoload code . .	107	<code>\nepagebreak</code> : (DPC) Use <code>\@testopt /1911</code>	50
1995/10/04 ltssstrc.dtx v3.0d		1995/10/16 ltthm.dtx v1.0g	
General: (DPC) Modify autoload code	125	General: Revert to previous <code>\newtheorem</code> behaviour	279
1995/10/04 lttab.dtx v1.1d		1995/10/17 ltclass.dtx v1.0r	
General: Modify autoload support	241	<code>\@providesfile</code> : Delay definition of <code>\ProvidesFile</code> till ltfinal	369
1995/10/06 ltdefs.dtx v1.2s		<code>\ProcessOptions*</code> : Reset <code>\CurrentOption</code> for graphics/1873 . .	371
<code>\declare@robustcommand</code> : Add <code>\aut@global</code> in autoload version	31	1995/10/17 ltdirchk.dtx v1.0l	
1995/10/06 ltfiles.dtx v1.0w		General: Modify initex version of <code>\ProvidesFile</code>	3
<code>\@missingfileerror</code> : Autoload error	66	1995/10/17 ltfinal.dtx v1.0v	
1995/10/09 ltdefs.dtx v1.2t		<code>\@providesfile</code> : reset macro . . .	386
<code>\@autoload</code> : Use <code>\@@input</code> not <code>\input</code> to save string space and stops autoload files appearing in <code>\listfiles</code>	33	<code>\reserved@b</code> : reset here after the <code>\input</code> above	385
1995/10/09 lterror.dtx v1.2j		1995/10/17 ltplain.dtx v1.1s	
General: Modify autoload support	38	<code>\eject</code> : Move <code>\supereject</code> to compat file	18
1995/10/09 ltoutenc.dtx v1.7m		1995/10/17 lttab.dtx v1.1e	
<code>\@inmathwarn</code> : Autoload error . .	74	<code>\@cline</code> : (DPC) Use <code>\@multicnt</code>	259
1995/10/10 ltssbas.dtx v3.0h		<code>\@multispan</code> : (DPC) Macro added.	259
<code>\showhyphens</code> : Use <code>\normalfont</code> and make colour safe, and autoloadable	123	1995/10/19 ltfinal.dtx v1.0w	
1995/10/10 ltssdcl.dtx v3.0c		<code>\@filelist</code> : Move after <code>\reserved@a</code> setting:-)	386
<code>\non@alpherr</code> : (DPC) autoload error message	152	1995/10/20 ltbibl.dtx v1.1k	
1995/10/10 ltplain.dtx v1.1r		<code>\@citex</code> : Removed refundefined flag	308
General: Autoload tracing code .	11	<code>\nocite</code> : Removed refundefined flag	309
1995/10/10 ltthm.dtx v1.0f			
General: Make <code>\newtheorem</code> ‘only preamble’	279		

1995/10/20 ltclass.dtx v1.0s	1995/10/25 ltalloc.dtx v1.1b
\@begindocumenthook: Make setting conditional, for autoload version	General: General doc improvements
375	34
1995/10/20 ltfsbas.dtx v3.0i	1995/10/25 ltfloat.dtx v1.1n
General: (DPC) Modify autoload code, change \undefined . . .	\@endfloatbox: (CAR) macro added: to unify code for double and single versions
107	297
1995/10/20 ltfsstrc.dtx v3.0e	\end@dblfloat: (CAR) unify code for double and single versions
General: (DPC) Modify autoload code	296
125	\end@float: (CAR) unify code for double and single versions
1995/10/22 ltfsbas.dtx v3.0j	296
General: (RmS) New size function macro \genb@sfcnt needs to be disabled at \document.	1995/10/25 ltidxglo.dtx v1.1d
107	General: Doc cleanup
1995/10/22 ltfsstrc.dtx v3.0f	305
General: Added ‘genb’ and ‘sgenb’ size functions to support new DC font naming scheme.	1995/10/25 ltsect.dtx v1.0q
125	\subparagraphmark: Use \let not \def to save space.
1995/10/23 lttab.dtx v1.1f	288
\@settab: (CAR)Ensure that \@hightab increases by at most one	1995/10/26 ltfsbas.dtx v3.0l
247	\define@newfont: (DPC) disable autofss2 for now
\@startline: (CAR)Ensure that \@nxttabmar is never larger than \@hightab	117
245	1995/10/27 ltpictur.dtx v1.1f
\@poptabs: (CAR)Ensure that \@curtab is never larger than \@hightab	General: Move initialisation to kernel from autoload file
248	276
\@tabbing: (CAR)Make \@hightab consistently a local variable	1995/10/31 ltboxes.dtx v1.0x
246	\@finalstrut: Add \nobreak in horiz mode to allow hyphenation. internal/1931
1995/10/24 ltdefs.dtx v1.2v	240
\@autoload: ignore end-of-line	1995/11/01 fontdef.dtx v2.2m
33	General: add \nfss@catcodes for internal/1932
1995/10/24 ltterror.dtx v1.2k	175
\@preamerr: Modify autoload support	1995/11/01 ltdirchk.dtx v1.0n
44	General: Initialise \@ad- dtofilelist to \@gobble
1995/10/24 ltfiles.dtx v1.1a	3
\document: Removed multiplelabels switch	1995/11/01 ltfinal.dtx v1.0x
62	General: (DPC) Switch meaning of \@addtofilelist for cfg files
Removed redefined switch	381
63	1995/11/01 ltfsbas.dtx v3.0m
1995/10/24 ltfsbas.dtx v3.0k	\DeclareFontShape: (DPC) Test for \relax not \undefined, internal/1933
\@@defaultsubs: macro removed	108
120	1995/11/01 ltfsini.dtx v3.0g
\wrong@fontshape: Make this code inline since it happens only here	General: (DPC) Switch meaning of \@addtofilelist for cfg files
119	171
1995/10/24 ltmiscen.dtx v1.1b	1995/11/02 ltfsbas.dtx v3.0n
\enddocument: Changed logic for producing warning messages and removed switch	\wrong@fontshape: (DPC) Remove extra space with \string for latex/1676
204	119
Use \@refundefined instead of switch	1995/11/02 ltoutenc.dtx v1.7n
204	General: Changed internal name \a to \@tabacckludge to protect against redefinition by malicious users.
1995/10/24 ltxref.dtx v1.1h	78
\@multiplelabels: Switch for multiplelabels removed	1995/11/07 ltlists.dtx v1.0k
200	\@doendpe: Enclosed \setbox0 assignment by a group so that it leaves the contents of box 0 intact.
\@newl@bel: Switch for multiplelabels replaced by inline code	227
200	1995/11/07 ltoutenc.dtx v1.7o
\@refundefined: Switch for refundefined replaced	General: Added \leavevmode at start of \c, otherwise the output routine might be invoked within the macro.
199	81
\@setref: Switch for refundefined renamed	
200	
\if@multiplelabels: Macro removed	
200	

- Changed `\char32` to `\@xxxii`
(two tokens less). 82
- Replaced octal number 27 by
decimal number 23 to protect
against the quote character be-
ing active. 82
- Replaced some 0's by `\z@`
(faster). 82
- 1995/11/10 ltoutput.dtx v1.1s
- `\@shipoutsetup`: Command re-
moved 335
 - `\@writesetup`: Command removed
In-lined 335
- 1995/11/14 ltclass.dtx v1.0t
- `\@unprocessedoptions`: Allow
empty option 376
 - `\@loadwithoptions`: macro added 372
 - `\LoadClassWithOptions`: macro
added 372
 - `\RequirePackageWithOptions`:
macro added 372
- 1995/11/17 ltffsbas.dtx v3.0m
- `\@wrong@font@char`: (DPC) Macro
added. latex/1676 120
 - `\define@newfont`: Redefine `\type-`
`out` latex/1676 116
 - `\wrong@fontshape`: Support
`\@wrong@font@char` latex/1676
. 119
- 1995/11/17 ltoutenc.dtx v1.7p
- `\UseTextSymbol`: Support
`\@wrong@font@char` latex/1676 76
- 1995/11/18 ltoutenc.dtx v1.7q
- `\UseTextSymbol`: Modify message
slightly 76
- 1995/11/21 fontdef.dtx v2.2n
- General: Incorporate changed fig-
ures, as in plain.tex 185
- 1995/11/27 ltffsbas.dtx v3.0n
- `\nfss@catcodes`: Reset hash, for
definitions in fd files 118
- 1995/11/28 ltterror.dtx v1.2l
- `\ClassInfo`: Typo in autoload code
/1985 41
- 1995/11/28 ltfloat.dtx v1.1n
- General: documentation fixes . . . 291
- 1995/11/28 ltffstrc.dtx v3.0g
- General: documentation fixes . . . 125
- 1995/11/28 ltoutenc.dtx v1.7r
- General: Added math mode checks
to text commands. 72
 - doc fixes 69
 - Renamed `\@changed@x@err` to
`\TextSymbolUnavailable`. . . 72
- 1995/11/29 ltoutenc.dtx v1.7t
- General: Added `\textasci-`
`icircum`, `\textasciitilde`,
`\textbackslash`, `\textbar`,
`\textgreater` and `\textless`. 83
 - Added `\textasciicircum`,
`\textasciitilde`, `\textreg-`
`istered` and `\texttrademark`. 80
- Added `\textbackslash` and
`\textbar`. 79, 86
 - Added `\textless` and
`\textgreater`. 80, 87
- 1995/12/01 ltoutenc.dtx v1.7u
- General: Made `\SS` a Default,
rather than having the default
point to the OT1 definition. . 80
- 1995/12/04 ltspc.dtx v1.2k
- `\nobreakspace`: (Macro added . . 57
- 1995/12/04 ltspc.dtx v1.2l
- `\@xobeysp`: (braces added to defini-
tion of tilde 57
- 1995/12/04 preload.dtx v2.4e
- General: Ulrik Vieth. added 12pt
OMS and OML preloads /1989 190
- 1995/12/05 ltdefns.dtx 1.2w
- `\@unexpandable@noexpand`: Re-
moved as never used. inter-
nal/1733 30
- 1995/12/05 ltfiles.dtx v1.1c
- `\document`: `\ignorespaces` added
for latex/1933 63
- 1995/12/05 ltfloat.dtx v1.1n
- `\@textsuperscript`: Use `\ensure-`
`math` for latex/1984. 303
- 1995/12/05 ltoutenc.dtx v1.7v
- `\@inmathwarn`: Changed `\TextSym-`
`bolUnavailable` text 74
- 1995/12/06 ltffsbas.dtx v3.00
- `\nfss@catcodes`: Reset hat, for
typeouts etc in fd files 118
- 1995/12/07 ltbibl.dtx v1.1l
- `\@citex`: Restored name of
`\G@refundefinedtrue` 308
- 1995/12/07 ltfloat.dtx v1.1m
- `\@textsuperscript`: Move `\m@th`
out of the `\ensuremath` for la-
tex/1984. 303
- 1995/12/07 ltxref.dtx v1.1i
- `\@setref`: Switch for redefined
restored 200
- 1995/12/07 ltdefns.dtx 1.2x
- `\G@refundefinedtrue`: Renamed
(back) from `\G@refundefined` 199
- 1995/12/11 ltoutenc.dtx v1.7w
- General: Modified `\copyright` . . 80
- 1995/12/13 ltdefns.dtx 1.2x
- `\-`: Documentation changed. . . . 22
- 1996/01/10 ltfiles.dtx v1.1d
- `\@iffileonpath`: Change argument
handling to not require doubled
hash. latex/2024 65
- 1996/01/20 ltidxglo.dtx v1.1e
- `\makeglossary`: Make no-op after
use pr/2048 306
- 1996/01/20 ltspc.dtx v1.2m
- `\makeindex`: Make no-op after use
pr/2048 306
- 1996/01/20 ltspc.dtx v1.2m
- `\vspace`: Made robust 55
- 1996/03/25 ltmath.dtx v1.1a
- `\@ensuredmath`: Macro added for
amslatex/2104 216

<code>\ensuremath</code> : Reimplement for am-	<code>\DeclareTextCompositeCommand</code> :
slatex/2104 216	Modified to cope with new
1996/04/18 ltpage.dtx v1.0i	<code>\add@accent</code> command: re-
General: Improve documentation 311	quired removal of check for one
1996/04/22 ltmiscen.dtx v1.1c	argument-command 75
General: Improve Documentation 202	1996/05/24 ltoutput.dtx v1.1t
1996/04/22 ltspc.dtx v1.2n	<code>\@specialoutput</code> : Check that
General: Documentation Improve-	<code>\@colroom</code> is less than <code>\vsize</code> ,
ments 48	indicating that a float has been
1996/04/22 lttab.dtx v1.1g	added 328
<code>\@tabclassz</code> : (DPC) Extra <code>\hskip</code>	Cut-off point changed to
keeps <code>\tabcolsep</code> in empty	<code>1.5\baselineskip</code> 328
columns internal/2122 257	<code>\@topnewpage</code> : Cut-off point
1996/04/23 ltcounts.dtx v1.1d	changed to <code>2.5\baselineskip</code> 327
General: Documentation improve-	1996/05/25 ltoutput.dtx v1.1u
ments 103	<code>\@specialoutput</code> : Correct the
1996/04/24 ltfiles.dtx v1.1e	above check 328
<code>\document</code> : (DPC) Reset <code>\AtBe-</code>	1996/06/03 ltmiscen.dtx v1.1d
<code>ginDocument</code> eg for latex/1297 63	<code>\@verbatim</code> : Exchanged the fol-
1996/05/08 ltfstrc.dtx v3.0h	lowing two code lines so that
<code>\math@egroup</code> : Use <code>\bgroup</code> instead	<code>\dospecials</code> cannot reset the
of <code>\begingroup</code> to match a ker-	category code of characters han-
nel change made in 1994!! . . 134	dled by <code>\@noligs</code> 207
1996/05/09 ltfntcmd.dtx v3.3t	General: Move setting of verbatim
<code>\check@icr</code> : Default definitions	font and <code>\@noligs</code> 202
added 194	<code>\verb</code> : Put setting of verbatim
1996/05/17 fontdef.dtx v2.2o	font after <code>\dospecials</code> so that
General: <code>\@@sqrt</code> removed, at last	<code>\dospecials</code> cannot reset the
. 173, 185	category code of characters han-
1996/05/17 ltfiles.dtx v1.1f	dled by <code>\@noligs</code> 208
<code>\nofiles</code> : added <code>\write</code> to <code>\pro-</code>	1996/06/10 ltboxes.dtx v1.0y
<code>tected@write</code> for latex/2146 . 63	<code>\@parboxto</code> : (DPC) Changed <code>\end-</code>
1996/05/18 ltoutenc.dtx v1.7x	<code>graf</code> to <code>\@@par</code> 237
General: Produce error if encoding	1996/06/10 ltsect.dtx v1.0t
not found. pr/2054 93	<code>\@sect</code> : (DPC) Changed <code>\endgraf</code>
1996/05/21 ltoutenc.dtx v1.7y	to <code>\@@par</code> 285
General: Corrected error message	<code>\@ssect</code> : (DPC) Changed <code>\endgraf</code>
(CAR) 93	to <code>\@@par</code> 287
1996/05/21 ltsect.dtx v1.0s	1996/06/13 ltdirchk.dtx v1.0r
<code>\@sect</code> : (DPC) Added extra braces	General: documentation improve-
for internal/2148 285	ments mainly from inter-
(DPC) Moved brace to allow	nal/2174 1
commands like <code>\MakeUppercase</code>	1996/06/14 lttab.dtx v1.1h
in 6th argument. Changed <code>\par</code>	<code>\@tabclassz</code> : (DPC) Change
to <code>\endgraf</code> to allow non-long	both <code>\z@skip</code> to <code>1sp</code> for la-
commands. internal/2148 . . 285	tex/2160 257
<code>\@ssect</code> : (DPC) Added extra	1996/06/22 ltspc.dtx v1.2o
braces for internal/2148 . . . 287	General: Documentation of prob-
(DPC) Moved brace to allow	lems added 48
commands like <code>\MakeUppercase</code>	1996/07/10 ltfinal.dtx v1.0y
in 4th argument. Changed <code>\par</code>	<code>\toks</code> : Free up memory from
to <code>\endgraf</code> to allow non-long	scratch registers /2213 . . . 385
commands. internal/2148 . . 287	1996/07/19 ltoutenc.dtx v1.8a
1996/05/23 ltoutenc.dtx v1.7z	<code>\@strip@args</code> : Use char 0 not @ as
<code>\@strip@args</code> : <code>\expandafter</code>	carrier for <code>\lowercase</code> /2197 . 76
added to match other changes	1996/07/26 ltboxes.dtx v1.0z
for latex/2133 76	<code>\if@minipage</code> : put <code>\global</code> into
<code>\add@accent</code> : macro added. la-	definition 238
tex/2133 74	1996/07/26 ltclass.dtx v1.0u
<code>\DeclareTextAccent</code> : Reimple-	<code>\@classoptionslist</code> : made only
mented using <code>\add@accent</code> to	preamble 367
save space latex/2133 74	

<code>\@unusedoptionlist</code> : made only preamble	367	1996/07/26 ltplain.dtx v1.1t	
1996/07/26 ltdefs.dtx v1.2y		<code>\sh@ft</code> : replace <code>\dimen\z@</code> by <code>\dimen@</code>	19
<code>\@reargdef</code> : third arg picked up by <code>\@yargdef</code>	26	1996/07/26 ltsect.dtx v1.0u	
<code>\@renew@command</code> : use <code>\noexpand</code> instead of <code>\string</code>	26	<code>\@starttoc</code> : removed <code>\global</code> before <code>\@nbreak</code>	288
use <code>\relax</code> in place of empty arg	26	<code>\@xsect</code> : Removed <code>\global</code> before <code>\@nbreak</code>	286
<code>\@renew@environment</code> : use <code>\relax</code> in place of empty arg	27	1996/07/26 ltspc.dtx v1.2p	
1996/07/26 ltfloat.dtx v1.1n		<code>\if@nbreak</code> : put <code>\global</code> inside definition	52
<code>\@endfloatbox</code> : remove unnecessary <code>\global</code> before <code>\@minipage</code>	297	1996/07/27 ltssbas.dtx v3.0q	
<code>\@savemarbox</code> : remove unnecessary <code>\global</code> before <code>\@minipage</code>	299	General: <code>\if@inmath</code> switch removed	115
<code>\@setminipage</code> : remove unnecessary <code>\global</code> before <code>\@minipage</code>	296	1996/07/27 ltspc.dtx v1.2q	
<code>\@setnbreak</code> : remove unnecessary <code>\global</code> before <code>\@nbreak</code>	296	General: Further documentation of problems	48
1996/07/26 ltssbas.dtx v3.0p		1996/07/27 ltspc.dtx v1.2r	
<code>\@DeclareMathSizes</code> : use faster <code>\if</code> test	112	General: Correct documentation of problems	48
<code>\nfss@catcodes</code> : omit <code>\relax</code> as not needed	118	1996/08/02 ltfloat.dtx v1.1o	
1996/07/26 ltssdcl.dtx v3.0e		<code>\@xypar</code> : Remove <code>\global</code> before <code>\@ignore</code>	300
<code>\init@restore@version</code> : Removed <code>\ifrestore@version</code> switch and replaced by <code>\init@restore@version</code>	151	1996/08/02 ltsect.dtx v1.0v	
1996/07/26 ltssstrc.dtx v3.0i		<code>\@afterheading</code> : Removed <code>\global</code> before <code>\@nbreak</code>	287
<code>\init@restore@glb@settings</code> : macro added replacing <code>\if@inmath</code> switch	133	1996/08/02 ltspc.dtx v1.2s	
1996/07/26 ltlists.dtx v1.0l		<code>\@Esphack</code> : Remove <code>\global</code> before <code>\@ignore</code>	53
<code>\@item</code> : Remove unnecessary <code>\global</code> before <code>\@minipage</code>	228	1996/08/25 ltssbas.dtx v3.0r	
Remove unnecessary <code>\global</code> before <code>\@nbreak</code>	229	<code>\nfss@catcodes</code> : Reset the acute, grave and double quote chars as well	118
1996/07/26 ltmath.dtx v1.1b		1996/09/21 ltoutput.dtx v1.1w	
General: Removed <code>\global</code> before <code>\@ignoretrue</code> in various places.	210	<code>\@writesetup</code> : Added <code>\@parboxrestore</code> and made consequent deletions: wait for the howls of protest	335
1996/07/26 ltmiscen.dtx v1.1e		1996/09/25 ltdirchk.dtx v1.0t	
<code>\@ignorefalse</code> : put <code>\global</code> into definition	203	General: Move <code>ltxcheck</code> to separate file	10
<code>\@begin</code> : remove <code>\global</code> before <code>\@ignore</code>	205	1996/09/28 ltmiscen.dtx v1.1f	
<code>\@end</code> : remove <code>\global</code> before <code>\@ignore</code>	205	<code>\@xobeysp</code> : Moved to <code>ltspc.dtx</code>	207
<code>\@ignorespacesafterend</code> : user level macro added	203	1996/09/28 ltspc.dtx v1.2t	
1996/07/26 ltoutput.dtx v1.1v		<code>\@xobeysp</code> : Moved from <code>ltmiscen.dtx</code> and redefined to use <code>\nbreakspace</code>	57
<code>\@testfp</code> : remove <code>\global</code> before <code>\@test</code>	354	1996/09/29 ltfiles.dtx v1.1g	
<code>\@xtryfc</code> : remove <code>\global</code> before <code>\@test</code>	340	<code>\document</code> : Added disabling of <code>\@nodocument</code>	63
<code>\@ztryfc</code> : remove <code>\global</code> before <code>\@test</code>	341	1996/09/29 ltoutput.dtx v1.1x	
<code>\clearpage</code> : add number of missing percents	325	<code>\newpage</code> : Checks for <code>noskipsec</code> and <code>inlabel</code> added	326
		1996/09/29 ltsect.dtx 1.0w	
		<code>\@noskipsectrue</code> : Added documentation	283
		1996/09/30 ltoutput.dtx v1.1y	
		<code>\newpage</code> : Checks for <code>noskipsec</code> and <code>inlabel</code> removed pending further tests	326

- 1996/10/04 ltclass.dtx v1.0v
`\RequirePackageWithOptions`: Reset `\@unprocessedoptions` for /2269 372
- 1996/10/05 ltfiles.dtx v1.1h
`\clubpenalty`: Added setting its value 62
- 1996/10/08 ltfntcmd.dtx v3.3u
`\DeclareTextFontCommand`: Removed `\check@icr` when in vmode since it causes various errors (see pr/2157) 193
- 1996/10/21 lttab.dtx v1.1i
`\array`: Use `\set@typeset@protect` 251
 General: Moved the code associated with `\mkpream` into the group provided by the box, for robustness (latex/2183) 251
`\multicolumn`: Make `\multicolumn` long (latex/2180) 253
`\tabbing`: Moved the `\indent` so that the `\everypar` can remove it when necessary; this is needed because the code for items in lists has changed (see pr/22111) 246
- 1996/10/23 ltlists.dtx v1.0m
`\item`: `\@nbreak...` moved into the `\everypar` and not executed unconditionally, see above .. 229
`\kern...` changed to `\setbox...` 228
 Added setting of `\clubpenalty` and set `\@nbreakfalse` only when necessary 229
- 1996/10/23 ltsect.dtx v1.0x
`\xsect`: Replaced `\hskip...` with `\setbox...` as used in `\afterheading` 286
- 1996/10/24 ltboxes.dtx v1.1a
`\arrayparboxrestore`: Added local settings of flags: dangerous! 238
`\iiiminipage`: Use it or lose it (`\setminpage`): Frank will want to lose it 238
- 1996/10/24 ltfloat.dtx v1.1p
`\floatboxreset`: Added local settings of flags: dangerous! ... 295
`\marginparreset`: Added local settings of flags: dangerous! . 300
`\xfloat`: Added `\@nodocument` to trap floats in the preamble . 294
- 1996/10/24 ltoutput.dtx v1.1z
`\addtocurcol`: Added `\nbreak`, etc as appropriate 344
`\specialoutput`: Added `\nbreak` as appropriate 330
`\topnewpage`: Added `\@nodocument` to trap `\twocolumn` in the preamble 326
- `\newpage`: Better checks for noskipsec and inlabel added, plus nobreak 326
- 1996/10/25 ltlists.dtx v1.0n
`\endtrivlist`: Change `\indent` to `\leavevmode` 227
 Reset flags explicitly 227
- 1996/10/25 ltoutput.dtx v1.2a
`\newpage`: Reset all flags explicitly 326
- 1996/10/26 ltlists.dtx v1.0o
`\endtrivlist`: Correct typo 227
- 1996/10/27 ltoutenc.dtx v1.8c
`\@strip@args`: Removed macro . 75
 General: Added `\r A` 82
 Added `\textasteriskcentered` 79, 86
 Corrected syntax descriptions . 69
 Removed `\aa` and `\AA` . 79, 82, 83
- 1996/10/28 ltplain.dtx v1.1u
 General: (CAR) More doc changes 11
`\dotfill`: Removed math mode . 20
- 1996/10/29 ltplain.dtx v1.1v
`\dotfill`: Got arithmetic correct (CAR) 20
- 1996/10/29 ltspc.dtx v1.2u
`\gnewline`: Added macro 52
`\no@lnbk`: Macro replaces `\@lnbk` and `\@nolnbk` 51
`\:`: Corrected and rationalised code 51
`\nolinebreak`: Reimplemented both using `\no@lnbk` 51
- 1996/10/31 ltfinal.dtx v1.0z
 General: Added extra `\lcode`, hoping it does no harm in T1 (pr/1969) 381, 384
- 1996/10/31 ltlists.dtx v1.0p
`\@trivlist`: Added check for missing item in outer list 226
- 1996/10/31 ltsect.dtx v1.0y
 General: Corrected and tidied documentation; removed long lines 282
- 1996/11/03 ltplain.dtx v1.1w
`\dotfill`: Saved tokens by using `\hb@xt@` 20
- 1996/11/04 ltterror.dtx v1.2m
`\@nodocument`: Always define `\@nodocument` in kernel, so that it can be cleared by `\document`. 43
- 1996/11/04 ltlists.dtx v1.0q
`\@trivlist`: Moved check for missing item: only checked when not inlabel flag is false 226
- 1996/11/05 ltfiles.dtx v1.1i
`\nofiles`: Standard `\if@nbreak` test added 63
- 1996/11/09 ltmath.dtx v1.1c
`\ensuredmath`: Made long, as it was before. /2104 216
- 1996/11/18 ltfssbas.dtx v3.0s
`\define@newfont`: (DPC) lowercase fd file names. internal/1044 . 117

- 1996/11/18 ltoutenc.dtx v1.8d
General: (DPC) lowercase external file names. internal/1044 93
- 1996/11/20 fontdef.dtx v2.2p
General: lowercase fd and enc.def file names /1044 173
- 1996/11/20 ltvers.dtx v1.0f
General: Check for old format modified /2319 21
- 1996/11/23 ltoutenc.dtx v1.8e
General: Corrected description 69, 70
Extended description 70
- 1996/11/28 ltvers.dtx v1.0g
General: Check for old format modified /2319 21
- 1996/12/06 ltdirchk.dtx v1.0u
`\IfFileExists`: *** removed from various messages for GNU Make. internal/2338 7
- 1996/12/06 ltfloat.dtx v1.1r
`\caption`: Call `\@setminpage` if needed. latex/2318 293
- 1996/12/06 ltfssini.dtx v3.0h
General: (DPC) Remove *** from messages internal/2338 171
- 1996/12/17 ltclass.dtx v1.0w
`\g@addto@macro`: Use `\begingroup` to save making a mathord . . 375
- 1996/12/20 ltsect.dtx v1.0z
`\dottedtocline`: Added `\nobreak` for latex/2343 290
- 1997/01/08 fontdef.dtx v2.2q
General: Use `\DeclareMathDelimiter` to set delimiter codes . 179
`\mathparagraph`: Define using `\DeclareMathSymbol` 186
- 1997/01/08 ltfiles.dtx v1.1j
`\include`: reset `\deadcycles` latex/2365 65
- 1997/01/08 ltmath.dtx v1.1d
`\root`: (DPC) Remove spurious space tokens from plain \TeX definition /2359 211
- 1997/02/05 ltclass.dtx v1.0x
`\g@addto@macro`: missing percent /2402 375
- 1997/02/21 ltlists.dtx v1.0r
`\@item`: `\ifvoid` check added for `\noindent`. latex/2414 228
- 1997/03/21 ltcounts.dtx v1.1e
`\fnsymbol`: Use `\mathsection` and `\mathparagraph`. latex/2445 105
- 1997/04/14 ltfiles.dtx v1.1k
`\document`: Set the document space factor defaults. latex/2404 . . 62
`\normalsfcodes`: Macro added (from patch file) latex/2404 . . 63
- 1997/04/14 ltoutput.dtx v1.2b
`\@writesetup`: Call `\normalsfcodes` (from patch file) latex/2404 336
- Move `\label` and `\index` (from patch file) 336
- 1997/04/24 ltbibl.dtx v1.1m
`\@citex`: `\@empty` to avoid primitive error on empty cite keys. latex/2432 308
- 1997/04/30 ltoutenc.dtx v1.9a
General: Changed `\textsc` to `\scshape` 80
Introduced `\textcopyright` and modified `\copyright` 80
Introduced `\textcopyright` and modify `\copyright` 80
Modified `\textunderscore`, removing `\mathunderscore` . . . 80
Modified `\underscore`, removing `\mathunderscore` 80
- 1997/04/30 ltoutenc.dtx v1.9b
General: Added `\leavevmode` to `\textunderscore` 80
- 1997/05/04 ltoutenc.dtx v1.9c
General: Added 'hex index tabs' . 84
Added TS1 encoding v2.2.beta 89
- 1997/05/07 ltoutenc.dtx v1.9d
General: Added `\leavevmode` to `\textcompwordmark` 80
- 1997/05/07 ltspace.dtx v1.2v
`\newline`: Made completely robust. 52
- 1997/05/29 ltfssrct.dtx v3.0j
General: Replaced `\` by `\MessageBreak`, as suggested by Donald Arseneau. 127
- 1997/05/29 ltlogos.dtx v1.1f
 \LaTeXe : Added `\m@th` so that the \LaTeXe 2 ϵ logo works with non-zero values of `\mathsurround`. 59
- 1997/06/16 ltdirchk.dtx v1.0v
General: documentation improvements mainly from internal/2520 1
- 1997/06/16 ltfloat.dtx v1.1s
General: documentation fixes . . . 291
- 1997/06/16 lftncmd.dtx v3.3v
General: Fix typo in documentation. 191
- 1997/08/05 ltoutenc.dtx v1.9e
General: Corrected order of arguments in `\UseTextSymbol` example. 70
- 1997/08/29 ltoutenc.dtx v1.9f
General: Added OT4 encoding, provided by Marcin Woliński. . . 69
- 1997/09/09 ltdefns.dtx v1.2z
`\providecommand`: Use `\begingroup` to avoid generating math ords if used in math mode. pr/2573 28
- 1997/09/15 ltpictur.dtx v1.1g
`\@getcirc`: Warn if lines become invisible pr/2524 274

- `\@picture@warn`: Macro added pr/2524 274
- `\@sline`: Warn if lines become invisible pr/2524 267
- 1997/10/06 ltcounts.dtx v1.1f
 - `\@Roman`: Change `\@Roman` to be fully expandable, so that the result is written properly to files. 105
 - `\@slowromancap`: Macro added. . 105
- 1997/10/08 ltlogos.dtx v1.1h
 - `\LaTeX`: Simplify macro (force loading of suitable math fonts once). 59
- 1997/10/10 ltclass.dtx v1.0y
 - `\endfilecontents`: `\@currentenv` in banner 377
 - `\reserved@c` not `\verbatim@out` to save a csname 377
 - Check for text before or after `\end environment`. latex/2636 377
 - Use `\@gobbletwo` 377
- 1997/10/17 ltfontcmd.dtx v3.3w
 - `\check@nocorr@`: Check for vertical mode moved here, from `\DeclareTextFontCommand` (see PR/2646). 194
 - `\DeclareTextFontCommand`: Reinstalled `\check@icr` as check is now done in `\check@nocorr@` (see PR/2646). 193
- 1997/10/20 ltfinal.dtx v1.1a
 - `\@uclclist`: Removed `\aa` and `\AA` from `\@uclclist` as these are macros. 384
- 1997/10/21 ltdefns.dtx v1.2z1
 - `\renew@command`: Use `\begin-group/\endgroup` rather than braces for grouping, to avoid generating empty math atom. 26
- 1997/10/21 ltssbas.dtx v3.0t
 - `\define@newfont`: Move `\makeatletter` to `\nfss@catcodes`. . . 117
 - `\nfss@catcodes`: Moved `\makeatletter` from `\try@load@font@shape`. 118
- 1997/11/09 ltoutput.dtx v1.2c
 - `\@specialoutput`: Remove incorrect code: only one `\@emptycol` is needed here 328
 - `\@topnewpage`: Documentation of vszie check enhanced 326
- 1997/11/13 ltssdcl.dtx v3.0f
 - `\DeclareSymbolFont`: (DPC) Really update `\group@list` dont leave new version in `\toks@`. latex/2661 155
 - `\stepcounter`: (DPC) Remove as never used. (Re)defined in ltcounts 151
- 1997/11/19 ltfloat.dtx v1.1t
 - `\@footnotetext`: Missing percent, again 304
- 1997/11/19 ltoutput.dtx v1.2d
 - `\@vtryfc`: Reindent code, to be understandable(DPC). 340
- 1997/11/20 ltssdcl.dtx v3.0g
 - `\document@select@group`: (DPC) inline use of `\stepcounter` (faster, and saves a csname per math version as no reset list) 152
 - `\select@group`: (DPC) inline use of `\stepcounter` (faster, and saves a csname per math version as no reset list) 151
- 1997/11/23 ltoutenc.dtx v1.9g
 - General: Use `\textperthousand`, `\textpertenthousand` and `\textfractionsolidus` not `\textpermill`, `\textpertenthousand` and `\textfraction`. /2673 89
- 1997/12/17 ltoutenc.dtx v1.9h
 - General: Added `\textperthousand` and `\textpertenthousand` 82, 83
 - Added code for textcomp.sty. . 92
 - Added section. 92
 - Added textcomp.sty. 69
 - As in OT1, Added `\leavevmode` at start of `\c`, otherwise the output routine might be invoked within the macro. 83
 - Changed to decimal codes in `\oalign`. 90
 - Changed to decimal codes. ... 87
 - Documentation changes and additions. 69
 - Example corrected, braces removed. 69
 - Removed default settings, see next section. 89
- 1997/12/19 ltoutenc.dtx v1.9i
 - General: Documentation corrections. 69
- 1997/12/20 fontdef.dtx v2.2s
 - General: Added documentation . 175
- 1997/12/31 ltoutenc.dtx v1.9k
 - General: Further correction 69
- 1998/01/12 ltoutenc.dtx v1.9k
 - General: Added `\ProvidesPackage` for textcomp.sty 69
 - Adding missing braces and `\ushape`. 90
- 1998/01/16 ltoutenc.dtx v1.9m
 - General: fixed decimal codes. latex/2734 87
- 1998/03/04 ltdefns.dtx v1.2z2
 - `\@xargdef`: Unnecessary `\expandafter` removed: pr/2758 . 25
- 1998/03/05 ltoutenc.dtx v1.9n
 - General: Added masc/fem ords as in pr/2579 80
- 1998/03/20 ltdefns.dtx v1.2z3
 - `\@thirdofthree`: Macro added .. 29

- 1998/03/20 ltoutenc.dtx v1.9o
 General: Added various `\UndeclareTextCommand` declarations for pr/2783 100
 Documentation added about order of decls 71
 Documentation added for pr/2783 71
 Load decls after defaults for speed. 100
`\UndeclareTextCommand`: Macro added for pr/2783 77
- 1998/03/21 ltclass.dtx v1.0z
 General: Added to documentation of filecontents 363
- 1998/03/21 ltclass.dtx v1.1a
`@providesfile`: Allow &. Internal/2702 369
 General: Correct to new onlypreamble command list 378
- 1998/03/25 ltfssbas.dtx v3.0u
`\showhyphens`: Suppress unnecessary error when used in preamble 123
- 1998/04/11 fontdef.dtx v2.2t
 General: Added `\mathring` accent (pr/2785) 185
- 1998/04/15 fontdef.dtx v2.2u
 General: Use new syntax for `\DeclareMathDelimiter` 179
- 1998/04/15 ltfssdcl.dtx v3.0h
`\xxDeclareMathDelimiter`: Macro added (pr/2662) 161
- 1998/04/17 fontdef.dtx v2.2v
 General: Reinsert symbol defs for < and > chars. 180
- 1998/04/18 fontdef.dtx v2.2w
 General: Reinsert symbol def for / char. 180
- 1998/05/07 ltclass.dtx v1.1b
`@fileswithoptions`: Modify help message for latex/2805 374
- 1998/05/18 lttab.dtx v1.1j
`@endpbox`: Use `\setlength` to set `\hsize`, so that the changes in the calc package apply here. 259
`\tabular*`: Use `\setlength`, so that calc extensions apply. .. 251
- 1998/05/20 ltfinal.dtx v1.1b
 General: Set up lccodes before loading hyphenation files: pr/2639 380
 Set up uc/lccodes after loading hyphenation files: pr/2639 .. 383
- 1998/05/28 lterror.dtx v1.2n
`\notdefinable`: Added message re ‘end...’ pr/1555 43
- 1998/06/04 ltboxes.dtx v1.1c
`@rule`: Support calc-expressions 239
- 1998/06/12 ltoutenc.dtx v1.9p
 General: Corrected 130 and 131, see pr/2834 91
- Renamed `\textmacron` pr/2840 92, 98
- 1998/06/12 ltoutenc.dtx v1.9q
`\add@accent`: Explicitly set `\spacefactor` after `\accent` (pr/2877) 75
- 1998/06/18 lttab.dtx v1.1k
 General: Small addition to documentation 241
- 1998/07/06 lttab.dtx v1.1l
 General: Small correction to documentation 241
- 1998/08/17 ltboxes.dtx v1.1e
 General: (RmS) Minor Documentation fixes. 232
- 1998/08/17 ltclass.dtx v1.1c
 General: (RmS) Minor documentation fixes. 363
- 1998/08/17 ltdirchk.dtx v1.0w
 General: (RmS) Documentation improvements. 1
- 1998/08/17 ltfntcmd.dtx v3.3x
 General: (RmS) Minor documentation fixes. 191
- 1998/08/17 ltfssbas.dtx v3.0v
 General: (RmS) Documentation fixes. 107
- 1998/08/17 ltfssdcl.dtx v3.0i
 General: (RmS) Corrected minor glitches in changes entries. .. 149
- 1998/08/17 ltfssini.dtx v3.0i
 General: (RmS) Minor documentation fixes. 168
- 1998/08/17 ltlogos.dtx v1.1i
 General: (RmS) Minor documentation fixes. 59
- 1998/08/17 ltmath.dtx v1.1c
 General: (RmS) Minor documentation fixes. 210
- 1998/08/17 ltmiscen.dtx v1.1g
 General: (RmS) Minor documentation fixes. 202
- 1998/08/17 ltspace.dtx v1.2w
 General: Documentation fixes. .. 48
- 1998/08/17 preload.dtx v2.1g
 General: (RmS) Minor documentation fixes. 188
- 1998/09/19 ltoutenc.dtx v1.9r
`\a`: Added `\string` (pr/2878) ... 78
- 1998/11/13 lttab.dtx v1.1m
`@array`: Check for hmode to see if something went wrong during parsing (pr/2884) 252
- 1999/01/05 fontdef.dtx v2.2x
 General: Need special protection for character > in `\changes` entry. 173
- 1999/01/06 ltfssbas.dtx v3.0w
`\DeclareFontEncoding`: Added `\LastDeclaredEncoding` to support cyrillic integration (pr/2988) 110

- `\LastDeclaredEncoding`: Added
`\LastDeclaredEncoding` to
support cyrillic integration
(pr/2988) 110
- 1999/01/06 ltoutenc.dtx v1.9r
`\@strip@args`: New impl for la-
tex/2930 76
General: Minor documentation fix. 90
- 1999/01/06 ltoutput.dtx v1.2e
`\@makecol`: Added negative vskip,
as when processing output-
box below: suggested by Fred
Bartlett pr/2892 332
- 1999/01/07 ltdefs.dtx v1.3a
`\@ifnextchar`: made long 32
`\@newenvb`: made long and brace
optional arg. latex/2896 27
`\@testopt`: made long and brace
optional arg. latex/2896 25
- 1999/01/07 ltdefs.dtx v1.3b
`\@ifnextchar`: extra `\long`. la-
tex/2902 32
- 1999/01/07 ltoutenc.dtx v1.9r
General: Hackery to allow using
fontenc several times 94
Hackery to temp support cyrillic
uc/lc 93
- 1999/01/13 ltoutenc.dtx v1.9s
`\@strip@args`: Simplified solution
for latex/2930 76
- 1999/01/18 ltdefs.dtx v1.3c
`\@yargd@f`: New implementation
DPC /2942 26
- 1999/02/09 ltdefs.dtx v1.3d
`\@yargd@f`: catch bad argument
forms by re-inserting #3 26
- 1999/02/12 ltfssini.dtx v3.0j
`\oldstylenums`: Use `\rmdefault`
instead of `cmm` (pr/2954) ... 170
- 1999/02/24 ltoutenc.dtx v1.9t
General: Corrected hackery cyrillic
uc/lc list 93
- 1999/03/01 ltdefs.dtx v1.3e
`\@ifnextchar`: remove extra `\long`.
internal/2967 32
- 1999/04/15 ltpictur.dtx v1.1h
`\@getlarrow`: Replaced octal num-
ber, CAR 267
`\@upvector`: Replaced octal num-
ber, CAR 268
General: Replaced octal number,
CAR 267, 268
Replaced octal numbers, CAR 260
- 1999/04/19 ltfloat.dtx v1.1u
`\caption`: Made caption an error
oustside a float: latex/2815 . 293
- 1999/04/27 ltboxes.dtx v1.1f
`\@parboxto`: (CAR) Changed
`\@empty` to `\relax` as flag for
natural width: pr/2975 237
- 1999/04/29 ltdefs.dtx v1.3f
`\@yargd@f`: Full expansion and con-
version needed for digit in new
version, see pr/3013 26
New macro added 26
- 1999/06/10 ltoutenc.dtx v1.9u
General: Ensure that we also forget
old options (pr/2888) 94
- 1999/06/12 ltoutenc.dtx v1.9v
General: Extend `\@uclclist` only
once 94
- 1999/10/09 ltmath.dtx v1.1e
`\active@math@prime`: Macro
added, see PR 3104. 213
`\prime@s`: Introduce `\ac-`
`tive@math@prime`. 213
- 1999/10/09 ltoutput.dtx 1.2f
`\@activechar@info`: Reset defini-
tion of active prime character
(used in math mode) 335
- 1999/10/28 ltoutenc.dtx v1.9w
`\add@accent`: Give `\ac-`
`cent@spacefactor` a default
definition (pr/3084) 75
- 1999/12/08 ltoutenc.dtx v1.9x
General: Changed `\CYRRHOOK` and
`\cyrrhook` to `\CYRRHK` and
`\cyrrhk` as name changed in
the cyrillic bundle for naming
consistency with other “hook”
glyphs. 93
- 2000/01/07 ltmiscen.dtx v1.1h
`\@verbatim`: Disable hyphenation
even if the font allows it. ... 207
- 2000/01/15 ltpictur.dtx v1.1i
`\@upvector`: Removed space at end-
of-line, CAR 268
- 2000/01/30 ltfntcmd.dtx v3.3y
`\DeclareTextFontCommand`: Use
`\hmode@bgroup` now (pr/3160) 193
- 2000/01/30 ltoutenc.dtx v1.9y
General: Use `\hmode@bgroup` where
applicable (pr/3160)
..... 81–83, 86, 88–90
- `\add@accent`: Use `\hmode@bgroup`
where applicable (pr/3160) .. 75
`\hmode@bgroup`: Macro added ... 75
- 2000/01/30 ltoutenc.dtx v1.9z
`\@use@text@encoding`: Macro
reimplemented (pr/3160) . 76, 77
`\add@accent`: Macro reimple-
mented (pr/3160) 75
`\hmode@start@before@group`:
Macro added (pr/3160) 77
- 2000/05/19 ltmiscen.dtx v1.1i
`\enddocument`: Reset `\AtEndDocu-`
`ment` for latex/3060 203
- 2000/05/26 ltpage.dtx v1.0j
`\@markright`: Reimplementation to
fix expansion error (pr/3203). 312
`\leftmark`: Use `\@empty` instead of
brace group (pr/3203). 312

<code>\markright</code> : Reimplementation to fix expansion error (pr/3203).	312	(pr/3333)	184
<code>\rightmark</code> : Use <code>\@empty</code> instead of brace group (pr/3203).	312	Guard against math active equal sign in <code>\Relbar</code> (pr/3333) . .	184
2000/06/02 ltpage.dtx v1.0k		2001/06/04 ltclass.dtx v1.1e	
<code>\@markright</code> : Small adjustment to give slightly less expansion, CAR	312	<code>\@providesfile</code> : But only if it is a char (pr/3334)	369
<code>\markright</code> : Small adjustment to give slightly less expansion, CAR	312	2001/06/04 ltdirchk.dtx v1.0y	
Tidied 1.0j reimplementation, CAR	312	General: But only if it is a char (pr/3334)	3
2000/07/11 ltmiscen.dtx v1.1j		2001/06/04 ltpictur.dtx v1.1j	
<code>\enddocument</code> : Fix typo in warning	203	<code>\@sline</code> : Don't warn for exactly zero pr/3318	267
2000/07/12 ltoutput.dtx 1.2g		2001/06/04 ltvers.dtx v1.0i	
General: Ensure that rule is in <code>\normalcolor</code>	359	General: Check for old format disabled	21
2000/07/12 ltoutput.dtx 1.2i		2001/06/05 ltoutenc.dtx v1.94	
<code>\@makecol</code> : Removed negative vskip, as it gives unacceptable results when the depth is large: pr/3189	332	General: Text composite Commands need kludges for ‘,’ – see tlb1903.lvt	82
2000/07/19 ltoutput.dtx v1.2h		2001/08/26 ltclass.dtx v1.1f	
<code>\@writsetup</code> : Reset and restore <code>\@ifnewlist</code> for internal/3231	335	<code>\@providesfile</code> : Readadded setting of space char (pr/3353)	369
2000/08/30 ltoutenc.dtx v1.91		2002/02/24 ltplain.dtx v1.1x	
<code>\@use@text@encoding</code> : Rearranged but no change to final code, CAR (pr/3160)	76	<code>\loggingall</code> : Macro added	20
<code>\add@accent</code> : Rearranged but no change to final code, CAR (pr/3160)	74	<code>\loggingoutput</code> : Macro added . .	20
2000/09/01 ltfinal.dtx v1.1d		<code>\showoutput</code> : Use newly added <code>\loggingoutput</code>	20
<code>\errhelp</code> : Set error help empty at very end (pr/449 done correctly).	386	<code>\tracingall</code> : Use newly added <code>\loggingoutput</code>	20
2001/01/07 ltoutput.dtx v1.2j		2002/06/16 ltoutenc.dtx v1.95	
<code>\@writsetup</code> : And do it in the right macro (pr/3286)	335	General: Added <code>\textbardbl</code> (pr/3400)	86
2001/02/16 ltxref.dtx v1.1k		Added default for <code>\textbardbl</code> (pr/3400)	79
<code>\@newl@bel</code> : Added an extra group level (PR3250), jlb	200	2002/06/17 ltoutenc.dtx v1.95	
2001/05/25 ltclass.dtx v1.1d		General: Corrected <code>\c</code> for T1 (pr/3442)	83
<code>\@providesfile</code> : Explicitly set catcode of <code>\endlinechar</code> to 10 (pr/3334)	369	Definition of <code>\textexclamdown</code> changed (pr/3368)	81
2001/05/25 ltdirchk.dtx v1.0x		Definition of <code>\textquestiondown</code> changed (pr/3368)	81
General: Explicitly set catcode of <code>\endlinechar</code> to 10 (pr/3334) . .	3	2002/06/18 ltoutenc.dtx v1.95	
2001/05/28 ltoutenc.dtx v1.93		General: Changed def for <code>\texregistered</code> to avoid small caps (pr/3420)	80
General: Added composites for compatibility with T1, pr/3295	82	2002/10/01 ltfloat.dtx v1.1v	
Changed the effect of <code>\. \i</code> , pr/3295	84	<code>\thempfootnote</code> : Use braces around <code>\itshape</code> to keep font change local (pr/3460).	303
2001/06/02 fontdef.dtx v2.2y		2002/10/02 ltfssbas.dtx v3.0x	
General: Provide default cfg files (pr/3264)	187	<code>\DeclareFontSubstitution</code> : Adding <code>\LastDeclaredEncoding</code> introduced a bug as on some occasions that macro name was stored in the internal lists instead of the actual encoding. (pr/3459)	110
2001/06/04 fontdef.dtx v2.2z		2002/10/28 ltlists.dtx v1.0s	
General: Guard against math active equal and pipe sign in <code>\models</code>		<code>\endtrivlist</code> : Check for math mode (pr/3437)	227

- 2002/10/28 ltoutenc.dtx v1.96
General: coding change, to follow bug fix by DEK in plain.tex (pr/3469) 82, 88
- 2002/12/13 ltbibl.dtx v1.1n
`\@citex`: Added `\leavevmode` in case citation is at start of paragraph (pr/3486) 308
- 2003/01/01 ltfntcmd.dtx v3.3z
General: Code checked and documentation extended by Chris 193
- 2003/05/18 ltbibl.dtx v1.1o
`\nocite`: Check if we are after `\document` 309
- 2003/08/27 ltpictur.dtx v1.1k
`\@bezier`: added missing displacement pr/3566 278
`\@sline`: check for `\@linechar` being empty pr/3570 266
- 2003/10/13 ltfinal.dtx v1.1e
General: Added extra `\lccode` for `\-` and `\textcompwordmark` . 381
- 2003/12/16 ltoutput.dtx v1.2k
`\@makecol`: Ensure that `\@elt` has a defined state (pr/3586) . . . 332
- 2003/12/30 ltpictur.dtx v1.1j
`\@getcirc`: issue warning if circle size can't be met pr/3473 . . 274
- 2004/01/03 ltoutenc.dtx v1.99b
General: Added `\textogonekcentered` (pr/3532) 83
Added composites for `\k` (pr/3532) 86
Use `\ooalign` for `\k` (pr/3532) 83
- 2004/01/04 ltbibl.dtx v1.1p
`\nocite`: Changed error message 309
- 2004/01/04 ltoutenc.dtx v1.99c
General: More adjustments for ogonek (pr/3532) 83
- 2004/01/23 ltdefns.dtx v1.1g
`\@newenva`: Use kernel version of `\@ifnextchar` (pr/3501) 27
`\@testopt`: Use kernel version of `\@ifnextchar` (pr/3501) 25
`\@xargdef`: Use kernel version of `\@ifnextchar` (pr/3501) 25
`\@xdblarg`: Use kernel version of `\@ifnextchar` (pr/3501) 33
- 2004/01/23 ltdefns.dtx v1.3g
`\kernel@ifnextchar`: Added macro (pr/3501) 32
- 2004/01/28 ltclass.dtx v1.1g
`\@providesfile`: Use kernel version of `\@ifnextchar` (pr/3501) . 369
- 2004/01/28 ltvers.dtx v1.0k
General: Check for old format made 5 years (pr/3601) 21
- 2004/02/02 fontdef.dtx v2.3
General: Many things from here on made robust 183
- 2004/02/04 fontdef.dtx v2.3a
General: Added bigtriangle synonyms for stmaryrd 181
- 2004/02/04 ltspace.dtx v1.3
`\nbreakdashes`: (Macro added . 56
- 2004/02/06 ltoutenc.dtx v1.99d
`\@inmathwarn`: New command added to fix severe bug: pr/3563 72
- 2004/02/07 ltoutput.dtx v1.2l
`\@docclearpage`: Empty kludgeins box if necessary, pr/3528 . . . 331
- 2004/02/13 ltoutenc.dtx v1.99e
General: Documentation fixes: typos 69
- 2004/02/15 ltbibl.dtx v1.1q
`\@citeofmt`: Added hook with default value `\hbox` 310
`\@citex`: Changed to use a hook with default value `\hbox` . . . 308
- 2004/02/15 ltspace.dtx v1.3a
`\nbreakdashes`: (Added spacefactor setting 56
- 2004/10/20 ltoutput.dtx v1.2m
`\@makecol`: Removed dead code . 332
- 2005/07/27 ltfssdcl.dtx v3.0j
`\DeclareMathAlphabet`: (MH) Make document commands robust 156
`\DeclareSymbolFontAlphabet`: (MH) Make document commands robust 165
`\new@mathalphabet`: (MH) Make document commands robust 157
`\non@alpherr`: (MH) Change because command is now properly robust 152
`\SetMathAlphabet`: (MH) Make document commands robust 158
- 2005/09/27 ltoutenc.dtx v1.99g
General: Replace `\sh@ft` by `\ltx@sh@ft` 81, 83, 88
- 2005/09/27 ltplain.dtx v1.1y
`\ltx@sh@ft`: New macro 19
`\sh@ft`: Macro no longer used but left for compatibility 19
- 2005/11/08 ltoutenc.dtx v1.99h
General: Added `\ij` and `\IJ` from babel. (pr/3771) 79, 82, 83
- 2005/11/10 ltmath.dtx v1.1g
`\[`: (MH) Fixed potential problem in `\[` (pr/3399). 214
General: (MH) Minor documentation fixes. 210
- 2006/05/18 ltboxes.dtx v1.1g
`\@parboxto`: Ensure `\@parboxto` holds the value of `\@tempdimb` not the register itself (pr/3867) 237
- 2007/08/05 ltclass.dtx v1.1h
`\@fileswithoptions`: Prevent loss of brackets PR/3965 373

2007/08/06 ltcntrl.dtx v1.0h	change (pr/3975)	156
\@fornoop: Really make defs long		37
2007/08/31 ltfssdcl.dtx v3.0l	2009/09/24 ltvers.dtx v1.0l	
\SetSymbolFont@: Font warning	General: Stop checking for old for-	
changed to info for encoding	mat	21

Index

The italic numbers denote the pages where the corresponding entry is described, numbers underlined point to the definition, all others indicate the places where it is used.

Symbols

$\backslash!$	b152, b154, <u>z144</u> , N114		k208, k224, p494, p498, p499, C208, C209, C210, C220, K10, K11
$\backslash"$	l181, l280, l318, l356, l364, l436, l468, l495, l503, l509, l513, l519, l523, l529, l535, l542, l543, l549, l553, l593, l636, o367, N115	$\backslash@@defaultsubs$	<u>o414</u>
$\backslash\#$	a9, a22, b6, b14, b219, d278, o306, o354, N98	$\backslash@@enc@update$	l138, o207, <u>o211</u>
$\backslash\$$	a21, b4, b13, d277, l261, l343, l350, l425, l648, l655, N99	$\backslash@@end$	a16, a169, d8, k186, k187, s121, y39, y49, M18, N198, N219
$\backslash\%$ a22, a52, a54, a74, b14, b217, d278, l386, l388, o356, L492, L493, N100		$\backslash@@endpbox$	C175, C206, <u>C354</u>
$\backslash\&$ a21, b5, b13, b218, d277, L111, N101		$\backslash@@eqnocr$	z228, z246, <u>z249</u> , z329
\backslash' . b239, l182, l281, l320, l354, l361, l438, l448, l454, l456, l459, l461, l469, l475, l481, l483, l486, l488, l496, l500, l507, l511, l516, l521, l524, l526, l533, l538, l539, l546, l551, l554, l594, l638, l657, l659, l660, l661, l664, l666, l667, l668, l670, l671, o366, s154, t172, y145, z151, B181, C63, K466, N116		$\backslash@@fileswith@pti@ns$	L184, <u>L354</u>
$\backslash($	<u>z168</u> , z193	$\backslash@@hyph$	<u>d9</u>
$\backslash)$	b239, <u>z168</u> , z194	$\backslash@@hyphenation$	<u>l160</u>
$\backslash*$	o359, <u>z148</u> , L426, L494	$\backslash@@if@newlist$	K476, K523
$\backslash+$	C63	$\backslash@@if@definable$	<u>d101</u> , l17
$\backslash,$. b153, b155, <u>i187</u> , t414, y145, z7, z8, z40, z108, z110, z113, z127, z144		$\backslash@@input$	a15, d7, d293, k162, k163, k172, o307
$\backslash-$	b121, <u>d9</u> , d11, i178, l315, l316, l431, l632, l633, o361, y145, B180, C63, N60	$\backslash@@italiccorr$	<u>d12</u> , v95, v99
$\backslash.$	b152, b154, k39, l183, l282, l351, l352, l370, l444, l445, l471, l472, l498, l595, l662, l669, o360	$\backslash@@line$	<u>B289</u>
$\backslash/$	a44, d12, o274, o362, L110	$\backslash@@math@bgroup$	v113, v120
$\backslash:$	b153, b155, d270, d271, <u>z149</u>	$\backslash@@math@egroup$	v110, <u>v110</u>
$\backslash;$	b153, b155, t408, z128, <u>z144</u>	$\backslash@@par$	d6, h4, <u>46</u> , y49, y104, y108, y111, A82, A85, B162, B179, C181, F50, F101, K205
$\backslash<$	l432, l586, o357, y145, C62, C100	$\backslash@@patterns$	<u>l160</u>
$\backslash=$ l184, l283, l369, l596, s154, B181, C62		$\backslash@@protect$	d228, d234, d243
$\backslash>$ l429, l587, o358, y145, <u>z144</u> , z149, C62		$\backslash@@startpbox$	C175, C206, <u>C354</u>
$\backslash?$	b152, b154, N116	$\backslash@@underline$	<u>B259</u> , B262, B263
$\backslash@$	a12, d272, d273, g22, <u>i190</u> , j2, L24, L32, N108	$\backslash@@unprocessedoptions$	L336, <u>L398</u>
$\backslash@@$	a254, a255, f15, f19, f20, f21, f22, f24, f27, f28, f30, f31,	$\backslash@@warning$	<u>g188</u>
		$\backslash@Alph$	m38, <u>m54</u>
		$\backslash@DeclareMathDelimiter$	r595, <u>r614</u>
		$\backslash@DeclareMathSizes$	o181, o182, <u>o184</u>
		$\backslash@Esphack$	<u>i77</u> , G126, G137
		$\backslash@M$	<u>b21</u> , b196, b197, d23, d25, i27, i28, i29, i30, i31, i32, i33, i34, i57, p401, p424, z238, A184, C58, F50, F83, F101, F113, F154, K145, K146, K206
		$\backslash@MM$	<u>b21</u> , G275, K249
		$\backslash@Mi$	<u>e3</u> , K117
		$\backslash@Mii$	<u>e3</u> , G49, G119, G137, G190, K245, K898
		$\backslash@Miii$	<u>e3</u> , G51, G192, K248
		$\backslash@Miv$	<u>e6</u> , G120, G126, K220
		$\backslash@Roman$	m36, <u>m42</u>
		$\backslash@TeXversion$	1, 5, <u>a249</u> , g31

File Key: a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltdefns.dtx,
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j=ltlogos.dtx, k=ltfiles.dtx, l=ltoutenc.dtx, m=ltcounts.dtx, n=ltlength.dtx,
o=ltfssbas.dtx, p=ltfssstrc.dtx, q=ltfsscmp.dtx, r=ltfssdcl.dtx, s=ltfssini.dtx,
t=fontdef.dtx, u=preload.dtx, v=ltfntcmd.dtx, w=ltpageno.dtx, x=ltxref.dtx,
y=ltmiscen.dtx, z=ltmath.dtx, A=ltlists.dtx, B=ltboxes.dtx, C=lttab.dtx,
D=lt pictur.dtx, E=ltthm.dtx, F=ltsect.dtx, G=ltfloat.dtx, H=ltidxglo.dtx,
I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx,
N=ltfinal.dtx, O=ltpatch.ltx

- `\@acci` [s154](#), [B181](#)
- `\@accii` [s154](#), [B181](#)
- `\@acciii` [s154](#), [B181](#)
- `\@acol` [C150](#),
[C160](#), [C230](#), [C231](#), [C243](#), [C244](#),
[C247](#), [C264](#), [C277](#), [C285](#), [C295](#)
- `\@acolampacol` [C228](#), [C245](#),
[C247](#), [C254](#), [C262](#), [C294](#), [C297](#)
- `\@activechar@info` [K457](#)
- `\@addamp` [C221](#), [C230](#),
[C231](#), [C246](#), [C260](#), [C295](#), [C296](#)
- `\@addfield` [C45](#),
[C55](#), [C77](#), [C84](#), [C116](#), [C127](#), [C129](#)
- `\@addmarginpar` [K283](#), [K1149](#)
- `\@addtobot` .. [K717](#), [K804](#), [K868](#), [K920](#)
- `\@addtocurcol` [K280](#), [K808](#)
- `\@addtodblcol` [K649](#), [K1032](#)
- `\@addtofilelist` [a48](#), [a50](#), [k54](#), [k162](#),
[k205](#), [s111](#), [s129](#), [s133](#), [s140](#),
[s143](#), [s150](#), [s153](#), [N67](#), [N70](#), [N239](#)
- `\@addtonextcol` [K648](#), [K955](#)
- `\@addtopreamble` [C279](#), [C292](#),
[C298](#), [C299](#), [C300](#), [C302](#), [C314](#)
- `\@addtoreset` [m16](#), [m28](#), [m33](#)
- `\@addtotoporbot` .. [K754](#), [K914](#), [K1001](#)
- `\@afterheading` [F75](#), [F108](#)
- `\@afterindentfalse` [F28](#)
- `\@afterindenttrue` .. [F26](#), [F107](#), [F153](#)
- `\@alph` [m37](#), [m50](#), [G254](#)
- `\@ampacol` [C228](#), [C245](#), [C256](#), [C297](#)
- `\@arabic` [m32](#), [m34](#), [m40](#), [G252](#)
- `\@argarraycr` [C185](#), [C186](#)
- `\@argdef` [d47](#)
- `\@argsrbox` [B269](#)
- `\@argtabularcr` [C192](#), [C193](#)
- `\@array` [C163](#), [C164](#)
- `\@arrayacol` [C150](#), [C228](#)
- `\@arrayclassiv` [C151](#), [C299](#)
- `\@arrayclassz` [C150](#), [C245](#)
- `\@arraycr` [C152](#), [C183](#), [C185](#)
- `\@arrayparboxrestore` [B176](#), [B190](#), [C352](#)
- `\@arrayrule` [C277](#),
[C279](#), [C283](#), [C285](#), [C287](#), [C314](#)
- `\@arstrut` [C174](#), [C207](#), [C311](#)
- `\@arstrutbox` . [C167](#), [C200](#), [C311](#), [C353](#)
- `\@author` [F5](#)
- `\@autoerr` [b75](#), [b247](#), [b255](#),
[g19](#), [g88](#), [g119](#), [g150](#), [g213](#),
[g220](#), [g223](#), [g226](#), [g230](#), [g236](#),
[g239](#), [g242](#), [g246](#), [g249](#), [g258](#),
[g264](#), [g267](#), [g270](#), [g273](#), [g278](#),
[g281](#), [g286](#), [k174](#), [l56](#), [o483](#), [r78](#)
- `\@autoload` [d286](#),
[g213](#), [p417](#), [C146](#), [D15](#), [K1212](#)
- `\@auxout` [I7](#), [I8](#), [I19](#), [I29](#), [I37](#),
[I43](#), [k81](#), [k87](#), [k103](#), [k118](#), [x33](#), [F145](#)
- `\@backslashchar`
..... [d191](#), [g216](#), [g218](#), [t185](#), [L459](#)
- `\@badcrrr` [g274](#)
- `\@badend` [g233](#), [y65](#)
- `\@badlinearg` [g260](#), [D79](#),
[D88](#), [D89](#), [D93](#), [D137](#), [D142](#), [D153](#)
- `\@badmath` [g237](#), [z168](#),
[z169](#), [z172](#), [z184](#), [z189](#), [z277](#), [z291](#)
- `\@badpoptabs` [g243](#), [C76](#), [C138](#)
- `\@badrequireerror` [L124](#), [L406](#)
- `\@badtab` [g247](#),
[C24](#), [C78](#), [C99](#), [C105](#), [C112](#), [C135](#)
- `\@begin@tempboxa`
[B11](#), [B26](#), [B114](#), [B162](#), [B270](#), [B278](#)
- `\@begindocumenthook`
.. [I33](#), [k48](#), [k51](#), [o301](#), [L365](#), [L379](#)
- `\@beginndvi` [K502](#), [K528](#)
- `\@beginndvibox` [K67](#), [K529](#)
- `\@beginparpenalty`
..... [i30](#), [z280](#), [z294](#), [A23](#), [A160](#)
- `\@begintheorem` [E30](#), [E35](#)
- `\@bezier` [D342](#), [D343](#)
- `\@bibitem` [I3](#), [I8](#)
- `\@biblabel` [I4](#), [I54](#)
- `\@bitor` [K15](#), [K672](#), [K702](#),
[K769](#), [K851](#), [K860](#), [K989](#), [K1094](#)
- `\@botlist` [K46](#), [K308](#), [K310](#),
[K535](#), [K556](#), [K565](#), [K566](#), [K731](#),
[K734](#), [K769](#), [K771](#), [K860](#), [K862](#)
- `\@botnum` [G172](#), [K90](#),
[K728](#), [K729](#), [K734](#), [K738](#), [K745](#),
[K1024](#), [K1029](#), [K1257](#), [K1279](#)
- `\@botroom` [G173](#), [K91](#), [K731](#), [K734](#), [K1258](#)
- `\@boxfpsbit` [K1327](#), [K1329](#), [K1334](#)
- `\@break@tfor` [f31](#), [k157](#), [v80](#)
- `\@bsphack` [I39](#),
[i9](#), [i63](#), [i138](#), [i154](#), [x32](#), [G48](#),
[G189](#), [H6](#), [H18](#), [H23](#), [H35](#), [K1229](#)
- `\@caption` [G12](#), [G14](#)
- `\@captertype` [G5](#), [G9](#), [G12](#), [G36](#), [G84](#), [K1291](#)
- `\@car` [24](#), [d30](#), [j14](#), [l82](#)
- `\@carcube` [d32](#), [d104](#)
- `\@ccclv` [b16](#), [K250](#), [K254](#), [K306](#),
[K307](#), [K335](#), [K359](#), [K363](#), [K364](#)
- `\@ccclvi` [b21](#), [b50](#), [b53](#), [b56](#)
- `\@cdr` [24](#), [d30](#), [d251](#), [d252](#)
- `\@centercr` [y68](#), [y76](#), [y83](#), [y89](#)

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`\@centering` [z208](#),
[z209](#), [z216](#), [z219](#), [z222](#), [z322](#), [z326](#)
`\@cflb` [K532](#)
`\@cflt` [K532](#)
`\@changed@cmd` . [l3](#), [l68](#), [l178](#), [o106](#), [o215](#)
`\@changed@x` [l3](#), [l166](#), [l174](#)
`\@changed@x@mouth` [l166](#), [l174](#)
`\@charlb` [k121](#), [k129](#)
`\@charrb` [k123](#), [k129](#)
`\@chclass` [C241](#), [C242](#), [C303](#), [C316](#), [C321](#)
`\@check@c` [d162](#), [d164](#)
`\@check@eq` [d168](#), [d169](#), [d173](#)
`\@checkend` [y11](#), [y61](#), [y64](#)
`\@chnum` [C249](#),
[C268](#), [C303](#), [C318](#), [C319](#), [C320](#)
`\@circ` [D308](#), [D309](#), [D310](#)
`\@circle` [D296](#), [D297](#)
`\@circlefnt` [D47](#), [D49](#),
[D257](#), [D275](#), [D301](#), [D316](#), [D333](#)
`\@cite` [l16](#), [l52](#)
`\@cite@ofmt` [l24](#), [l53](#)
`\@citea` [l15](#), [l17](#)
`\@citeb` [l16](#), [l18](#), [l19](#),
[l20](#), [l23](#), [l24](#), [l41](#), [l42](#), [l43](#), [l44](#), [l45](#)
`\@citex` [l13](#), [l14](#)
`\@classi` [C241](#), [C275](#)
`\@classii` [C241](#), [C289](#)
`\@classiii` [C241](#), [C294](#)
`\@classiv` [C151](#), [C162](#), [C242](#)
`\@classoptionslist`
[L9](#), [L153](#), [L164](#), [L281](#), [L282](#), [L517](#)
`\@classv` [C242](#), [C300](#)
`\@classz` [C150](#), [C161](#), [C241](#)
`\@cline` [C335](#)
`\@clnht` ... [D95](#), [D96](#), [D104](#), [D106](#),
[D108](#), [D118](#), [D125](#), [D151](#), [D327](#)
`\@clnwd` [D97](#),
[D103](#), [D107](#), [D109](#), [D110](#), [D327](#)
`\@cls@pkg` [L87](#), [L88](#),
[L316](#), [L345](#), [L382](#), [L391](#), [L393](#), [L410](#)
`\@clxextension`
... [L16](#), [L41](#), [L52](#), [L70](#), [L94](#),
[L120](#), [L137](#), [L153](#), [L163](#), [L203](#),
[L218](#), [L226](#), [L280](#), [L349](#), [L357](#), [L383](#)
`\@clubpenalty` [k9](#), [k19](#), [A186](#), [F89](#), [F118](#)
`\@colht` ... [k16](#), [G171](#), [G173](#), [G176](#),
[G179](#), [G180](#), [K95](#), [K179](#), [K190](#),
[K199](#), [K200](#), [K311](#), [K323](#), [K350](#),
[K383](#), [K417](#), [K423](#), [K427](#), [K437](#),
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[K674](#), [K707](#), [K1108](#), [K1392](#), [N12](#)
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[K1029](#), [K1253](#), [K1272](#), [K1446](#)
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[K845](#), [K848](#), [K876](#), [K983](#), [K986](#),
[K1254](#), [K1402](#), [K1406](#), [K1451](#), [N11](#)
`\@combinedblfloats` [K568](#), [K1492](#)
`\@combinefloats` [K377](#), [K532](#)
`\@comdblflflt` [K568](#)
`\@comflelt` [K538](#), [K554](#), [K568](#)
`\@cons` [24](#),
[d29](#), [m33](#), [G118](#), [G135](#), [G234](#),
[K185](#), [K678](#), [K692](#), [K711](#), [K713](#),
[K880](#), [K948](#), [K1017](#), [K1110](#),
[K1133](#), [K1150](#), [K1151](#), [K1452](#)
`\@contfield` [C52](#), [C128](#), [C140](#)
`\@ctrerr` [g228](#), [m53](#), [m57](#), [m60](#)
`\@curfield` [C16](#), [C43](#),
[C49](#), [C53](#), [C54](#), [C56](#), [C121](#), [C122](#)
`\@curline`
[C16](#), [C29](#), [C41](#), [C46](#), [C55](#), [C56](#),
[C57](#), [C81](#), [C82](#), [C94](#), [C119](#), [C120](#)
`\@curr@enc` [l119](#), [l121](#)
`\@currbox` [G56](#),
[G87](#), [G91](#), [G118](#), [G135](#), [G155](#),
[G157](#), [G159](#), [G198](#), [G201](#),
[G206](#), [G210](#), [K161](#), [K162](#), [K173](#),
[K174](#), [K176](#), [K177](#), [K185](#), [K261](#),
[K262](#), [K648](#), [K649](#), [K842](#), [K844](#),
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[K1048](#), [K1052](#), [K1063](#), [K1069](#),
[K1071](#), [K1075](#), [K1080](#), [K1089](#),
[K1103](#), [K1110](#), [K1133](#), [K1151](#),
[K1160](#), [K1297](#), [K1298](#), [K1327](#),
[K1357](#), [K1362](#), [K1407](#), [K1410](#),
[K1422](#), [K1430](#), [K1447](#), [K1452](#)
`\@currdir` [1](#), [4](#), [a55](#), [a77](#), [a79](#),
[a85](#), [a87](#), [a93](#), [a95](#), [a100](#), [a102](#),
[a112](#), [a125](#), [a190](#), [a203](#), [a216](#), [L436](#)
`\@current@cmd` [l25](#), [o219](#)
`\@currentlabel` [x34](#),
[x37](#), [x40](#), [z212](#), [z307](#), [B243](#), [G277](#)
`\@currenvir` [g234](#), [y3](#), [y55](#), [y65](#), [A112](#),
[B74](#), [L453](#), [L459](#), [L467](#), [L471](#), [L477](#)
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`\@currxt` [L15](#), [L23](#), [L31](#), [L93](#), [L94](#),
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 k216, k217, L14, L22, L30, L85,
 L87, L93, L146, L222, L306,
 L308, L331, L333, L335, L337,
 L338, L375, L391, L393, L400, L410
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 \@curroptions
 ... L146, L154, L176, L400, L401
 \@currsiz s58
 \@currtype K100,
 K669, K670, K671, K672, K769,
 K851, K860, K989, K1094,
 K1297, K1299, K1300, K1303
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 C28, C77, C78, C79, C85, C86,
 C89, C93, C94, C98, C133, C134
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 C28, C40, C46, C80, C93, C97, C98
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 D198, D199, D200, D203, D206,
 D208, D217, D219, D220, D221,
 D222, D225, D228, D231, D329
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 D192, D193, D194, D195, D205,
 D207, D210, D211, D212, D213,
 D215, D216, D227, D230, D329
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 D192, D194, D197, D199, D200,
 D201, D205, D207, D209, D210,
 D211, D212, D215, D219, D221,
 D222, D223, D229, D232, D329
 \@date F7
 \@dbflt G32, G162
 \@dblarg 23, d275, F37, F125, G12
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 K326, K328, K613, K620, K621,
 K1094, K1096, K1133, K1135
 \@dblfloat G31
 \@dblfloatplacement
 . k25, G177, K325, K1251, K1498
 \@dblflset G26
 \@dblfpbot G185, K1541
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 \@dblfpstop G183, K1541
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 K183, K185, K321, K322, K573,
 K577, K579, K580, K1105, K1110
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 K88, K108, K186, K188, K584,
 K1045, K1046, K1109, K1112,
 K1120, K1140, K1145, K1261
 \@dbltoproom G179,
 G181, K89, K1048, K1051,
 K1052, K1061, K1062, K1065,
 K1068, K1071, K1074, K1079,
 K1083, K1088, K1107, K1262
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 \@declaredoptions
L8, L127, L150, L166, L181, L363
 \@declareoption ... L125, L126, L134
 \@defaultsubs o404, o414, y26
 \@defaultunits o185, o245, p133, p135
 \@defdefault@ds ... L125, L130, L135
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 K49, K308, K317, K318, K596,
 K604, K605, K851, K853, K948,
 K950, K989, K991, K1017, K1019
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 . m12, m25, z197, A217, A218,
 A219, A220, E8, E16, G251, G253
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 t464, t465, t467, t468, B258,
 B288, C169, C201, D127, D178,
 D181, D196, D203, D376, K1189
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 \@dischyph d11, B180
 \@docclearpage K246, K297
 \@documentclasshook L3, L285
 \@doendpe y62, A123
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 \@donoparitem A134, A148
 \@dot D296, D309
 \@dotsep F160
 \@dottedtocline F149
 \@downline D175, D179, D184
 \@downvector D146, D184
 \@eha I47, g195, g219, g222,
 g225, g235, g238, g280, k88, l54,
 l939, l949, o33, o77, o119, o162,
 o201, o256, p106, r16, r57, r118,
 r233, r265, r306, r351, r356,
 r411, r519, r523, r527, r561,
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 g229, g263, g266, g269, K182, K314

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d124, g195, g274, g277, g285,
g288, y130, y141, z253, A210, F4
- \@ehd . g195, g232, g241, g245, g248,
g256, r76, C91, C100, G6, L251
- \@elt d29, k122, m20, m24, K8,
K11, K15, K41, K42, K43, K44,
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K576, K578, K606, K622, K639,
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B20, B29, B119, B175, B276, B286
- \@enddocumenthook .. y10, L365, L380
- \@endfloatbox G115, G132, G142
- \@endparenv A120, A123
- \@endparpenalty
..... i31, z281, z295, A23, A124
- \@endpbox C175,
C206, C236, C301, C352, C355
- \@endpfalse y59, A126, A127, A128, B77
- \@endpeltrue A128
- \@endpetrue A124, A125
- \@endtheorem E13, E19, E25, E35
- \@enlargepage .. K1203, K1208, K1214
- \@ensuredmath z264, z266
- \@enumctr A224, A227, A228
- \@enumdepth .. A216, A222, A223, A224
- \@eqcnt z205,
z250, z255, z309, z324, z325, z327
- \@eqncr ... z217, z235, z256, z257, z311
- \@eqnnum .. z199, z200, z254, z268, z302
- \@eqnsel z205, z323
- \@eqnswfalse z234
- \@eqnswtrue z207, z213, z255, z308
- \@eqpen z205, z238, z240, z247
- \@err@ g40,
g44, g47, g55, g67, g71, g74, g82
- \@esphack . I50, i11, i69, i143, i160,
x35, G240, H17, H19, H34, K1231
- \@evenfoot J12, J15, K492
- \@evenhead J12, J15, K491
- \@expandtwoargs
..... d189, L74, L152, L166, L190
- \@expast C209, C237
- \@failedlist K637,
K660, K672, K678, K692, K702
- \@fcolmadefalse K628
- \@fcolmadetrue K690
- \@filef@und ... k144, k154, k162, k172
- \@filelist
... k53, k204, k205, k216, s111,
s129, s140, s150, N67, N223, N239
- \@filesfalse k64
- \@fileswith@pti@ns L124,
L184, L276, L277, L279, L303, L354
- \@fileswith@ptions
..... L271, L272, L274, L278
- \@fileswithoptions
..... L203, L210, L218, L269
- \@filestrue k7
- \@finalstrut . B247, B287, C353, G282
- \@firstampfalse ... C224, C247, C264
- \@firstamptrue C232
- \@firstcolumnfalse K1471
- \@firstcolumntrue
..... k22, K79, K155, K1477
- \@firstofone I18,
I42, d184, k47, l73, l118, p300,
r40, r99, r606, y9, z262, C340, G10
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d247, d274, k155, l102, l911,
l927, r610, x19, J16, L48, L64, L77
- \@firsttab C2, C65, C66, C67, C97, C109
- \@flcheckspace ... K731, K767, K1398
- \@flfail K660, K685, K702, K711
- \@float G26, G32
- \@floatboxreset G97, G99
- \@floatpenalty G3,
G49, G51, G54, G116, G119,
G124, G126, G133, G137,
G190, G192, G196, G200, G234
- \@floatplacement k25, G169,
K130, K157, K201, K353, K1252
- \@flsetnum K728,
K764, K849, K987, K1045, K1366
- \@flsettextmin ... K825, K973, K1382
- \@flstop K1268
- \@flsucceed .. K653, K661, K684, K713
- \@fltovf g268, G89, G201
- \@flupdates K734, K779, K1443
- \@flushglue
e17, y77, y83, y90, y103, A76, B187
- \@fnsymbol m39, m58
- \@font@info o108, o146, o152,
o285, o334, o452, p30, p38, p46,
p74, p87, p126, p154, p168,
p179, p193, p209, p215, p228,
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p532, p544, r126, r141, r175,

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 p77, p448, p464, p480, p489,
 p502, p531, p543, q20, y23, N73
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 .. G264, G270, G288, G294, G295
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 G264, G270, G271, G304, G310
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 L150, L164, L176, L181, L196, L401
 \@forloop f19, f20
 \@fornoop f15, f23, f29
 \@fortmp f17, f18, f26
 \@fpbot G185, K658, K1535
 \@fpmin G176,
 G182, K94, K689, K1259, K1458
 \@fps G37, G38, G40,
 G43, G60, K1289, K1291, K1294
 \@fpsadddefault ... G41, G44, K1286
 \@fpsep G184, K656, K665, K706, K1535
 \@fpstype K725,
 K746, K747, K761, K792, K793,
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 K968, K970, K1042, K1057,
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 K1122, K1282, K1298, K1300,
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 K1386, K1415, K1418, K1429
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 \@framebox B107, B108
 \@framepicbox B107, B141
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 G199, K41, K161, K375, K550,
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 \@getfpsbit K722, K758, K1039, K1325
 \@getlarrow D144, D152, D154
 \@getlinechar D90, D129
 \@getpen i7, i10, i21, i55
 \@getrarrow D145, D152, D161
 \@glossaryfile H21, H22, H31
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 \@gobble .. I11, I25, I26, d79, d102,
d181, d191, d210, d214, d292,
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 i42, i207, k54, k204, l29, l889,
 o401, p299, q16, r19, r21, r179,
 r190, r249, r296, r297, r326,
 r332, r340, r345, r363, r377,
 r387, r396, r409, r426, r435,
 r513, r555, r648, r711, r784,
 r815, s133, s143, s153, F126,
 F127, F128, F129, F130, F146,
 G7, K498, K499, K500, K696,
 K1247, K1459, L239, L422,
 L446, L451, N70, N168, N174, N239
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 \@gobblefour d181,
 r15, r176, r287, r289, r293,
 r295, r305, r309, r433, r485, L453
 \@gobbletwo d148,
 d149, d181, f12, k26, o406, r93,
 y16, y24, J11, J13, L445, N79
 \@gtempa d95, d96, d154, d156, k183,
 k184, k186, k187, k188, C3, C5,
 C6, C7, C8, L84, L85, L95, L97
 \@halfwidth D2, D48,
 D50, D57, D127, D177, D180,
 D196, D203, D217, D227, D230,
 D335, D361, D374, D375, D376
 \@halignto .. C152, C156, C159, C173
 \@hangfrom F49, F100, F121
 \@height b190,
d13, i148, i156, l247, l249, p144,
 t246, t464, t465, t467, t468,
 B88, B93, B127, B137, B258,
 B288, C168, C201, C327, C344,
 D127, D178, D181, D196, D203,
 D219, D226, D293, D375, K1189
 \@highpenalty i56, N3
 \@hightab ... C11, C23, C25, C65,
 C77, C86, C87, C102, C133, C134
 \@hline D81, D126, D143
 \@holdpg K103, K250,
 K252, K253, K258, K259, K260
 \@hspace i191, i192
 \@hspacer i191, i193
 \@hvector D139, D143
 \@icentercr y71, y72
 \@iden d187
 \@if d143, d144, d146
 \@if@pti@ns L74, L76, L82
 \@if@ptions .. L69, L70, L73, L75, L314
 \@ifatmargin C57, C97
 \@ifclasslater 365, L51
 \@ifclassloaded 365, L40

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 I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx,
 N=ltfinal.dtx, O=ltpatch.ltx

- `\@ifclasswith` [365](#), [L69](#)
- `\@ifdefinable` [23](#), [d51](#),
[d53](#), [d99](#), [d101](#), [d212](#), [l14](#), [l17](#),
[m11](#), [n3](#), [s54](#), [B54](#), [E7](#), [E15](#), [E22](#)
- `\@iffileonpath` [k140](#), [k148](#)
- `\@ifl@aded` .. [L40](#), [L41](#), [L44](#), [L50](#), [L313](#)
- `\@ifl@t@r` [L56](#), [L59](#), [L66](#), [L260](#)
- `\@ifl@ter` [l875](#),
[l876](#), [L51](#), [L52](#), [L55](#), [L58](#), [L341](#)
- `\@ifl@ter@@` [l875](#), [l876](#)
- `\@ifnch` [d257](#), [d259](#), [d271](#)
- `\@ifnextchar`
.. [I3](#), [I13](#), [23](#), [a45](#), [d253](#), [d258](#),
[d274](#), [i44](#), [i206](#), [k163](#), [m13](#),
[p371](#), [y70](#), [z203](#), [A133](#), [B5](#), [B7](#),
[B10](#), [B31](#), [B56](#), [B57](#), [B61](#), [B65](#),
[B106](#), [B107](#), [B109](#), [B142](#), [B146](#),
[B150](#), [B154](#), [B195](#), [B199](#), [B203](#),
[B250](#), [B266](#), [B268](#), [C59](#), [C163](#),
[C185](#), [C192](#), [D12](#), [D63](#), [D74](#),
[D263](#), [E3](#), [E5](#), [E28](#), [G27](#), [G162](#),
[G203](#), [G262](#), [G285](#), [G302](#), [K157](#),
[K1270](#), [L90](#), [L255](#), [L270](#), [L275](#)
- `\@iforloop` [f21](#), [f22](#)
- `\@ifpackagelater` [365](#), [L51](#)
- `\@ifpackageloaded` [365](#), [L40](#)
- `\@ifpackagewith` [365](#), [L69](#)
- `\@ifframebox` [B110](#), [B111](#), [B112](#)
- `\@ifframepicbox` [B142](#), [B143](#)
- `\@ifstar` [23](#), [d40](#), [d274](#), [i38](#), [i132](#), [i191](#),
[o181](#), [q111](#), [y69](#), [y136](#), [z237](#),
[C58](#), [C184](#), [C191](#), [D73](#), [D296](#),
[F35](#), [F125](#), [K1198](#), [L125](#), [L147](#)
- `\@ifundefined` [I20](#), [I44](#), [23](#), [d96](#), [d103](#),
[d123](#), [d131](#), [d156](#), [d167](#), [d245](#),
[l891](#), [m3](#), [m7](#), [m16](#), [o75](#), [o161](#),
[p384](#), [r211](#), [x23](#), [y44](#), [y53](#), [E21](#),
[J3](#), [J7](#), [L38](#), [L115](#), [L177](#), [L483](#), [L486](#)
- `\@ignorefalse` [y4](#), [y58](#), [y63](#), [G239](#)
- `\@ignoretrue`
[i82](#), [y4](#), [y7](#), [z196](#), [z199](#), [z231](#), [z332](#)
- `\@iiiminipage`
.. [B197](#), [B201](#), [B204](#), [B205](#), [B206](#)
- `\@iiparbox` [B148](#),
[B152](#), [B155](#), [B156](#), [B157](#), [B234](#)
- `\@iiminipage` [B200](#), [B202](#)
- `\@iinput` [k163](#), [k164](#)
- `\@iiparbox` [B151](#), [B153](#)
- `\@iirsbox` [B268](#), [B277](#)
- `\@imakebox` [B10](#), [B25](#), [B63](#)
- `\@imakepicbox` ... [B31](#), [B32](#), [B68](#), [B144](#)
- `\@iminipage` [B196](#), [B198](#)
- `\@include` [k89](#), [k90](#)
- `\@index` [H18](#), [H19](#), [H35](#)
- `\@indexfile` [H4](#), [H5](#), [H14](#)
- `\@inlabelfalse` [A28](#), [A104](#), [A174](#), [K140](#)
- `\@inlabeltrue` [A28](#), [A168](#)
- `\@inmatherr` .. [g282](#), [A112](#), [A132](#), [D296](#)
- `\@inmathwarn` [l3](#)
- `\@input` [k28](#), [k93](#), [k171](#), [F135](#)
- `\@input@` [I31](#), [k108](#), [k173](#), [o344](#)
- `\@inputcheck` [a17](#), [a138](#), [a139](#), [a142](#),
[a150](#), [d24](#), [k3](#), [k135](#), [k136](#), [k143](#),
[k152](#), [k153](#), [k156](#), [L433](#), [L434](#), [L441](#)
- `\@insertfalse` [K813](#), [K961](#), [K1037](#)
- `\@inserttrue` [K741](#), [K786](#), [K900](#), [K1115](#)
- `\@invalidchar` [g288](#)
- `\@iparbox` [B147](#), [B149](#)
- `\@irsbox` [B266](#), [B268](#), [B269](#)
- `\@isavebox` [B61](#), [B62](#)
- `\@isavepicbox` [B66](#), [B67](#)
- `\@ishortstack` [D64](#), [D72](#)
- `\@istackcr` [D74](#), [D75](#)
- `\@itabcr` [C59](#), [C60](#)
- `\@item` [A133](#), [A146](#)
- `\@itemdepth` .. [A231](#), [A233](#), [A234](#), [A235](#)
- `\@itemfudge` [C40](#), [C46](#), [C73](#)
- `\@itemitem` [A235](#), [A238](#)
- `\@itemlabel` [A44](#), [A96](#), [A133](#)
- `\@itempenalty` [i32](#), [A23](#), [A165](#)
- `\@iwhiledim` [f7](#)
- `\@iwhilenum` [f3](#)
- `\@iwhilesw` [f10](#)
- `\@ixpt` [o490](#)
- `\@ixstackcr` [D73](#)
- `\@killglue` [D30](#), [D38](#), [D44](#)
- `\@kludgeins` ... [K270](#), [K271](#), [K272](#),
[K274](#), [K300](#), [K301](#), [K379](#), [K400](#),
[K401](#), [K407](#), [K408](#), [K409](#), [K418](#),
[K434](#), [K438](#), [K448](#), [K1191](#), [K1230](#)
- `\@labels` [A27](#),
[A136](#), [A137](#), [A179](#), [A196](#), [A197](#)
- `\@largefloatcheck` . [G117](#), [G134](#), [G154](#)
- `\@lastchclass` [C232](#),
[C242](#), [C243](#), [C245](#), [C253](#), [C276](#),
[C290](#), [C294](#), [C303](#), [C316](#), [C317](#)
- `\@latex@e@error` [d292](#)
- `\@latex@error` [I47](#),
[d97](#), [d124](#), [g150](#), [g191](#), [g215](#),
[g222](#), [g225](#), [g229](#), [g232](#), [g234](#),
[g238](#), [g241](#), [g244](#), [g248](#), [g254](#),
[g261](#), [g266](#), [g269](#), [g272](#), [g274](#),
[g276](#), [g280](#), [g285](#), [g288](#), [k88](#), [l52](#),
[o8](#), [o33](#), [o77](#), [o119](#), [o162](#), [o201](#),

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N=ltfinal.dtx, O=ltpatch.ltx

- o256, p105, q90, q101, r14,
r55, r75, r116, r137, r153, r233,
r265, r305, r309, r351, r356,
r411, r479, r485, r519, r523,
r527, r561, r571, r655, r660,
r663, r695, r698, r752, r755,
r758, r825, r831, s36, s86, v125,
y54, y129, y141, z253, A209,
C91, C100, F4, G6, L214, L233,
L246, L315, L390, L407, L415, L420
- \@latex@info d197, g150
- \@latex@info@no@line g150, K458
- \@latex@warning
I22, I45, g150, g188, l60, x14,
D259, G158, K1292, L470, L476
- \@latex@warning@no@line
..... d175, g150, g189,
k13, k202, x8, x26, x27, y31,
F6, K191, K223, K1165, K1358,
L86, L261, L342, L435, L442, L500
- \@latexbug g271, K285, K1151
- \@latexerr
g188, K182, K314, K1221, K1238
- \@lbibitem I3, I4
- \@ldots t412, t414
- \@leftcolumn K102, K1472, K1481
- \@leftmark J16, J36
- \@let@token d257,
d260, d263, d271, i172, i173,
i180, v65, v78, z153, z155, z158
- \@lign z138, z140
- \@linechar .. D90, D91, D92, D96,
D97, D99, D104, D106, D107,
D108, D109, D111, D115, D116,
D119, D120, D125, D150, D325
- \@linefmt D47, D49, D90,
D143, D151, D182, D185, D332
- \@linelen D78,
D79, D103, D110, D119, D121,
D126, D127, D128, D136, D137,
D178, D181, D183, D184, D326
- \@listctr I9, A192, A215
- \@listdepth
. A23, A35, A38, A43, A99, B218
- \@listfiles k52, k208, k223
- \@loadwithoptions . L220, L226, L230
- \@lowpenalty i55, N3
- \@ltab C62, C97
- \@m I17, b21, b150, b152, b153, b186,
b187, i190, k39, A80, D113, D117
- \@mainaux
. k5, k31, k32, k81, k93, k118, y15
- \@makebox B7, B9
- \@makecaption G24
- \@makecol K209, K336, K356
- \@makefcolumn
. K317, K318, K326, K328, K1456
- \@makefnmark G255, G298
- \@makefntext B246, G281
- \@makeoother
a23, a44, a73, d277, d278, o357,
o358, o359, o360, o361, o362,
o363, o364, o365, o366, o367,
y113, y123, y134, L110, L111, L458
- \@makepicbox B6, B30, D232
- \@makespecialcolbox K380, K404
- \@marbox . G199, G201, G205, G209,
G210, G234, K1150, K1160,
K1163, K1171, K1173, K1174,
K1176, K1177, K1178, K1187
- \@marginparreset G218, G225
- \@markright J29, J34
- \@maxdepth . k50, K72, K362, K394, N9
- \@maxtab C2, C85
- \@medpenalty i56, N3
- \@midlist K47,
K375, K376, K769, K771, K880
- \@minipagefalse A171, B191,
B193, B231, G112, G144, G220
- \@minipagerestore B219, B221
- \@minipagetrue B192, G111
- \@minus d13, K1528,
K1529, K1530, K1533, K1534
- \@missingfileerror
..... k167, k174, 366, L335
- \@miv e3
- \@mkboth J11, J13
- \@mklab A45, A130
- \@mkpream C171, C204, C232
- \@mparbottom G242,
G243, K99, K352, K1161,
K1169, K1170, K1171, K1172
- \@mpargs B210, B234
- \@mparswitchfalse K83
- \@mpfn . B216, G262, G267, G307, G311
- \@mpfootins B225,
B226, B229, B235, B238, B239
- \@mpfootnotetext B217, B237
- \@mplistdepth B218, B235
- \@multicnt
C338, C340, C341, C342, C349,
C350, C351, D38, D39, D41,
D322, D359, D361, D362, D363,
D364, D368, D372, D383, D387

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N=ltfinal.dtx, O=ltpatch.ltx

`\@multiplelabels` [k27](#), [x25](#), [x31](#), [y29](#), [y35](#)
`\@multiput` [D36](#), [D37](#)
`\@multispan` [C339](#), [C343](#), [C347](#)
`\@namedef` [23](#), [d27](#), [k128](#),
[l894](#), [o110](#), [o111](#), [o135](#), [p378](#),
[x28](#), [y121](#), [z257](#), [z258](#), [C157](#),
[E12](#), [E13](#), [E18](#), [E19](#), [E23](#), [E24](#), [E25](#)
`\@nameuse`
[23](#), [d28](#), [k116](#), [k127](#), [E23](#), [J5](#), [K486](#)
`\@nbitem` [A158](#), [A211](#)
`\@ne` [b16](#)
`\@needsf@rmat` [L256](#), [L259](#), [L264](#)
`\@needsformat` [L244](#), [L254](#), [L258](#)
`\@negargfalse` [D86](#)
`\@negargtrue` [D85](#)
`\@newcommand` [d46](#), [d47](#)
`\@newctr` [m13](#), [m15](#), [E8](#)
`\@newenv` [d119](#), [d120](#), [d130](#)
`\@newenva` [d117](#), [d118](#)
`\@newenvb` [d119](#), [d120](#)
`\@newl@bel` [I10](#), [x22](#), [y17](#)
`\@newline` [i45](#), [i47](#)
`\@newlistfalse`
... [A29](#), [A33](#), [A108](#), [A172](#), [K477](#)
`\@newlisttrue` [A29](#), [A33](#), [A87](#)
`\@next` [G56](#), [G198](#), [G199](#),
[K9](#), [K161](#), [K261](#), [K668](#), [K1150](#)
`\@nextchar`
... [C239](#), [C240](#), [C298](#), [C299](#), [C300](#)
`\@nil` [a108](#),
[a109](#), [c5](#), [c11](#), [d30](#), [d31](#), [d32](#),
[d104](#), [d251](#), [d252](#), [f13](#), [f19](#), [f27](#),
[j14](#), [l82](#), [o275](#), [o288](#), [o373](#), [o433](#),
[o436](#), [o437](#), [o445](#), [p306](#), [p307](#),
[p309](#), [p322](#), [p328](#), [p332](#), [p333](#),
[p373](#), [p394](#), [p401](#), [p509](#), [p523](#),
[q16](#), [q34](#), [q43](#), [q47](#), [r31](#), [r275](#),
[r283](#), [r316](#), [r836](#), [r838](#), [v41](#), [v45](#),
[C335](#), [C336](#), [L27](#), [L29](#), [L60](#),
[L61](#), [L67](#), [L195](#), [L198](#), [L292](#), [L300](#)
`\@nmbrlistfalse` [A33](#), [A46](#), [A91](#)
`\@nmbrlisttrue` [A215](#)
`\@nnil` [f13](#), [f20](#), [f21](#), [f22](#), [f28](#),
[o185](#), [p133](#), [p135](#), [p299](#), [p301](#),
[p315](#), [p317](#), [p322](#), [p336](#), [p338](#),
[p345](#), [p360](#), [p361](#), [p363](#), [p394](#), [p401](#)
`\@no@font@optfalse` [q119](#)
`\@no@lnbk` [i13](#), [i14](#), [i15](#)
`\@no@pgbk` [i3](#), [i4](#), [i5](#)
`\@nobreakfalse` [i58](#), [i60](#), [A183](#), [F77](#),
[F112](#), [F140](#), [G107](#), [K142](#), [K889](#)
`\@nobreaktrue` [i59](#), [F109](#), [G106](#)
`\@nocnterr` [g224](#)
`\@nocounterr` . [g224](#), [m4](#), [m8](#), [m16](#), [E21](#)
`\@nodocument`
. [g231](#), [k58](#), [y50](#), [G35](#), [K133](#), [K160](#)
`\@noitemargfalse` [A32](#), [A190](#)
`\@noitemargtrue` [A32](#), [A133](#)
`\@noitemerr`
. [g275](#), [i111](#), [i130](#), [A69](#), [A81](#), [A107](#)
`\@noligs` [y114](#), [y135](#), [y151](#)
`\@nolnerr` [g221](#), [i17](#), [i51](#), [y68](#)
`\@nomath` ... [o2](#), [o254](#), [s31](#), [s49](#), [s51](#), [s56](#)
`\@noparitemfalse` [A30](#), [A135](#)
`\@noparitemtrue` [A30](#), [A66](#)
`\@noparlistfalse` [A31](#), [A70](#)
`\@noparlisttrue` [A31](#), [A67](#)
`\@normalcr` [i35](#), [i43](#), [B190](#)
`\@normalsize` [L4](#), [L5](#)
`\@noskipsecfalse` [k45](#), [F81](#), [K135](#)
`\@noskipsectrue` [F21](#), [F78](#)
`\@notdefinable` [d105](#), [d106](#), [d110](#), [g214](#)
`\@notprerr` [g279](#), [k56](#)
`\@nthm` [E3](#), [E4](#)
`\@nxcttabmar` [C11](#), [C23](#), [C25](#),
[C27](#), [C66](#), [C102](#), [C103](#), [C109](#), [C110](#)
`\@obsoletefile` [k201](#)
`\@oddfoot` .. [J11](#), [J14](#), [J15](#), [K105](#), [K489](#)
`\@oddhead` [J11](#), [J14](#), [K104](#), [K489](#)
`\@onefilewithoptions`
... [L284](#), [L288](#), [L294](#), [L304](#), [L353](#)
`\@onelevel@sanitize` [d279](#), [G38](#)
`\@onlypreamble` [I40](#), [d33](#), [d161](#),
[d163](#), [d172](#), [d180](#), [k61](#), [k70](#), [k85](#),
[k203](#), [k229](#), [l23](#), [l24](#), [l66](#), [l67](#),
[l71](#), [l94](#), [l114](#), [l144](#), [l145](#), [l159](#),
[l895](#), [o26](#), [o90](#), [o92](#), [o98](#), [o114](#),
[o142](#), [o157](#), [o178](#), [o183](#), [o198](#),
[o384](#), [p379](#), [q18](#), [q26](#), [q32](#), [q69](#),
[q73](#), [q78](#), [q83](#), [q88](#), [q98](#), [q116](#),
[q117](#), [q118](#), [q124](#), [q128](#), [q133](#),
[r8](#), [r10](#), [r35](#), [r37](#), [r63](#), [r72](#), [r97](#),
[r167](#), [r168](#), [r171](#), [r203](#), [r236](#),
[r238](#), [r240](#), [r253](#), [r268](#), [r315](#),
[r317](#), [r359](#), [r398](#), [r414](#), [r491](#),
[r530](#), [r533](#), [r574](#), [r577](#), [r580](#),
[r600](#), [r613](#), [r666](#), [r701](#), [r705](#),
[r708](#), [r761](#), [r781](#), [r785](#), [r849](#),
[v122](#), [v123](#), [x30](#), [H12](#), [H29](#),
[L10](#), [L12](#), [L18](#), [L19](#), [L26](#), [L28](#),
[L34](#), [L36](#), [L39](#), [L42](#), [L43](#), [L50](#),
[L53](#), [L54](#), [L58](#), [L66](#), [L68](#), [L71](#),
[L72](#), [L75](#), [L82](#), [L91](#), [L99](#), [L101](#),
[L118](#), [L121](#), [L122](#), [L133](#), [L134](#),

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N=ltfinal.dtx, O=ltpatch.ltx

- L135, L142, L148, L161, L174,
 L186, L188, L193, L199, L204,
 L208, L211, L219, L224, L227,
 L231, L240, L253, L258, L264,
 L273, L278, L303, L353, L355,
 L364, L377, L378, L381, L388,
 L397, L404, L405, L413, L418,
 L423, L506, L507, L508, L509, L511
 \@opargbegintheorem E32, E35
 \@opcol K210, K218, K318, K336, K341
 \@options L187
 \@othm E3, E20
 \@outerparskip
 A8, A88, A117, A142, A212
 \@outputbox K101,
 K359, K361, K383, K386, K387,
 K411, K413, K414, K419, K422,
 K427, K429, K436, K442, K444,
 K515, K541, K547, K557, K558,
 K581, K588, K651, K654, K657,
 K663, K664, K1472, K1478, K1486
 \@outputdblcol K344, K1469
 \@outputpage
 K327, K346, K472, K1493, K1501
 \@oval D263, D264
 \@ovbtrue D265
 \@ovdx ... D239, D273, D279, D281,
 D292, D294, D348, D349, D350,
 D351, D365, D366, D368, D382
 \@ovdy ... D239, D274, D280, D281,
 D286, D290, D355, D356, D357,
 D358, D369, D370, D372, D386
 \@ovhorz D278, D279, D291
 \@ovltrue D265
 \@ovri .. B17, D239, D272, D286, D295
 \@ovro ... D239, D272, D279, D280,
 D285, D290, D291, D300, D307
 \@ovrtrue D265
 \@ovttrue D265
 \@ovvert D276, D277, D283
 \@ovxx D239,
 D267, D269, D273, D277, D278,
 D291, D345, D346, D347, D351,
 D360, D361, D367, D368, D381
 \@ovyy ... D239, D268, D269, D274,
 D279, D283, D352, D353, D354,
 D358, D360, D371, D372, D385
 \@p@pfilename L27, L29, L34
 \@pagedp K98,
 K258, K263, K831, K1179, K1189
 \@pageht
 K97, K259, K263, K265, K266,
 K267, K272, K830, K1162, K1169
 \@par h3, h6
 \@parboxrestore
 B162, B190, B215, B242,
 G19, G96, G217, G276, K167, K478
 \@parboxto B157
 \@parmoderr g265, G54, G195
 \@parse@version .. L60, L61, L67, L68
 \@partaux k5, k87, k103,
 k105, k106, k112, k121, k123, k126
 \@partlist k84, k99
 \@partswfalse k8
 \@partswtrue k83
 \@pass@options
 ... L113, L118, L119, L120, L329
 \@pboxswfalse B160, B208
 \@pboxswtrue B170
 \@penup z129, z130
 \@percentchar
 a53, L450, L452, L454, L456, L495
 \@picbox D6, D21, D27, D28
 \@picht D6, D20, D27
 \@picture D12, D18
 \@picture@warn D123, D251, D255, D259
 \@pkgextension L16, L40, L51, L69,
 L119, L210, L213, L230, L295, L399
 \@plus d13, i197, F16, F151,
 J40, K1528, K1529, K1530,
 K1533, K1534, K1538, K1539,
 K1540, K1544, K1545, K1546
 \@pnumwidth F163
 \@popfilename L20, L350
 \@pr@videpackage L90, L92, L99
 \@preamble C172, C174,
 C182, C207, C226, C228, C229,
 C233, C248, C266, C267, C302
 \@preamblecmds .. d33, k57, L518, L519
 \@preamerr ... g250, C181, C244, C323
 \@process@pti@ns
 L160, L173, L175, L186
 \@process@options .. L147, L149, L161
 \@protected@testopt d57, d69
 \@providesfile .. a45, a46, L102, N235
 \@optionlist
 L37, L74, L146, L319, L325, L400
 \@pushfilename L20, L305
 \@put D262, D281, D307
 \@qend d105, d251, g218
 \@qrelax d106, d251
 \@rc@ifdefinable d99, d101, d212, i14
 \@reargdef d91
 \@refundefined k46, x3, y27

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`\@creinserts` [K279](#), [K282](#), [K397](#)
`\@removeelement` [f32](#), [L190](#)
`\@reqcolroom` [K830](#),
[K831](#), [K834](#), [K836](#), [K837](#), [K842](#),
[K846](#), [K848](#), [K875](#), [K876](#), [K977](#),
[K979](#), [K981](#), [K984](#), [K986](#),
[K1282](#), [K1399](#), [K1403](#), [K1406](#)
`\@reset@ptions` [L310](#), [L351](#), [L356](#)
`\@resetactivechars` [K457](#), [K475](#)
`\@resetfhps` [K944](#), [K1349](#)
`\@restorepar` .. [h6](#), [i139](#), [i155](#), [46](#), [A126](#)
`\@reversemarginfalse` [G243](#), [K82](#)
`\@reversemargintrue` [G242](#)
`\@rightmark` [J16](#), [J37](#)
`\@rightskip` [y79](#), [y83](#), [A75](#), [B186](#)
`\@rjfieldfalse` [C36](#), [C68](#)
`\@rjfieldtrue` [C116](#)
`\@roman` [m35](#), [m41](#)
`\@rsbox` [B266](#), [B267](#)
`\@rtab` [C62](#), [C77](#)
`\@rule` [B250](#), [B251](#)
`\@sanitize` .. [d277](#), [H7](#), [H18](#), [H24](#), [H35](#)
`\@savebox` [B57](#), [B60](#)
`\@savemarbox` . [G205](#), [G206](#), [G209](#), [G212](#)
`\@savepicbox` [B57](#), [B64](#)
`\@savsf` [i61](#), [i67](#), [i72](#), [i80](#)
`\@savsk` [i61](#), [i66](#), [i73](#), [i81](#)
`\@scolelt` [K606](#), [K648](#)
`\@sdblcrolelt` [K622](#), [K649](#)
`\@seccntformat` [F43](#), [F94](#)
`\@secondoftwo`
.. [a35](#), [d184](#), [d249](#), [k149](#), [l100](#),
[l913](#), [l929](#), [x21](#), [J17](#), [L46](#), [L62](#), [L80](#)
`\@secpenalty` [i33](#), [F19](#), [F33](#)
`\@sect` [F37](#), [F38](#)
`\@seqncr` [z256](#)
`\@setckpt` [k121](#), [k128](#), [y16](#)
`\@setfloattypecounts`
..... [K814](#), [K962](#), [K1038](#), [K1296](#)
`\@setfontsize` [s56](#)
`\@setfps` [G34](#)
`\@setfpsbit` ... [G70](#), [G73](#), [G76](#), [K1340](#)
`\@setminipage`
.. [B220](#), [G21](#), [G102](#), [G110](#), [G231](#)
`\@setnobreak` [G104](#), [G230](#)
`\@setpar` [h3](#), [46](#), [A78](#)
`\@setref` [x10](#)
`\@setsize` [s56](#)
`\@settab` [C62](#), [C84](#)
`\@settodim` [n6](#)
`\@settopoint` [n11](#)
`\@sharp` .. [C178](#), [C205](#), [C235](#), [C250](#),
[C251](#), [C269](#), [C271](#), [C273](#), [C301](#)
`\@shipoutsetup` [K472](#)
`\@shortstack` [D63](#), [D64](#)
`\@sline` [D81](#), [D84](#), [D147](#)
`\@slowromancap` [m42](#), [m43](#)
`\@spaces` [g192](#)
`\@specialoutput` [K204](#)
`\@specialpagefalse` [K78](#), [K486](#)
`\@specialpagetrue` [J9](#)
`\@specialstyle` [J9](#), [K486](#)
`\@sptoken` [d260](#), [d270](#)
`\@sqrt` [z203](#)
`\@sssect` [F36](#), [F95](#)
`\@stackcr` [D70](#), [D73](#)
`\@star@or@long` [d39](#), [d44](#),
[d93](#), [d115](#), [d121](#), [d151](#), [d160](#), [d194](#)
`\@startcolumn` [K211](#), [K218](#), [K593](#)
`\@startdblcolumn` [K593](#), [K1499](#), [K1505](#)
`\@startfield`
. [C30](#), [C48](#), [C83](#), [C95](#), [C116](#), [C124](#)
`\@startline` .. [C22](#), [C59](#), [C60](#), [C61](#), [C74](#)
`\@startpbox` [C175](#),
[C206](#), [C236](#), [C300](#), [C352](#), [C354](#)
`\@startsection` [F22](#)
`\@starttoc` [F132](#)
`\@stopfield` [C34](#), [C50](#), [C61](#),
[C77](#), [C84](#), [C116](#), [C118](#), [C127](#), [C129](#)
`\@stopline` [C32](#), [C58](#), [C76](#)
`\@stpelt` [m20](#), [m23](#)
`\@strip@args` [l79](#)
`\@svector` [D139](#), [D147](#)
`\@sverb` [y136](#), [y137](#), [y144](#)
`\@svsec` [F40](#), [F43](#), [F49](#), [F61](#)
`\@svsechd` [F59](#), [F84](#), [F104](#)
`\@sxverbatim` [y95](#), [y121](#)
`\@tabacckludge` .. [l178](#), [l180](#), [l353](#), [l354](#)
`\@tabacol` [C160](#), [C228](#)
`\@tabarray` [C152](#), [C162](#), [C163](#)
`\@tabclassiv` [C162](#), [C298](#)
`\@tabclassz` [C161](#), [C252](#)
`\@tabcr` [C58](#), [C64](#)
`\@tabfbox` [C16](#), [C71](#), [C73](#)
`\@tablab` [C63](#), [C117](#)
`\@tabminus` [C63](#), [C108](#)
`\@tabplus` [C63](#), [C101](#)
`\@tabpush`
[C11](#), [C68](#), [C76](#), [C127](#), [C130](#), [C132](#)
`\@tabrj` [C63](#), [C115](#)
`\@tabular` [C156](#), [C159](#), [C160](#)
`\@tabularcr` [C162](#), [C190](#)

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`\@tempboxa` [e13](#), [l74](#), [n6](#), [n7](#),
[A195](#), [A201](#), [A202](#), [A204](#), [B13](#),
[B14](#), [B15](#), [B16](#), [B21](#), [B22](#), [B23](#),
[B24](#), [B100](#), [B116](#), [B123](#), [B133](#),
[B211](#), [B234](#), [B273](#), [B274](#), [B275](#),
[B282](#), [B283](#), [B284](#), [B285](#), [D182](#),
[D183](#), [D257](#), [D258](#), [D272](#), [D275](#),
[D280](#), [D281](#), [D300](#), [D301](#), [D306](#),
[D307](#), [D373](#), [D391](#), [F121](#), [F122](#),
[G201](#), [G235](#), [K255](#), [K301](#), [K306](#),
[K307](#), [K448](#), [K505](#), [K512](#), [K513](#),
[K539](#), [K543](#), [K555](#), [K561](#), [K568](#),
[K569](#), [K570](#), [K571](#), [K575](#), [K583](#)

`\@tempcnta` [e7](#), [r582](#), [r583](#),
[r584](#), [r585](#), [r589](#), [C212](#), [C213](#),
[C214](#), [C215](#), [D87](#), [D88](#), [D114](#),
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[D132](#), [D134](#), [D135](#), [D148](#), [D149](#),
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[D168](#), [D169](#), [D170](#), [D171](#), [D172](#),
[D173](#), [D174](#), [D204](#), [D205](#), [D206](#),
[D207](#), [D208](#), [D226](#), [D227](#), [D228](#),
[D229](#), [D230](#), [D231](#), [D248](#), [D249](#),
[D250](#), [D252](#), [D254](#), [D256](#), [D258](#),
[D284](#), [D288](#), [D302](#), [D303](#), [D304](#),
[D305](#), [D311](#), [D312](#), [D313](#), [D314](#),
[D315](#), [D316](#), [D364](#), [D380](#), [G58](#),
[G64](#), [G66](#), [G79](#), [G80](#), [G86](#), [G87](#),
[K16](#), [K18](#), [K20](#), [K699](#), [K700](#),
[K701](#), [K702](#), [K724](#), [K727](#), [K760](#),
[K763](#), [K871](#), [K1041](#), [K1044](#),
[K1151](#), [K1153](#), [K1156](#), [K1158](#),
[K1160](#), [K1182](#), [K1330](#), [K1331](#),
[K1335](#), [K1341](#), [K1345](#), [N17](#),
[N22](#), [N23](#), [N24](#), [N86](#), [N91](#), [N92](#), [N93](#)

`\@tempcntb` [e7](#),
[r583](#), [r587](#), [r589](#), [D157](#), [D158](#),
[D159](#), [D161](#), [D162](#), [D163](#), [D284](#),
[D285](#), [D288](#), [D289](#), [G84](#), [G85](#),
[G86](#), [K17](#), [K20](#), [K21](#), [K1341](#),
[K1342](#), [K1343](#), [N18](#), [N22](#), [N87](#), [N91](#)

`\@tempdima` [e10](#), [z116](#),
[z119](#), [z125](#), [B27](#), [B28](#), [B115](#),
[B116](#), [B121](#), [B122](#), [B123](#), [B125](#),
[B161](#), [B162](#), [B209](#), [B213](#), [B254](#),
[B257](#), [B258](#), [B271](#), [B273](#), [B279](#),
[B282](#), [C37](#), [C38](#), [C39](#), [C79](#), [C80](#),
[C81](#), [C82](#), [C200](#), [C201](#), [D110](#),
[D111](#), [D113](#), [D114](#), [D115](#), [D116](#),
[D117](#), [D118](#), [D247](#), [D248](#), [D249](#),
[D258](#), [D273](#), [D274](#), [D276](#), [D277](#),

[D303](#), [D305](#), [D310](#), [D311](#), [D312](#),
[F156](#), [F157](#), [F166](#), [G121](#), [G123](#),
[G156](#), [G157](#), [G158](#), [K177](#), [K178](#),
[K179](#), [K363](#), [K365](#), [K417](#), [K419](#),
[K420](#), [K425](#), [K430](#), [K434](#), [K439](#),
[K443](#), [K686](#), [K689](#), [K704](#), [K714](#),
[K1103](#), [K1104](#), [K1107](#), [K1108](#),
[K1161](#), [K1162](#), [K1163](#), [K1164](#),
[K1167](#), [K1170](#), [K1173](#), [K1175](#),
[K1447](#), [K1448](#), [K1450](#), [K1451](#)

`\@tempdimb` [e10](#), [o455](#),
[o459](#), [p133](#), [p134](#), [p399](#), [p432](#),
[p433](#), [p442](#), [p443](#), [p447](#), [p469](#),
[p472](#), [p475](#), [p477](#), [B164](#), [B165](#),
[B255](#), [B258](#), [B272](#), [B274](#), [B280](#),
[B283](#), [D111](#), [D112](#), [D269](#), [D270](#),
[D271](#), [D298](#), [D299](#), [D308](#), [D309](#),
[K704](#), [K705](#), [K706](#), [K707](#), [K714](#)

`\@tempdimc` . [e10](#), [p426](#), [p427](#), [p429](#),
[p430](#), [p432](#), [p433](#), [B256](#), [B257](#), [B258](#)

`\@tempskipa`
. [e14](#), [i19](#), [i22](#), [i23](#), [p135](#), [p136](#),
[A116](#), [A117](#), [A118](#), [A140](#), [A142](#),
[A143](#), [A144](#), [A212](#), [A213](#), [A214](#),
[F25](#), [F27](#), [F28](#), [F33](#), [F45](#), [F46](#),
[F71](#), [F72](#), [F74](#), [F86](#), [F87](#), [F96](#),
[F97](#), [K1219](#), [K1220](#), [K1222](#), [K1230](#)

`\@tempskipb` [e14](#),
[i87](#), [i89](#), [i91](#), [i94](#), [i96](#), [i106](#), [i122](#), [i125](#)

`\@tempswafalse`
[I13](#), [a25](#), [k97](#), [o69](#), [r205](#), [r255](#),
[r319](#), [r400](#), [r824](#), [r830](#), [v79](#), [y18](#),
[y105](#), [K730](#), [K766](#), [K1047](#), [L431](#)

`\@tempwattrue` [I13](#),
[a26](#), [k95](#), [k100](#), [o72](#), [r208](#), [r258](#),
[r322](#), [r403](#), [r787](#), [v69](#), [y42](#), [y110](#),
[K1049](#), [K1072](#), [K1408](#), [K1425](#), [L430](#)

`\@temptokena` [e16](#), [y45](#),
[y46](#), [J22](#), [J23](#), [J30](#), [J31](#), [J34](#), [J35](#)

`\@testdef` [y17](#), [y40](#)

`\@testfalse` [K12](#), [K14](#), [K15](#)

`\@testfp` . . [K673](#), [K703](#), [K1333](#), [K1459](#)

`\@testopt` [d20](#), [d46](#),
[d67](#), [d71](#), [d117](#), [i3](#), [i4](#), [i13](#), [i14](#), [z243](#)

`\@testpach` [C240](#), [C316](#)

`\@testpatch` [C316](#)

`\@testtrue` [K13](#), [K21](#), [K675](#), [K708](#), [K1337](#)

`\@text@composite` [l79](#)

`\@text@composite@x` [l79](#)

`\@textbottom`
[J40](#), [J42](#), [K389](#), [K431](#), [K445](#), [K454](#)

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I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx,
N=ltfinal.dtx, O=ltpatch.ltx

- \@textfloatsheight . . . K352, K827,
K829, K878, K879, K884, K1282
- \@textmin G180,
G181, K93, K829, K833, K836,
K837, K981, K1065, K1067,
K1083, K1390, K1392, K1394
- \@textsuperscript . G256, G258, G259
- \@texttop . J40, J42, K385, K412, K454
- \@tf@r f25, f26
- \@tfor f25, k150,
k210, v70, B36, C238, D266, G59
- \@tforloop f27, f28, f30
- \@thanks F10, F13
- \@thefnmark B244,
G255, G256, G263, G268,
G278, G287, G292, G303, G308
- \@thefoot K105, K489, K492, K519
- \@thehead K104, K489, K491, K509
- \@themargin K55, K490, K492, K504
- \@themark J21, J22, J29, J30, J35, J38
- \@thirdofthree d188, l152
- \@thm E12, E18, E24, E26
- \@thmcounter E11, E17, E33
- \@thmcountersep E10, E33
- \@title F3
- \@tocrmarg F152
- \@toodeep g240, A36, A222, A233
- \@toplist K45, K308, K309, K534,
K540, K550, K551, K767, K779
- \@topnewpage K147
- \@topnum G169, K86,
K764, K765, K779, K783, K791,
K1024, K1029, K1255, K1276
- \@toproom . G171, K87, K767, K779, K1256
- \@topsep A1, A71, A73, A161
- \@topsepadd A1, A59, A61, A71, A124
- \@totalleftmargin y102,
A9, A53, A54, B185, C37, C67, C72
- \@tracemessage K1244
- \@traceval K1244
- \@trivlist A48, A57, A92
- \@tryfcolumn . K596, K613, K627, K1460
- \@trylist K636, K639, K668, K688
- \@twoclasseserror L201, L419
- \@twocolumnfalse K80, K128
- \@twocolumntrue K154
- \@twoloadclasserror L349, L414
- \@twosidefalse K81
- \@typein d19, d20, d26
- \@typeset@protect d70, d217,
d224, d226, l26, l32, l165, l173, s57
- \@uclclist l815, l816, l863, N165
- \@undefined . I33, a15, a16, a55, a56,
a57, a78, a86, a94, a101, a152,
a156, a182, a189, a249, a250,
b86, b89, d196, g31, k51, k52,
k137, l150, l152, o310, o401,
o469, v104, D338, G5, L4, L339,
L365, L482, L485, L499, N189,
N224, N225, N226, N227, N228
- \@unexpandable@noexpand d192
- \@unexpandable@protect
d192, d229, d235, d240, k75, C234
- \@unknownoptionerror . L360, L389, L402
- \@unprocessedoptions
. L185, L229, L336, L340, L404
- \@unused d4, g15, g35, g62, k3, L504
- \@unusedoptionlist
. k12, k14, L11, L138, L139, L191
- \@upline D175, D176, D182
- \@upordown . D95, D96, D104, D125, D151
- \@upvector D146, D182
- \@use@option
. L156, L168, L178, L180, L189
- \@use@text@encoding l115, l1106
- \@vbsphack i86
- \@verb y136, y144
- \@verbatim y100, y118, y121
- \@vereq t365, t366
- \@viipt o489
- \@vipt o488
- \@vipt o487
- \@vline D80, D175
- \@vobeyspaces y93, y118, y144
- \@vpt o486
- \@vspace i132
- \@vspacer i132
- \@vtryfc K642, K650
- \@vvector D138, D146
- \@warning g188
- \@wckptelt k122, k125
- \@whiledim f7, D44, D103
- \@whilenoop f3
- \@whilenum f3, C214, D39,
D205, D207, D227, D230, D380
- \@whilesw f10, K212, K318, K327, K1500
- \@whileswnoop f10
- \@wholewidth
. B85, B87, B88, B90, B92,
B93, B94, B95, D2, D48, D50,
D57, D177, D180, D218, D225,
D287, D293, D334, D335, D377
- \@width b193, d13, i193, l245,
l248, p146, t522, B90, B92,

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- B129, B136, B258, B288, C170,
 C201, C315, C334, D127, D177,
 D180, D197, D204, D218, D225,
 D287, D377, G250, K1189, K1483
 \wrglossary H25, [H30](#)
 \wrindex H8, [H13](#)
 \wriateckpt k110, [k119](#)
 \writefile k26, [y43](#), F147
 \writesetup [K472](#)
 \wrong@font@char .. [l126](#), [o402](#), [o413](#)
 \wtryfc [K652](#), [K662](#)
 \x@protect d73, [d216](#)
 \x@sf [G297](#), [G299](#)
 \xDeclareMathDelimiter .. [r612](#), [r667](#)
 \xaddvskip [i86](#), [i107](#)
 \xarg [D77](#), [D80](#), [D85](#),
 [D89](#), [D90](#), [D126](#), [D128](#), [D133](#),
 [D134](#), [D138](#), [D144](#), [D152](#), [D319](#)
 \xargarraycr [C187](#), [C196](#), [C200](#)
 \xargdef [d47](#)
 \xarraycr [C184](#), [C185](#)
 \xbitor [K15](#), [K17](#)
 \xcentercr [y69](#), [y70](#)
 \xdblarg [d275](#)
 \xdblfloat [G162](#)
 \xdim [D34](#), [D40](#), [D42](#), [D323](#),
 [D381](#), [D382](#), [D383](#), [D384](#), [D390](#)
 \xeqncr [z235](#)
 \exnoop [C208](#), [C218](#)
 \expast [C209](#), [C210](#)
 \xfloat [G28](#), [G29](#), [G34](#), [G164](#)
 \xfootnote [G262](#), [G265](#)
 \xfootnotemark [G285](#), [G289](#)
 \xfootnotenext [G302](#), [G305](#)
 \xhline [C328](#), [C329](#)
 \xifnch [d261](#), [d271](#)
 \xiipt [o493](#), [t83](#), [t85](#), [t86](#)
 \xipt [o492](#), [t82](#)
 \xivpt [o494](#), [t84](#), [t86](#)
 \xmpar [G203](#), [G204](#)
 \xnewline [i39](#), [i40](#), [i44](#)
 \xnext [K10](#), [K11](#)
 \xnthm [E5](#), [E6](#)
 \xobeysp [i182](#), [y94](#), [y95](#)
 \xprocess@ptions .. [L147](#), [L162](#), [L174](#)
 \xpt [o491](#), [t81](#), [t84](#), [t85](#)
 \xssect [F69](#), [F70](#), [F106](#)
 \xtabcr [C58](#), [C59](#)
 \xtabularcr [C191](#), [C192](#)
 \xthm [E28](#), [E29](#)
 \xtryfc [K639](#), [K667](#)
 \xtypein [d20](#), [d21](#)
 \xverbatim [y95](#), [y118](#)
 \xvipt [o495](#), [t85](#), [t87](#)
 \xxDeclareMathDelimiter .. [r597](#), [r601](#)
 \xxpt [o496](#), [t86](#), [t87](#)
 \xxvpt [o497](#), [t87](#)
 \xxxii [e2](#), [l324](#), [l326](#), [G85](#),
 [K670](#), [K671](#), [K700](#), [K701](#), [K1299](#)
 \xympar [G207](#), [G211](#), [G233](#)
 \yarg [D77](#),
 [D81](#), [D85](#), [D86](#), [D95](#), [D133](#),
 [D139](#), [D146](#), [D148](#), [D175](#), [D319](#)
 \yargarraycr [C188](#), [C198](#), [C202](#)
 \yargd@f [d75](#)
 \yargdef [d51](#), [d62](#), [d75](#), [d92](#)
 \ydim [D35](#), [D40](#), [D42](#), [D324](#),
 [D385](#), [D386](#), [D387](#), [D388](#), [D389](#)
 \yeqncr [z235](#)
 \ympar [G203](#), [G208](#)
 \ynthm [E5](#), [E14](#)
 \ythm [E28](#), [E29](#)
 \ytryfc [K680](#), [K682](#)
 \yyarg [D85](#), [D86](#), [D87](#), [D90](#), [D152](#), [D319](#)
 \ztryfc [K687](#), [K698](#)
 \[..... [o363](#), [z170](#), [z195](#), [z276](#), [N117](#)
 \\\ [a21](#), [a194](#), [a195](#), [a196](#), [a197](#),
 [a200](#), [a207](#), [a208](#), [a209](#), [a210](#),
 [a213](#), [a220](#), [a221](#), [a222](#), [a223](#),
 [a226](#), [a233](#), [a235](#), [a236](#), [a239](#),
 [a242](#), [b13](#), [d191](#), [d277](#), [g274](#),
 [i35](#), [i204](#), [k209](#), [k224](#), [l420](#), [o351](#),
 [t170](#), [48](#), [y76](#), [y83](#), [y89](#), [y97](#),
 [z217](#), [z311](#), [B190](#), [B272](#), [B274](#),
 [C64](#), [C152](#), [C162](#), [C176](#), [D70](#), [N102](#)
 \{ [a3](#), [a7](#), [a21](#), [b2](#), [b13](#), [g25](#), [l262](#), [l422](#),
 [o352](#), [t168](#), [y96](#), [z59](#), [z108](#), [N105](#)
 \} [a8](#), [a21](#), [b3](#), [b13](#), [g24](#), [l263](#),
 [l423](#), [o353](#), [t169](#), [y96](#), [z59](#), [N106](#)
 \] .. [b239](#), [o364](#), [z170](#), [z196](#), [z286](#), [N118](#)
 \^ [a10](#), [a19](#), [a22](#), [a66](#), [a253](#),
 [b7](#), [b9](#), [b11](#), [b14](#), [b158](#), [b159](#),
 [b173](#), [b174](#), [d5](#), [d278](#), [i204](#), [i206](#),
 [i208](#), [l186](#), [l241](#), [l284](#), [l355](#), [l362](#),
 [l418](#), [l501](#), [l508](#), [l512](#), [l517](#), [l522](#),
 [l527](#), [l534](#), [l540](#), [l541](#), [l547](#), [l552](#),
 [l597](#), [o349](#), [o350](#), [o355](#), [L427](#),
 [L428](#), [L429](#), [L481](#), [L484](#), [L487](#),
 [N49](#), [N50](#), [N51](#), [N52](#), [N54](#), [N55](#),
 [N56](#), [N57](#), [N59](#), [N103](#), [N109](#),
 [N110](#), [N111](#), [N112](#), [N125](#), [N126](#),
 [N127](#), [N154](#), [N155](#), [N156](#), [N157](#),
 [N159](#), [N160](#), [N161](#), [N162](#), [N164](#)

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d278, l268, t173, z166, z167, N104
 - \` l187,
l285, l319, l353, l360, l437, l499,
l506, l510, l515, l520, l525, l532,
l536, l537, l545, l550, l598, l637,
o365, s154, y145, B181, C63, N119
 - \| l421, m59, t479, N120
 - \~ a22, b10, b14,
d278, g23, i184, l194, l242, l286,
l363, l419, l502, l514, l518, l528,
l544, l548, l599, y139, y149, N107
 - _U I17, a21, a38, b13, b158,
b176, d277, d291, g22, g23, g24,
g25, g28, i183, o348, o480, q11,
t171, y93, y94, E36, E38, L104, N97
- A**
- \A N44, N122, N149
 - \a l178, C1, N33, N123, N138
 - \AA b164, l195, l327, l389
 - \aa b164, l200, l321, l399
 - \abovedisplayshortskip .. b139, z319
 - \abovedisplayskip b138,
z312, z314, z316, z317, z318, z319
 - \accent l76, l295, l322, l375, l610
 - \accent@spacefactor l75, l76, l77
 - \active a11, a66, a253, b10,
b11, b173, b174, b176, y93, y94,
y138, y147, z151, z166, K466,
L427, L428, L429, L481, L484, L487
 - \active@math@prime .. z150, z151, K470
 - \acute t424
 - \add@accent l70, l72
 - \addcontentsline F53, F63, F142, G16
 - \addpenalty i113, A124,
A160, A165, F33, K290, K892
 - \addto@hook
o127, o129, o485, r187, r278,
r282, r299, r423, r429, r437,
r453, r456, r459, r796, r803, r806
 - \addtocontents F143, F144
 - \addtocounter m6, m18, 103
 - \addtolength n5, z314, z316, 106
 - \addtoversion q130
 - \addvspace i100, y70, A124,
A161, A162, A166, A214, F33
 - \adjdemerits b118
 - \AE l196, l300, l390, l615, N178
 - \ae l201, l303, l400, l619, N178
 - \afterassignment b189, b192,
d230, d236, l167, l175, o245, z129
 - \aftergroup o66,
o259, p156, p222, r70, r82, r90,
v47, y142, B73, K473, K481, K482
 - \aleph t227
 - \alloc@ b47, b48, b49, b50,
b51, b53, b54, b55, b56, b57, o23
 - \allocationnumber b37, b59,
b60, b61, b67, b68, b69, C4, C9
 - \allowbreak b196, z40
 - \Alph m38, 103
 - \alph m37, 103
 - \alpha t187
 - \alpha@elt
r36, r191, r373, r475, r795, r796
 - \alpha@list r32, r34, r200, r361, r373,
r418, r473, r474, r791, r797, r798
 - \amalg t293
 - \and 282, F14
 - \angle t243
 - \approx t333
 - \arabic m34, 103, E33
 - \arccos z13
 - \arcsin z10
 - \arctan z16
 - \arg z26
 - \array C150
 - \arraycolsep
z220, z221, z324, z325, C228, C306
 - \arrayrulewidth
C292, C306, C314, C315,
C327, C331, C334, C344, C346
 - \arraystretch C168, C169, C310
 - \Arrowvert t475
 - \arrowvert t473
 - \ast t151, t309
 - \asympt t357
 - \AtBeginDocument . I34, I48, k47, L374
 - \AtBeginDvi K67
 - \AtEndDocument y9, L374
 - \AtEndOfClass z275, L374
 - \AtEndOfPackage ... L185, L229, L374
 - \atopwithdelims z57, z58, z59
 - \aut@global d54, d86, d127,
d137, d141, d147, d202, d285, d289
 - \author 282, F5
- B**
- \b l188, l291, l371, l606
 - \backslash t170, t494
 - \badness b97
 - \bar t428

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<code>\baselineskip</code>	b157, b187, b223, p140, p141, p142, p144, p145, t418, z112, z113, z121, z127, z131, B188, C180, D67, D187, K190, K221, K501, K516
<code>\baselinestretch</code>	o236, p118, p119, p138, p199
<code>\batchmode</code>	k186, k187, q96, s121, N198, N219
<code>\begin</code>	g232, g234, l563, p7, t4, u4, y51, y52, z279, F14, F17, G150, G152, L238, M3
<code>\belowdisplayshortskip</code> . .	b141, z318
<code>\belowdisplayskip</code>	b140, z317
<code>\best@size</code>	p400, p434, p440, p446
<code>\beta</code>	t188
<code>\bezier</code>	260, D341, D342
<code>\bfdefault</code>	s14, t32
<code>\bfseries</code>	I20, s12, s13, v19, x13, E36, E38
<code>\bgroup</code>	b171
<code>\biblecite</code>	I7, I9, I10
<code>\bibdata</code>	I25, I29
<code>\bibitem</code>	I3
<code>\bibliography</code>	I27, 307
<code>\bibliographystyle</code>	I32, 307
<code>\bibstyle</code>	I25, I37
<code>\Big</code>	t525, z44, z45, z46
<code>\big</code>	t524, z41
<code>\bigbreak</code>	b203
<code>\bigcap</code>	t263
<code>\bigcirc</code>	t306
<code>\bigcup</code>	t264
<code>\Bigg</code>	t527, z50, z51, z52
<code>\bigg</code>	t526, z47, z48, z49
<code>\Biggl</code>	z50
<code>\biggl</code>	z47
<code>\Biggm</code>	z51
<code>\biggm</code>	z48
<code>\Biggr</code>	z52
<code>\biggr</code>	z49
<code>\Bigl</code>	z44
<code>\bigl</code>	z41
<code>\Bigm</code>	z45
<code>\bigm</code>	z42
<code>\bigodot</code>	t271
<code>\bigoplus</code>	t270
<code>\bigotimes</code>	t269
<code>\Bigr</code>	z46
<code>\bigr</code>	z43
<code>\bigskip</code>	b208, i162
<code>\bigskipamount</code>	b207, i164, i165, G246
<code>\bigsqcup</code>	t274
<code>\bigtriangledown</code>	t279, t280
<code>\bigtriangleup</code>	t278, t281
<code>\biguplus</code>	t262
<code>\bigvee</code>	t260
<code>\bigwedge</code>	t261
<code>\binoppenalty</code>	b109
<code>\bm@b</code>	B21
<code>\bm@c</code>	B21
<code>\bm@l</code>	B21
<code>\bm@r</code>	B21
<code>\bm@s</code>	B21
<code>\bm@t</code>	B21
<code>\bmod</code>	z35
<code>\boldmath</code>	j14, s49
<code>\bordermatrix</code>	z115
<code>\bot</code>	t242
<code>\botfigrule</code>	K560, K1547
<code>\botmark</code>	J36, K526
<code>\bottomfraction</code>	G173, K1516
<code>\bowtie</code>	t390
<code>\Box</code>	s92
<code>\boxmaxdepth</code>	b132, D264, D298, K362, K384, K428, K533, K542, K582
<code>\brace</code>	z59
<code>\braced</code>	t459, t463, t464, t466, t468
<code>\bracelu</code>	t461, t465, t467
<code>\bracerd</code>	t460, t465, t467
<code>\braceru</code>	t462, t464, t468
<code>\bracevert</code>	t512
<code>\brack</code>	z58
<code>\break</code>	b196, b201, i53
<code>\breve</code>	t429
<code>\brokenpenalty</code>	b114
<code>\buildrel</code>	t377, z107
<code>\bullet</code>	t295
<code>\bx@A</code>	K23, K41
<code>\bx@B</code>	K24, K41
<code>\bx@C</code>	K25, K41
<code>\bx@D</code>	K26, K41
<code>\bx@E</code>	K27, K41
<code>\bx@F</code>	K28, K42
<code>\bx@G</code>	K29, K42
<code>\bx@H</code>	K30, K42
<code>\bx@I</code>	K31, K42
<code>\bx@J</code>	K32, K42
<code>\bx@K</code>	K33, K43
<code>\bx@L</code>	K34, K43
<code>\bx@M</code>	K35, K43
<code>\bx@N</code>	K36, K43
<code>\bx@O</code>	K37, K44

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`\bx@Q` K39, K44
`\bx@R` K40, K44
- C**
- `\c` 1189, 1294, 1374, 1463,
 1465, 1490, 1492, 1505, 1531, 1609
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`\c@dbltopnumber` .. G166, G178, K1521
`\c@enumi` A217
`\c@enumii` A217, A217
`\c@enumiv` A217
`\c@equation` z197, z230, z331
`\c@errorcontextlines` g181
`\c@footnote` F11, G252, G291
`\c@mpfootnote` B216, G254
`\c@ncel` t369, t370
`\c@page` w3, w6, w7, K119, K1156
`\c@secnumdepth` .. F39, F54, F64, F123
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`\c@totalnumber` ... G168, G174, K1517
`\cal` s155
`\calculate@math@sizes` ... o450, p173
`\cap` t286
`\capitalacute` 1683, 1967
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`\capitalogonek` 1679, 1965
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`\capitaltie` 1694, 11035
`\capitaltilde` 1685, 1969
`\caption` G4
`\cases` z108
`\cdot` t308
`\cdotp` t410, t416
`\cdots` t416
`\cdp@elt` o71,
 o91, o102, o103, o124, o127,
 o129, r125, r207, r257, r321, r402
`\cdp@list` ... o73, o89, o103, o131,
 o132, r143, r209, r259, r323, r404
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`center (environment)` y73
`\centering` y73, y75
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 153, 1119, o204, o214, o224, o243
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`\check@ic1`
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<code>\color@begingroup</code>	o476, z87, z103, B13, B47, B101, B212, B245, C49, C53, G280, K367
<code>\color@endbox</code>	B47, G147, G223, K172, K510, K520
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<code>\color@hbox</code>	B47, K507, K517
<code>\color@setgroup</code>	B47, B59, B78
<code>\color@vbox</code> B47, G92, G214, G236, K163	
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<code>\columnseprule</code>	K63, K1483
<code>\columnwidth</code>	k18, k21, k22, k24, B214, B241, G95, G276, K61, K125, K126, K127, K149, K150, K151, K152, K153, K1181, K1183, K1480, K1485
<code>\cong</code>	t365
<code>\contentsline</code>	F143, F148
<code>\coprod</code>	t259
<code>\copyright</code>	l240, l270, s75
<code>\cos</code>	z12
<code>\cosh</code>	z14
<code>\cot</code>	z18
<code>\coth</code>	z19
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<code>\countdef</code>	a13, b37, b38, b39, b41, b47, w3
<code>\cr</code> b167, l955, l958, z118, z122, z225, z255, z328, C174, C185, C192, C201, C202, C345, D72, D74, D75	
<code>\crrc</code> . . . b224, l292, l296, l299, l372, l376, l380, l382, l384, l579, l607, l611, l614, l678, l681, l728, l959,	
	s77, t243, t244, t246, t367, t370, t374, t438, t439, t440, t441, t442, t443, t444, t445, t446, t447, t448, t450, z109, z111, z112, z113, z118, z120, z121, z122, z140, z141, C153, C154, D72
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<code>\csc</code>	z21
<code>\cup</code>	t287
<code>\curr@fontshape</code> l135, o63, o280, o290, o294, o296, o387, o393, o396, o402, o409, o411, p92, p100, p121, p449, p473, p519, p536, r147, r152
<code>\curr@math@size</code> o269, p210, p216, p221, p238
<code>\CurrentOption</code>	l845, l847, l859, L13, L140, L150, L151, L152, L157, L164, L165, L166, L169, L176, L177, L181, L182, L183, L190, L192, L196, L197, L198, L309, L391, L392, L401, L402
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<code>\CYRABHCHDSC</code>	l817
<code>\cyrabhchdsc</code>	l817
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<code>\cyrcl</code>	l819
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D

\d	1190, 1297, 1378, 1612
\dag	1266
\dagger	1266, m58, m59, t289
\dashbox	D187
\dashv	t317
\date	282, F7
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\dbltextfloatsep	
	K170, K178, K587, K1105, K1531
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\ddagger	1267, m58, m60, t288
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\ddots	t421
\deadcycles	k115, y39, y49, K249
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	11117, 11118, 11119, 11120, 11121,
	11122, 11123, 11124, 11125, 11126,
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	11142, 11143, 11144, 11145, 11146,
	11147, 11148, 11149, 11150, 11151,
	11152, 11153, 11154, 11155, 11156,
	11157, 11158, 11159, 11160, 11161
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\DeclareFixedFont	o48
\DeclareFontEncoding	
	1279, 1359, 1559, 1585,
	1591, 1674, o93, t45, t46, t47, t48
\DeclareFontEncoding@ ..	o97, o99, o114
\DeclareFontEncodingDefaults ..	
	o143, q80, q81, t15
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	o27, o29, q15, q17, q71, q72

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	o116 , t16 , t17 , t49 , t50 , t51 , t52	t242 , t247 , t248 , t249 , t250 ,
<code>\DeclareMathAccent</code>		t252 , t253 , t254 , t255 , t256 ,
	r492 , r530 , t424 , t425 ,	t257 , t258 , t259 , t260 , t261 ,
	t426 , t427 , t428 , t429 , t430 ,	t262 , t263 , t264 , t265 , t267 ,
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<code>\DeclareMathAlphabet</code>		t274 , t275 , t276 , t277 , t278 ,
	q109 , q113 , q115 , q122 ,	t279 , t282 , t284 , t286 , t287 ,
	r318 , r481 , r492 , t70 , t71 , t72 , t73	t288 , t289 , t290 , t291 , t292 ,
<code>\DeclareMathAlphabetCharacter</code> .	r591	t293 , t294 , t295 , t296 , t297 ,
<code>\DeclareMathDelimiter</code>		t298 , t299 , t300 , t301 , t302 ,
	r593 , t174 , t175 ,	t303 , t304 , t305 , t306 , t307 ,
	t176 , t177 , t178 , t179 , t182 ,	t308 , t309 , t310 , t311 , t312 ,
	t184 , t185 , t469 , t471 , t473 ,	t313 , t314 , t315 , t316 , t317 ,
	t475 , t477 , t480 , t482 , t484 ,	t318 , t319 , t320 , t321 , t322 ,
	t486 , t488 , t490 , t492 , t494 ,	t323 , t324 , t325 , t327 , t329 ,
	t496 , t498 , t500 , t502 , t504 ,	t331 , t332 , t333 , t334 , t335 ,
	t506 , t508 , t510 , t512 , t514 , t516	t336 , t337 , t338 , t339 , t340 ,
<code>\DeclareMathRadical</code>	r709 , t437	t341 , t343 , t344 , t345 , t346 ,
<code>\DeclareMathSizes</code>		t347 , t349 , t351 , t353 , t354 ,
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	t80 , t81 , t82 , t83 , t84 , t85 , t86 , t87	t360 , t361 , t362 , t363 , t385 ,
<code>\DeclareMathSizes*</code>	o180	t387 , t409 , t410 , t411 , t459 ,
<code>\DeclareMathSymbol</code>		t460 , t461 , t462 , t518 , t519 , t520
	r534 , r592 , r609 , t88 ,	<code>\DeclareMathVersion</code>
	t89 , t90 , t91 , t92 , t93 , t94 , t95 ,	r169 , s1 , s2
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	t117 , t118 , t119 , t120 , t121 ,	l899 , l900 , l901 , l903 , p29 , p37 ,
	t122 , t123 , t124 , t125 , t126 ,	p45 , p53 , p56 , p60 , 365 , L123 , L412
	t127 , t128 , t129 , t130 , t131 ,	<code>\DeclareOption*</code>
	t132 , t133 , t134 , t135 , t136 ,	365 , L123
	t137 , t138 , t139 , t140 , t141 ,	<code>\DeclarePreloadSizes</code>
	t142 , t143 , t144 , t145 , t146 ,	o160 , q85 , q86 , u19 , u21 ,
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	t157 , t158 , t159 , t160 , t161 ,	u49 , u50 , u53 , u54 , u57 , u58 , u64
	t162 , t163 , t164 , t165 , t166 ,	<code>\DeclareRobustCommand</code>
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	t181 , t183 , t187 , t188 , t189 ,	d194 , g4 , g11 , g33 , g60 , i35 ,
	t190 , t191 , t192 , t193 , t194 ,	i43 , i132 , i168 , i182 , i187 , i191 ,
	t195 , t196 , t197 , t198 , t199 ,	j3 , j13 , l261 , l262 , l263 , l264 ,
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	t210 , t211 , t212 , t213 , t214 ,	o229 , o233 , o235 , o253 , p113 ,
	t215 , t216 , t217 , t218 , t219 ,	s3 , s6 , s9 , s12 , s15 , s18 , s21 ,
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	t225 , t226 , t227 , t229 , t230 ,	t368 , t371 , t376 , t378 , t380 ,
		t383 , t389 , t391 , t393 , t395 ,
		t397 , t399 , t401 , t403 , t405 ,
		t407 , t413 , t415 , t417 , t420 , v3 ,
		v108 , z203 , z260 , G257 , N165 , N172
		<code>\DeclareSizeFunction</code> .
		p377 , p464 ,
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p502, p503, p531, p532, p543, p544
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- `\default@family`
 [o104](#), [o136](#), [o375](#), [o378](#), [o397](#)
- `\default@M` [o111](#), [o151](#), [o154](#), [o158](#)
- `\default@mextra` [q1](#), [q79](#)
- `\default@series`
 [o104](#), [o137](#), [o376](#), [o379](#), [o394](#)
- `\default@shape`
 [o105](#), [o138](#), [o377](#), [o380](#), [o392](#)
- `\default@T` [o145](#), [o148](#), [o158](#), [o220](#)
- `\defaultthyphenchar` [b121](#)
- `\defaultscriptratio` [o455](#), [o466](#)
- `\defaultscriptscriptratio` [o456](#), [o466](#)
- `\defaultskewchar` [b122](#)
- `\define@mathalphabet` [q1](#), [q121](#)
- `\define@mathgroup` [q1](#), [q125](#)
- `\define@newfont` [o272](#), [o282](#)
- `\deg` [z34](#)
- `\delcode` [r707](#)
- `\delimiter` [r638](#), [r703](#)
- `\delimiterfactor` [b123](#)
- `\delimitershortfall` [b133](#)
- `\Delta` [t217](#)
- `\delta` [t190](#)
- `\depth` [B16](#), [B19](#)
- `\det` [z30](#)
- `\DH` [l391](#), [N179](#)
- `\dh` [l401](#), [N179](#)
- `\Diamond` [s93](#)
- `\diamond` [t294](#)
- `\diamondsuit` [t256](#)
- `\dim` [z28](#)
- `\dimen@` [b41](#), [b190](#),
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 [C159](#), [K386](#), [K388](#), [K413](#), [K415](#)
- `\dimen@i` [b41](#)
- `\dimen@ii` [b41](#)
- `\dimendef` [b42](#), [b43](#), [b44](#), [b48](#)
- `\discretionary` [d10](#), [z148](#)
- `\display` [z134](#), [z138](#), [z139](#)
- `\displaylines` [z133](#)
- `\displaymath` [z195](#)
- `displaymath` (environment) [z193](#)
- `\displaystyle` [t440](#), [t443](#),
 [t446](#), [t448](#), [z62](#), [z140](#), [z219](#),
 [z222](#), [z259](#), [z283](#), [z299](#), [z323](#), [z326](#)
- `\displaywidowpenalty` [b113](#)
- `\displaywidth` [z140](#), [z218](#), [z271](#), [z302](#)
- `\div` [t297](#)
- `\DJ` [l392](#), [N179](#)
- `\dj` [l402](#), [N179](#)
- `\do` [l16](#), [l41](#),
 [a21](#), [a22](#), [a73](#), [b13](#), [b14](#), [d36](#), [f3](#),
 [f7](#), [f16](#), [f26](#), [k56](#), [k59](#), [k99](#), [k151](#),
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 [y113](#), [y134](#), [y145](#), [y151](#), [B36](#),
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 [L176](#), [L181](#), [L196](#), [L401](#), [L458](#), [L517](#)
- `\do@noligs` [y146](#), [y151](#)
- `\do@subst@correction` [o58](#), [p454](#), [p527](#)
- `\DocInput` [p8](#), [t5](#), [u5](#), [M4](#)
- `\document` [l40](#), [k11](#), [60](#)
- `\document@select@group` [r98](#), [r160](#)
- `\documentclass` [p2](#), [t2](#), [u2](#), [L200](#),
 [L207](#), [L234](#), [L237](#), [L326](#), [L421](#), [M2](#)
- `\documentstyle` [L205](#), [L421](#)
- `\dorestore@version` [r70](#), [r80](#)

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<code>\dospecials</code>		<code>\endmath</code>	z194
... a21 , a73 , b13 , y113 , y134 , L458		<code>\endminipage</code>	B222
<code>\dot</code>	t433	<code>\endpicture</code>	D25
<code>\doteq</code>	t377	<code>\endsloppypar</code>	J49
<code>\dotfill</code>	b234	<code>\endtabbing</code>	C75
<code>\dots</code>	l274 , l276	<code>\endtabular</code>	C153
<code>\doublehyphendemerits</code>	b116	<code>\endtabular*</code>	C153
<code>\doublerulesep</code>	C279 , C306 , C330	<code>\endtrivlist</code>	y74 , y81 , y87 , y119 , z304 , A100 , A101 , C76 , E39
<code>\Downarrow</code>	t490	<code>\endverbatim</code>	y118 , y122
<code>\downarrow</code>	t484	<code>\enlargethispage</code>	K1196
<code>\downbracefill</code>	t445 , t463	<code>\enlargethispage*</code>	K1196
<code>\ds@</code>	L145 , L362	<code>\enskip</code>	i201
<code>\dt@pfalse</code>	z135	<code>\enspace</code>	i198
<code>\dt@ptrue</code>	z134	<code>\ensuremath</code>	m58 , z260 , G260
<code>\dump</code>	N243	<code>\enumerate</code>	A221
E			
<code>\E</code>	L459 , L462 , L489	<code>enumerate (environment)</code>	A221
<code>\egroup</code>	b171	environments:	
<code>\eject</code>	b201	<code>center</code>	y73
<code>\ell</code>	t231	<code>displaymath</code>	z193
<code>\em</code>	s30 , s31 , v25	<code>enumerate</code>	A221
<code>\emergencystretch</code>	b96 , J45 , J51	<code>eqnarray</code>	z205 , z305
<code>\emph</code>	v25	<code>eqnarray*</code>	z256
<code>\empty</code>	b169	<code>equation</code>	z197 , z293
<code>\empty@sfcnt</code>	o321 , p464 , p465 , p468 , p486 , p495 , p539	<code>filecontents</code>	363
<code>\emptyset</code>	t238	<code>flushleft</code>	y80
<code>\enc@update</code> o205 , o207 , o223 , o226 , p129		<code>flushright</code>	y86
<code>\encodingdefault</code>		<code>itemize</code>	A232
..... l845 , l871 , r161 , s80 , t38		<code>lrbox</code>	232
<code>\end</code> a16 , d8 , d251 , g235 , p9 , t6 , u6 , y60 , y97 , y98 , z290 , A112 , F15 , F17 , L467 , L471 , L477 , M5		<code>math</code>	z193
<code>\end@dblfloat</code>	G130	<code>minipage</code>	233
<code>\end@float</code>	G114 , G139 , G238	<code>sloppypar</code>	J48
<code>\endarray</code>	C153	<code>thebibliography</code>	307
<code>\endcenter</code>	y74	<code>verbatim*</code>	y121
<code>\enddisplaymath</code>	z196	<code>\epsilon</code>	t191
<code>\enddocument</code>	y8	<code>\eqnarray</code>	z210 , z257
<code>\endenumerate</code>	A230	<code>eqnarray (environment)</code>	z205 , z305
<code>\endeqnarray</code>	z227 , z258	<code>eqnarray* (environment)</code>	z256
<code>\endequation</code>	z199	<code>\eqno</code>	z199
<code>\endfilecontents</code>	L425	<code>\equation</code>	z198
<code>\endflushleft</code>	y81	<code>equation (environment)</code>	z197 , z293
<code>\endflushright</code>	y87	<code>\equiv</code>	t356
<code>\endgraf</code>	b166	<code>\err@rel@i</code>	q89 , q122 , q126
<code>\enditemize</code>	A241	<code>\errhelp</code>	a164 , c23 , g42 , g69 , M12 , N80 , N234
<code>\endline</code>	b166 , z118	<code>\errmessage</code>	a4 , a169 , b74 , c24 , g50 , g75 , o389 , p385 , p515 , q55 , M16 , N82
<code>\endlinechar</code> .. a39 , a40 , a41 , a151 , d23 , d25 , k182 , L105 , L106 , L107		<code>\error@fontshape</code>	
<code>\endlist</code>	A98 , A230 , A241 o370 , o390 , p107 , p517 , r146	
<code>\endlrbox</code>	B80	<code>\errorcontextlines</code>	
	 b94 , b126 , b252 , g181	

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- `\errorstopmode` [b244](#), [N242](#)
`\escapechar` . [d95](#), [d140](#), [d145](#), [d154](#),
 [o286](#), [o420](#), [p183](#), [r45](#), [r104](#), [r145](#)
`\eta` [t193](#)
`\evensidemargin` [K54](#), [K492](#)
`\every@math@size` [o51](#), [p189](#), [p201](#)
`\everycr` .. [b222](#), [z135](#), [z138](#), [z218](#), [z320](#)
`\everydisplay` [o262](#), [o263](#), [o268](#)
`\everyjob` [c28](#), [r165](#), [N204](#), [N205](#), [N207](#)
`\everymath` [o261](#), [o263](#), [o266](#)
`\everypar` [k37](#), [o477](#), [46](#), [y50](#),
 [y116](#), [A126](#), [A127](#), [A170](#), [A187](#),
 [B183](#), [C72](#), [F31](#), [F79](#), [F90](#),
 [F110](#), [F119](#), [G112](#), [K142](#), [K890](#)
`\execute@size@function`
 [p318](#), [p346](#), [p364](#), [p381](#)
`\ExecuteOptions` . [l904](#), [p57](#), [p70](#), [L194](#)
`\exhyphenpenalty` [b108](#), [b195](#)
`\exists` [t249](#)
`\exp` [z31](#)
`\external@font` [p84](#),
 [p87](#), [p98](#), [p102](#), [p104](#), [p347](#),
 [p365](#), [p439](#), [p477](#), [p549](#), [p551](#), [p553](#)
`\extra@def` [q1](#), [q74](#)
`\extracolsep` [C149](#)
`\extract@alph@from@version`
 [o426](#), [o432](#), [r108](#)
`\extract@font` [o297](#), [p81](#)
`\extract@fontinfo` [p314](#), [p321](#)
`\extract@range@fontinfo`
 [o314](#), [p331](#), [p338](#), [p361](#), [p394](#)
`\extract@size@fn` [o311](#), [p305](#), [p328](#)
- F**
- `\f@baselineskip`
 [o234](#), [o241](#), [o382](#), [p119](#),
 [p136](#), [p140](#), [p155](#), [p169](#), [p180](#), [p194](#)
`\f@encoding` . [l133](#), [o199](#), [o218](#), [o221](#),
 [o222](#), [o224](#), [o243](#), [o275](#), [o280](#),
 [o333](#), [o335](#), [o337](#), [o342](#), [o344](#),
 [o374](#), [o386](#), [p91](#), [p261](#), [p507](#), [r131](#)
`\f@family` [l921](#), [l924](#), [l938](#),
 [l948](#), [l954](#), [l1109](#), [o227](#), [o237](#),
 [o276](#), [o280](#), [o333](#), [o335](#), [o337](#),
 [o342](#), [o344](#), [o378](#), [o397](#), [p91](#), [r131](#)
`\f@linespread` ... [o237](#), [p118](#), [p137](#),
 [p138](#), [p141](#), [p149](#), [p152](#), [p163](#), [p166](#)
`\f@series` [j14](#), [o227](#),
 [o238](#), [o277](#), [o280](#), [o379](#), [o394](#), [s67](#)
`\f@shape`
 [o227](#), [o239](#), [o278](#), [o280](#), [o380](#), [o392](#)
- `\f@size` [l135](#), [l956](#), [o63](#),
 [o234](#), [o240](#), [o279](#), [o381](#), [o411](#),
 [o453](#), [o454](#), [o457](#), [o458](#), [p119](#),
 [p121](#), [p134](#), [p154](#), [p169](#), [p172](#),
 [p175](#), [p180](#), [p187](#), [p194](#), [p206](#),
 [p209](#), [p215](#), [p221](#), [p238](#), [p239](#),
 [p242](#), [p247](#), [p315](#), [p322](#), [p341](#),
 [p343](#), [p362](#), [p425](#), [p427](#), [p429](#),
 [p445](#), [p446](#), [p451](#), [p469](#), [p485](#),
 [p494](#), [p512](#), [p520](#), [p525](#), [p537](#), [p555](#)
`\f@user@size` .. [p445](#), [p450](#), [p512](#), [p525](#)
`\fam` [o24](#)
`\familydefault` [r162](#), [s81](#), [t38](#)
`\fbox` [232](#), [B98](#), [B107](#)
`\fboxrule` [B96](#), [B118](#),
 [B121](#), [B127](#), [B129](#), [B136](#), [B137](#), [N8](#)
`\fboxsep` [B96](#),
 [B102](#), [B117](#), [B122](#), [B132](#), [B134](#), [N7](#)
`\filbreak` [b199](#)
`\file@contents`
 ... [L430](#), [L431](#), [L432](#), [L511](#), [L517](#)
`\filecontents` [L425](#)
`filecontents (environment)` [363](#)
`\filename@area` [a193](#), [a199](#),
 [a206](#), [a212](#), [a219](#), [a225](#), [a232](#),
 [k168](#), [k193](#), [k196](#), [k212](#), [k224](#), [k226](#)
`\filename@base`
 [a241](#), [k168](#), [k193](#), [k196](#), [k219](#), [k224](#)
`\filename@dot` [a239](#), [a242](#)
`\filename@ext` [a237](#), [a239](#),
 [k169](#), [k189](#), [k190](#), [k193](#), [k196](#), [k220](#)
`\filename@parse`
 . [1](#), [4](#), [a57](#), [a189](#), [k166](#), [k188](#), [k217](#)
`\filename@path` .. [a194](#), [a195](#), [a200](#),
 [a207](#), [a208](#), [a213](#), [a220](#), [a221](#), [a226](#)
`\filename@simple`
 [a197](#), [a210](#), [a223](#), [a233](#), [a235](#)
`\fill` [i195](#)
`\finalhyphendemerits` [b117](#)
`\finph@nt` [z87](#), [z89](#), [z90](#)
`\finsm@sh` [z103](#), [z105](#), [z106](#)
`\firstmark` [J37](#), [K526](#)
`\fix@penalty` [v83](#)
`\fixed@sfcnt` .. [o326](#), [p543](#), [p544](#), [p547](#)
`\flat` [t252](#)
`\floatingpenalty` [G275](#)
`\floatpagefraction` [G176](#), [K1520](#)
`\floatsep` [K544](#),
 [K562](#), [K569](#), [K1400](#), [K1449](#), [K1525](#)
`\flushbottom` [J41](#)
`\flushleft` [y80](#)
`flushleft (environment)` [y80](#)

File Key: a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltdefns.dtx, e=ltalloc.dtx, f=ltcntrl.dtx, g=lterror.dtx, h=ltpar.dtx, i=ltspace.dtx, j=ltlogos.dtx, k=ltfiles.dtx, l=ltoutenc.dtx, m=ltcounts.dtx, n=ltlength.dtx, o=ltfssbas.dtx, p=ltfssstrc.dtx, q=ltfsscmp.dtx, r=ltfssdcl.dtx, s=ltfssini.dtx, t=fontdef.dtx, u=preload.dtx, v=ltfntcmd.dtx, w=ltpageno.dtx, x=ltxref.dtx, y=ltmiscen.dtx, z=ltmath.dtx, A=ltlists.dtx, B=ltboxes.dtx, C=lttab.dtx, D=lt pictur.dtx, E=ltthm.dtx, F=ltsect.dtx, G=ltfloat.dtx, H=ltidxglo.dtx, I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx, N=ltfinal.dtx, O=ltpatch.ltx

- `\flushright` [y86](#)
 - `flushright` (environment) [y86](#)
 - `\fmtname` [c1](#), [c28](#), [c31](#), [L243](#), [L247](#)
 - `\fmtversion`
 - . [c1](#), [c11](#), [c30](#), [c33](#), [g1](#), [o1](#), [C1](#), [D1](#), [K4](#), [L260](#), [L263](#), [N188](#), [N214](#)
 - `\fmtversion@topatch` [N186](#), [N188](#), [N200](#), [N201](#), [N213](#), [N221](#), [O5](#)
 - `\fnsymbol` [m39](#), [103](#)
 - `\font` [b227](#), [b232](#), [l251](#), [l252](#), [l253](#), [l338](#), [l345](#), [l643](#), [l650](#), [o54](#), [o62](#), [o64](#), [p84](#), [s31](#), [s54](#), [s66](#), [u8](#), [u9](#), [u10](#), [v67](#), [y115](#)
 - `\font@info` [p99](#), [p321](#), [p394](#), [p401](#)
 - `\font@name` [l134](#), [l137](#), [o61](#), [o169](#), [o171](#), [o271](#), [o288](#), [o410](#), [p84](#), [p88](#), [p90](#), [p105](#), [p120](#), [p123](#), [p126](#), [p284](#), [p285](#), [p286](#), [p287](#), [p288](#), [p293](#)
 - `\font@submax` [p407](#), [p442](#), [p443](#), [y22](#), [y24](#), [N72](#), [N74](#), [N83](#)
 - `\fontdimen` [b227](#), [b232](#), [l251](#), [l252](#), [l253](#), [l338](#), [l345](#), [l643](#), [l650](#), [s31](#), [s66](#), [v67](#), [D48](#), [D50](#), [D334](#)
 - `\fontencoding` [l871](#), [o199](#), [o230](#), [r161](#), [t14](#)
 - `\fontfamily` [l940](#), [o227](#), [r162](#), [s5](#), [s8](#), [s11](#)
 - `\fontname` [o64](#)
 - `\fontseries` [o227](#), [r163](#), [s14](#), [s17](#)
 - `\fontshape` [l348](#), [l653](#), [o227](#), [r164](#), [s20](#), [s23](#), [s26](#), [s29](#)
 - `\fontsize` [j6](#), [l256](#), [l958](#), [o52](#), [o235](#), [s60](#), [G260](#)
 - `\fontsubfuzz` [p407](#), [p447](#), [y22](#)
 - `\footins` [G245](#), [G271](#), [K264](#), [K265](#), [K266](#), [K267](#), [K299](#), [K358](#), [K366](#), [K370](#), [K399](#)
 - `\footnote` [G262](#)
 - `\footnotemark` [F9](#), [G284](#)
 - `\footnoterule` [B228](#), [G249](#), [K369](#)
 - `\footnotesep` . [B247](#), [G261](#), [G274](#), [G282](#)
 - `\footnotesize` [B240](#), [G272](#)
 - `\footnotetext` [F11](#), [G301](#)
 - `\footskip` [K58](#), [K516](#)
 - `\forall` [t248](#)
 - `\fps@dbl` [G34](#)
 - `\frac` [z202](#)
 - `\frame` [B82](#), [B144](#)
 - `\framebox` [232](#), [B105](#)
 - `\frenchspacing` . [b152](#), [k40](#), [y118](#), [y144](#)
 - `\frown` [t359](#)
 - `\frozen@everydisplay` [o261](#), [o267](#)
 - `\frozen@everymath` [o261](#), [o265](#)
 - `\fussy` [J50](#)
 - `\futurelet` [d257](#), [d271](#), [i172](#), [i180](#), [v65](#), [z153](#), [C327](#)
- G**
- `\g@addto@macro` [L369](#), [L375](#), [L379](#), [L380](#)
 - `\G@refundefinedfalse` [x5](#)
 - `\G@refundefinedtrue` . [l21](#), [l44](#), [x3](#), [x12](#)
 - `\Gamma` [t216](#)
 - `\gamma` [t189](#)
 - `\gcd` [z33](#)
 - `\ge` [t330](#)
 - `\gen@sfcnt` ... [o322](#), [p480](#), [p481](#), [p484](#)
 - `\genb@sfcnt` ... [o323](#), [p489](#), [p490](#), [p493](#)
 - `\genb@x` [p494](#), [p497](#)
 - `\genb@y` [p497](#)
 - `\GenericError` [g19](#), [g91](#), [g122](#), [g153](#), [p62](#)
 - `\GenericInfo` [g4](#), [g112](#), [g143](#), [g173](#), [p31](#), [p34](#), [p39](#), [p75](#)
 - `\GenericWarning` [g11](#), [g102](#), [g133](#), [g164](#), [p42](#), [p47](#), [p50](#), [p78](#)
 - `\geq` [t329](#), [t330](#)
 - `\get@cdp` [r275](#), [r283](#), [r316](#)
 - `\get@external@font` ... [p83](#), [p96](#), [p526](#)
 - `\getanddefine@fonts` [o421](#), [o439](#), [p274](#), [r46](#), [r93](#), [r105](#), [r187](#), [r246](#), [r280](#), [r282](#), [r299](#), [r422](#), [r423](#), [r455](#), [r456](#), [r802](#), [r803](#)
 - `\GetFileInfo` [t3](#)
 - `\getlinechar` [D129](#)
 - `\gets` [t348](#)
 - `\gg` [t343](#)
 - `\glb@currsz` [k35](#), [o258](#), [p171](#), [p206](#), [p210](#), [p216](#), [p239](#)
 - `\glb@settings` . [o259](#), [p171](#), [p218](#), [p249](#)
 - `\globaldefs` [o422](#), [p185](#), [r47](#), [r106](#)
 - `\glossary` [305](#), [F146](#), [H23](#), [H35](#), [J20](#), [J28](#), [K500](#)
 - `\glossaryentry` [H32](#)
 - `\goodbreak` [b199](#)
 - `\grave` [t425](#)
 - `\group@elt` [r26](#), [r185](#), [r217](#), [r218](#), [r239](#), [r243](#), [r834](#)
 - `\group@list`
 - . . [r189](#), [r224](#), [r237](#), [r242](#), [r243](#), [r272](#), [r494](#), [r536](#), [r616](#), [r619](#), [r669](#), [r672](#), [r719](#), [r722](#), [r789](#), [r840](#)
 - `\guillemotleft` [l403](#), [l620](#)
 - `\guillemotright` [l404](#), [l621](#)
 - `\guilsinglleft` [l405](#)
 - `\guilsinglright` [l406](#)

File Key: a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltdefns.dtx, e=ltalloc.dtx, f=ltcntrl.dtx, g=lterror.dtx, h=ltpar.dtx, i=ltspace.dtx, j=ltlogos.dtx, k=ltfiles.dtx, l=ltoutenc.dtx, m=ltcounts.dtx, n=ltlength.dtx, o=ltfssbas.dtx, p=ltfssstrc.dtx, q=ltfsscmp.dtx, r=ltfssdcl.dtx, s=ltfssini.dtx, t=fontdef.dtx, u=preload.dtx, v=ltfntcmd.dtx, w=ltpageno.dtx, x=ltxref.dtx, y=ltmiscen.dtx, z=ltmath.dtx, A=ltlists.dtx, B=ltboxes.dtx, C=lttab.dtx, D=lt pictur.dtx, E=ltthm.dtx, F=ltsect.dtx, G=ltfloat.dtx, H=ltidxglo.dtx, I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx, N=ltfinal.dtx, O=ltpatch.ltx

H

`\H` [g27](#), [l185](#), [l287](#),
[l365](#), [l458](#), [l466](#), [l485](#), [l493](#), [l600](#)
`\h@false` [z77](#)
`\h@true` [z78](#), [z79](#)
`\halign` ... [b222](#), [z96](#), [z140](#), [z218](#), [z320](#)
`\hangindent` [F122](#)
`\hat` [t431](#)
`\hb@xt@` [b237](#), [d16](#),
[l324](#), [z140](#), [z223](#), [z269](#), [z283](#),
[z298](#), [z328](#), [B28](#), [B43](#), [B116](#),
[B289](#), [B293](#), [B294](#), [C39](#), [D21](#),
[D31](#), [D40](#), [D143](#), [D177](#), [D180](#),
[D183](#), [D185](#), [D187](#), [D262](#), [D291](#),
[D390](#), [F163](#), [F166](#), [K509](#), [K519](#),
[K1181](#), [K1479](#), [K1480](#), [K1485](#)
`\hbadness` [b104](#), [o480](#)
`\hbar` [t228](#)
`\headheight` [K56](#), [K505](#)
`\headsep` [K57](#), [K514](#)
`\heartsuit` [t257](#)
`\height` [B15](#), [B18](#)
`\hexnumber@` [r509](#),
[r517](#), [r532](#), [r551](#), [r559](#), [r567](#),
[r576](#), [r579](#), [r588](#), [r589](#), [r628](#),
[r636](#), [r681](#), [r689](#), [r703](#), [r704](#),
[r707](#), [r732](#), [r740](#), [r745](#), [r747](#), [s71](#)
`\hfuzz` [b127](#), [J46](#), [J47](#), [J53](#), [J54](#)
`\hgl@` [b192](#), [b193](#)
`\hglue` [b189](#)
`\hideskip` [b79](#), [b213](#)
`\hidewidth`
... [b213](#), [l292](#), [l293](#), [l296](#), [l299](#),
[l372](#), [l373](#), [l377](#), [l380](#), [l382](#), [l384](#),
[l607](#), [l608](#), [l611](#), [l614](#), [l678](#), [l681](#)
`\hline` [C326](#), [C329](#)
`\hmode@bgroup` [l72](#),
[l78](#), [l292](#), [l298](#), [l326](#), [l337](#), [l344](#),
[l372](#), [l379](#), [l382](#), [l384](#), [l577](#), [l607](#),
[l613](#), [l642](#), [l649](#), [l677](#), [l680](#), [l726](#), [v7](#)
`\hmode@start@before@group`
... [l73](#), [l116](#), [l118](#), [l124](#), [l139](#)
`\holdinginserts` [b95](#)
`\hom` [z29](#)
`\hookleftarrow` [t388](#)
`\hookrightarrow` [t386](#)
`\hphantom` [z75](#)
`\hrule` [b190](#),
[b234](#), [i148](#), [i156](#), [l245](#), [l248](#),
[t246](#), [t522](#), [B88](#), [B93](#), [B127](#),
[B137](#), [C327](#), [C344](#), [D293](#), [G250](#)
`\hrulefill` [b234](#)

I

`\hspace` [i191](#)
`\hyphenation` [l160](#)
`\hyphenchar` [y115](#)
`\hyphenpenalty` [b107](#)
`\I` [b158](#), [L485](#), [L503](#), [N49](#), [N154](#)
`\i` [l202](#),
[l304](#), [l351](#), [l352](#), [l353](#), [l354](#), [l355](#),
[l356](#), [l407](#), [l444](#), [l445](#), [l537](#), [l539](#),
[l541](#), [l543](#), [l622](#), [N54](#), [N159](#), [N166](#)
`\ialign` [b222](#), [b224](#),
[t243](#), [t367](#), [t438](#), [t441](#), [t444](#),
[t447](#), [z109](#), [z111](#), [z119](#), [C173](#), [D72](#)
`\if@afterindent` [F107](#), [F114](#)
`\if@compatibility` [L2](#), [L202](#)
`\if@endpe` [y62](#), [A128](#)
`\if@eqnsw` [z205](#), [z254](#)
`\if@fcolmade`
[K76](#), [K212](#), [K318](#), [K327](#), [K597](#),
[K614](#), [K641](#), [K695](#), [K1463](#), [K1500](#)
`\if@filesw` [I4](#), [I8](#),
[I19](#), [I28](#), [I36](#), [I43](#), [k7](#), [k30](#), [k92](#),
[k104](#), [k111](#), [k120](#), [y14](#), [y28](#), [F136](#)
`\if@firstamp` [C221](#)
`\if@firstcolumn` [K76](#),
[K194](#), [K227](#), [K320](#), [K1153](#), [K1470](#)
`\if@ignore` [y4](#), [y63](#)
`\if@inlabel`
[A28](#), [A65](#), [A102](#), [A150](#), [A173](#), [K138](#)
`\if@insert` [K76](#),
[K799](#), [K908](#), [K942](#), [K1012](#), [K1128](#)
`\if@minipage` [i102](#),
[i115](#), [y101](#), [A139](#), [B191](#), [C70](#), [G20](#)
`\if@mparswitch` [K76](#), [K1155](#)
`\if@multiplelabels` [x31](#)
`\if@negarg` [D76](#), [D98](#), [D112](#), [D151](#)
`\if@newlist` [y119](#), [A29](#), [A33](#),
[A69](#), [A78](#), [A106](#), [A156](#), [K476](#), [K523](#)
`\if@nmbrlist` [A33](#), [A191](#)
`\if@no@font@opt` [q100](#), [q119](#)
`\if@nobreak` [i58](#), [i117](#), [k67](#), [k79](#), [A157](#),
[A182](#), [B177](#), [F30](#), [F111](#), [G105](#),
[G228](#), [J25](#), [J33](#), [K142](#), [K287](#), [K887](#)
`\if@noitemarg` [A32](#), [A189](#)
`\if@noparitem` [A30](#), [A147](#)
`\if@noparlist` [A31](#), [A114](#)
`\if@noskipsec` [A58](#),
[B178](#), [F21](#), [F23](#), [F80](#), [G229](#), [K132](#)
`\if@ovb` [D233](#), [D279](#), [D284](#)
`\if@ovl` [D233](#), [D277](#), [D294](#)
`\if@ovr` [D233](#), [D276](#), [D292](#)
`\if@ovt` [D233](#), [D278](#), [D288](#)

File Key: a=ltmdirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltdefns.dtx,
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o=ltfssbas.dtx, p=ltfssstrc.dtx, q=ltfsscmp.dtx, r=ltfssdcl.dtx, s=ltfssini.dtx,
t=fontdef.dtx, u=preload.dtx, v=ltfntcmd.dtx, w=ltpageno.dtx, x=ltxref.dtx,
y=ltmiscen.dtx, z=ltmath.dtx, A=ltlists.dtx, B=ltboxes.dtx, C=lttab.dtx,
D=lt pictur.dtx, E=ltthm.dtx, F=ltsect.dtx, G=ltfloat.dtx, H=ltidxglo.dtx,
I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx,
N=ltfinal.dtx, O=ltpatch.ltx

`\if@partsw` [k7](#), [k96](#)
`\if@pboxsw` [B174](#), [B249](#)
`\if@reversemargin` [K82](#), [K1158](#)
`\if@reversemarginpar` [K76](#)
`\if@rjfield` [C21](#), [C35](#)
`\if@specialpage` [K76](#), [K485](#)
`\if@tempswa` [I52](#), [a25](#),
[a26](#), [a27](#), [e9](#), [k102](#), [o74](#), [r210](#),
[r260](#), [r324](#), [r405](#), [r833](#), [v73](#), [y30](#),
[y107](#), [K732](#), [K768](#), [K1093](#), [L448](#)
`\if@test` .. [K12](#), [K13](#), [K677](#), [K710](#),
[K774](#), [K855](#), [K864](#), [K993](#), [K1098](#)
`\if@twocolumn` ... [k20](#), [G32](#), [G131](#),
[K76](#), [K120](#), [K215](#), [K226](#), [K319](#),
[K343](#), [K599](#), [K632](#), [K1152](#), [K1464](#)
`\if@twoside` [K76](#), [K119](#), [K488](#)
`\ifdt@p` [z133](#), [z135](#)
`\iff` [t408](#)
`\IfFileExists` [a125](#),
[k134](#), [k161](#), [k172](#), [60](#), [366](#), [N182](#)
`\ifG@refundefined` [x3](#), [x4](#), [x5](#)
`\ifh@` [z76](#), [z93](#)
`\ifin@` [l861](#), [l864](#), [q40](#), [q42](#), [r1](#),
[r13](#), [r174](#), [r271](#), [r273](#), [r334](#), [r347](#),
[r417](#), [r419](#), [r447](#), [r495](#), [r506](#),
[r537](#), [r548](#), [r617](#), [r620](#), [r640](#),
[r670](#), [r673](#), [r717](#), [r720](#), [r723](#),
[r790](#), [r792](#), [r821](#), [L80](#), [L155](#), [L167](#)
`\ifinner` [z169](#), [z183](#), [G53](#), [G194](#)
`\ifmath@fonts` [o179](#), [p176](#)
`\ifnot@nil` [p297](#), [p316](#), [p337](#)
`\ifodd` [r764](#), [D192](#), [D212](#), [G64](#), [K21](#),
[K119](#), [K489](#), [K724](#), [K727](#), [K760](#),
[K763](#), [K871](#), [K874](#), [K1041](#),
[K1044](#), [K1156](#), [K1335](#), [K1343](#)
`\iftc@forced` [l896](#), [l906](#), [l1115](#)
`\ifv@` [z75](#), [z92](#)
`\ifvbox` [K270](#), [K300](#), [K379](#), [K400](#)
`\ignorespaces` .. [I7](#), [I9](#), [i24](#), [i74](#), [i83](#),
[i207](#), [k60](#), [o232](#), [y63](#), [y71](#), [y72](#),
[z191](#), [A55](#), [A207](#), [B79](#), [B247](#),
[C59](#), [C60](#), [C61](#), [C74](#), [C83](#), [C96](#),
[C100](#), [C107](#), [C114](#), [C116](#), [C125](#),
[C207](#), [C269](#), [C271](#), [C273](#), [C300](#),
[D24](#), [D32](#), [D43](#), [D74](#), [D75](#),
[E30](#), [E32](#), [F93](#), [G17](#), [G24](#), [G282](#)
`\ignorespacesafterend` [y7](#)
`\IJ` [l205](#), [l335](#), [l410](#)
`\ij` [l204](#), [l333](#), [l409](#)
`\Im` [t234](#)
`\imath` [t229](#)
`\in` [t340](#), [t369](#)

`\in@` [l859](#), [l862](#), [q39](#), [q41](#), [r1](#),
[r12](#), [r173](#), [r270](#), [r272](#), [r330](#), [r343](#),
[r416](#), [r418](#), [r445](#), [r493](#), [r504](#),
[r535](#), [r546](#), [r615](#), [r618](#), [r638](#),
[r668](#), [r671](#), [r715](#), [r718](#), [r721](#),
[r788](#), [r791](#), [r819](#), [L79](#), [L152](#), [L166](#)
`\in@@` [r3](#), [r5](#)
`\in@false` [r4](#)
`\in@true` [r4](#)
`\include` [k86](#), [60](#)
`\includeonly` [k82](#), [60](#)
`\indent` [A151](#), [C72](#)
`\index` [305](#), [F146](#), [H6](#), [H18](#), [J20](#), [J28](#), [K499](#)
`\indexentry` [H15](#)
`\inf` [z25](#)
`\infty` [t236](#)
`\init@restore@glb@settings`
[p219](#), [p222](#), [p224](#)
`\init@restore@version` [r49](#), [r64](#), [r84](#), [r85](#)
`\input` [a15](#), [a121](#), [a124](#),
[a181](#), [d7](#), [k163](#), [l1094](#), [p16](#), [q8](#),
[q96](#), [s131](#), [s142](#), [s152](#), [t10](#), [t11](#),
[t12](#), [t13](#), [t20](#), [t21](#), [t25](#), [t26](#),
[t55](#), [t56](#), [t57](#), [t58](#), [t540](#), [t541](#),
[t542](#), [y19](#), [60](#), [366](#), [L206](#), [N69](#), [N187](#)
`\input@path` [1](#), [4](#), [a56](#),
[a78](#), [a80](#), [a86](#), [a88](#), [a94](#), [a96](#),
[a101](#), [a103](#), [a113](#), [a180](#), [k137](#), [k151](#)
`\InputIfFileExists`
[k160](#), [k165](#), [k173](#), [k192](#),
[l849](#), [l1162](#), [o342](#), [s105](#), [s123](#),
[s134](#), [s144](#), [60](#), [366](#), [L332](#), [M8](#), [N63](#)
`\inputlineno` [a250](#), [b86](#),
[b87](#), [b88](#), [g183](#), [g186](#), [s104](#), [N34](#),
[N45](#), [N53](#), [N128](#), [N139](#), [N150](#), [N158](#)
`\insecunt` [b37](#), [b47](#), [b48](#), [b49](#),
[b51](#), [b62](#), [b63](#), [b64](#), [b65](#), [b66](#), [b67](#)
`\insert` [b69](#), [G271](#), [K399](#), [K400](#), [K1230](#)
`\install@mathalphabet`
[o416](#), [o433](#), [o440](#), [r193](#), [r196](#),
[r277](#), [r278](#), [r375](#), [r427](#), [r430](#),
[r437](#), [r452](#), [r453](#), [r460](#), [r804](#), [r806](#)
`\int` [t266](#)
`\interdisplaylinepenalty`
[i29](#), [z55](#), [z137](#), [z240](#)
`\interfootlinepenalty` [b148](#)
`\interfootnotelinepenalty`
[b148](#), [i34](#), [G273](#)
`\interlinepenalty`
[i27](#), [y108](#), [y111](#), [F50](#), [F101](#),
[F154](#), [G273](#), [K290](#), [K892](#), [K896](#)

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N=ltfinal.dtx, O=ltpatch.ltx

- `\intertextsep` K875,
 K879, K894, K897, K904, K1525
`\intop` t265, t266
`\iota` t195
`\is@orange` o315, p332, p333
`\ishortstack` D62
`\itdefault` s29, t34
`\item` I4, I8,
 g277, y73, y80, y86, y100, z282,
 z297, A131, A209, C69, E36, E38
`\itemindent` . A9, A42, A95, A177, A198
`\itemize` A232
`itemize (environment)` A232
`\itemsep` A1, A166
`\iterate` a28, a29, b178
`\itshape` l346, l651,
 s27, s28, s32, v21, E36, E38, G254
- J**
- `\J` N51, N156
`\j` l203, l305, l408, l623, N166
`\jmath` t230
`\Join` s91
`\joinrel` t379, t386, t388, t390, t392,
 t394, t396, t398, t400, t404, t406
`\jot` z53, z134, z247
- K**
- `\k` l381,
 l447, l452, l474, l479, l555, l556,
 l604, l605, l656, l658, l663, l665
`\kappa` t196
`\ker` z27
`\kernel@ifnextchar`
 d48, d68, d119, d258, d275, L112
`\kill` C61
- L**
- `\L` l197, l323, l393, l618, L482, L502, N179
`\l` l206, l325, l411, l624, N179
`\l@ngrel@x` .. d41, d42, d43, d89, d138
`\label` x32, F146, J20, J28, K498
`\labelsep` .. A9, A200, A206, E36, E38
`\labelwidth` A9, A93, A199, A201, A204
`\Lambda` t219
`\lambda` t197
`\land` t283
`\angle` t498
`\language` ... b35, b56, b89, b90, M10
`\last@fontshape` o388, o403
`\lastbox` z123,
 z124, A127, A175, F82, F115, K255
`\LastDeclaredEncoding` ... o112, o115
- `\lastpenalty` v94, v97
`\lastskip` b202, b203, b205,
 b207, i19, i66, i87, i88, i92, i94,
 i95, i103, i119, i122, i123, v84,
 v87, A115, A116, A140, A141, D44
`\LaTeX` j3, j15, L451
`\LaTeXe` j13
`\lbrace` l262, t502
`\lbrack` b162
`\lccode` g22, g23, g24, g25,
 g26, g27, l109, y139, y149, N31,
 N41, N50, N52, N54, N56, N59,
 N60, N61, N62, N136, N146,
 N155, N157, N159, N161, N164
`\lceil` t506
`\ldotp` t409, t412, t523
`\ldots` l276, t413
`\le` t328
`\leaders` ... b234, t246, t464, t465,
 t467, t468, C344, D287, D293, F159
`\leadsto` s94
`\leavevmode` . l14, b193, b220, b223,
 b234, b236, i169, i183, l78, l139,
 l243, l245, l295, l324, l328, l331,
 l375, l610, l640, l952, v105,
 y108, y119, y132, y150, z282,
 z297, A58, A103, B4, B8, B81,
 B83, B99, B113, B159, B207,
 B252, B265, C160, D65, D187,
 F23, F155, G296, K134, K139
`\left` t524,
 t525, t526, t527, z108, z114, z125
`\Leftarrow` t324, t400, t406
`\leftarrow`
 t347, t348, t388, t398, t404, t456
`\leftarrowfill` t442, t456
`\lefteqn` z259
`\leftharpoonupdown` t361, t375
`\leftharpoonup` t360
`\lefthyphenmin` b92, M11
`\leftline` B289
`\leftmargin`
 A9, A52, A53, A94, A136, A138
`\leftmargini` z275, A17
`\leftmarginii` A17
`\leftmarginiii` A17
`\leftmarginiv` A17
`\leftmarginv` A17
`\leftmarginvi` A17
`\leftmark` J34
`\Leftrightarrow` t323
`\leftrightharpoonup` t346

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- `\leftskip` [b215](#), [y77](#), [y84](#),
[y90](#), [y102](#), [A74](#), [B186](#), [F152](#), [F157](#)
 - `\leq` [t327](#), [t328](#)
 - `\lfloor` [t510](#)
 - `\lg` [z4](#)
 - `\lgroup` [t512](#)
 - `\lhd` [s97](#)
 - `\lhook` [t385](#), [t386](#)
 - `\lim` [z6](#)
 - `\liminf` [z8](#)
 - `\limits` [t446](#), [t450](#), [z107](#), [z201](#)
 - `\limsup` [z7](#)
 - `\line` [g262](#), [D77](#), [D260](#)
 - `\linebreak` [i13](#), [48](#)
 - `\linepenalty` [b106](#)
 - `\lineskip`
..... [b156](#), [b188](#), [b223](#), [t366](#), [z130](#),
[B187](#), [C62](#), [C180](#), [D67](#), [D188](#), [K501](#)
 - `\lineskiplimit` .. [b157](#), [b188](#), [b225](#),
[b226](#), [t366](#), [t418](#), [z132](#), [z136](#), [K501](#)
 - `\linespread` [o233](#)
 - `\linethickness` [D56](#)
 - `\linewidth` .. [k24](#), [z176](#), [z283](#), [z298](#),
[z302](#), [z320](#), [A15](#), [A51](#), [A52](#),
[A54](#), [B184](#), [C38](#), [G164](#), [K127](#), [K153](#)
 - `\list` [A34](#), [A226](#), [A237](#)
 - `\listfiles` [k206](#), [366](#)
 - `\listparindent` [A9](#), [A41](#), [A50](#)
 - `\ll` [t344](#)
 - `\llap` [A228](#), [A239](#), [B293](#), [B294](#)
 - `\lmoustache` [t469](#)
 - `\ln` [z5](#)
 - `\lnot` [t251](#)
 - `\LoadClass` [364](#),
[L212](#), [L226](#), [L349](#), [L408](#), [L416](#), [L417](#)
 - `\LoadClassWithOptions` [365](#), [L225](#)
 - `\log` [z3](#)
 - `\loggingall` [b248](#)
 - `\loggingoutput` [b241](#), [b252](#)
 - `\Longleftarrow` [t400](#)
 - `\longleftarrow` [t397](#)
 - `\Longleftrightarrow` [t406](#), [t408](#)
 - `\longleftarrow` [t404](#)
 - `\longmapsto` [t402](#)
 - `\Longrightarrow` [t394](#)
 - `\longrightarrow` [t395](#), [t402](#)
 - `\loop` [a28](#), [b178](#), [C350](#)
 - `\lor` [t285](#)
 - `\lower` [j2](#), [t366](#), [B125](#),
[D23](#), [D96](#), [D183](#), [D184](#), [D221](#), [D222](#)
 - `\lower@bound` [p342](#), [p343](#), [p355](#)
 - `\lowercase` [g29](#), [l110](#),
[l847](#), [o249](#), [o341](#), [y143](#), [y150](#), [N175](#)
 - `\lq` [b160](#)
 - `\lrbox` [B69](#)
 - `lrbox` (environment) [232](#)
 - `\ltx@sh@ft` [b229](#),
[l292](#), [l299](#), [l372](#), [l380](#), [l607](#), [l614](#)
- M**
- `\M` [b158](#)
 - `\m@ne` [b39](#)
 - `\m@th` .. [b209](#), [b221](#), [j13](#), [t243](#), [t367](#),
[t369](#), [t370](#), [t373](#), [t414](#), [t438](#),
[t441](#), [t444](#), [t447](#), [t453](#), [t456](#),
[t463](#), [t466](#), [t528](#), [z68](#), [z71](#), [z89](#),
[z105](#), [z108](#), [z110](#), [z115](#), [z134](#),
[z214](#), [z283](#), [z298](#), [z308](#), [B174](#),
[B263](#), [C163](#), [F159](#), [G255](#), [G260](#)
 - `\magstep` [b149](#)
 - `\magstephalf` [b149](#)
 - `\makeatletter` [d272](#), [d288](#), [k26](#), [o305](#),
[o347](#), [y19](#), [F134](#), [K2](#), [L206](#), [L311](#)
 - `\makeatother` [d272](#), [L206](#), [N241](#)
 - `\makebox` [z176](#), [232](#), [B3](#)
 - `\makeglossary` [k69](#), [305](#), [H20](#)
 - `\makeindex` [k68](#), [305](#), [H3](#)
 - `\makelabel`
[A45](#), [A97](#), [A195](#), [A208](#), [A228](#), [A239](#)
 - `\MakeLowercase` [N172](#), [N181](#)
 - `\makeph@nt` [z84](#), [z86](#)
 - `\makesm@sh` [z100](#), [z102](#)
 - `\maketitle` [282](#)
 - `\MakeUppercase` [N165](#), [N165](#)
 - `\mandatory@arg` [p374](#), [p477](#),
[p485](#), [p494](#), [p507](#), [p509](#), [p514](#),
[p516](#), [p521](#), [p523](#), [p538](#), [p549](#), [p551](#)
 - `\mapsto` [t352](#)
 - `\mapstochar` [t351](#), [t352](#), [t402](#)
 - `\marginpar` [G187](#)
 - `\marginparpush` [K66](#), [K1172](#)
 - `\marginparsep` [K65](#), [K1183](#), [K1185](#)
 - `\marginparwidth` ... [G216](#), [G64](#), [K1185](#)
 - `\mark` [J23](#), [J31](#), [J39](#)
 - `\markboth` [J18](#)
 - `\markright` [J18](#)
 - `\math` [z193](#)
 - `math` (environment) [z193](#)
 - `\math@bgroup` [o447](#), [p260](#),
[p266](#), [r40](#), [r99](#), [v112](#), [v113](#), [v120](#)
 - `\math@egroup`
[o447](#), [p264](#), [p265](#), [v113](#), [v114](#), [v121](#)
 - `\math@fonts`
..... [o417](#), [o422](#), [p186](#), [p290](#), [r47](#), [r106](#)

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<code>\math@fontsfalse</code>	<code>\mathhexbox</code>
... j7 , l256 , l957 , o50 , o181 , o189	b221 , s78
<code>\math@fontstrue</code>	<code>\mathindent</code>
o179 , o461	z273 , z284 , z300 , z310
<code>\math@version</code>	<code>\mathinner</code>
o10 , o253 , o421 , o425 , o427 , o428 , o430 , p184 , r43 , r46 , r51 , r52 , r56 , r67 , r68 , r69 , r87 , r88 , r89 , r102 , r105 , r109 , r111 , r113 , r117 , s53	t412 , t416 , t421 , t523
<code>\mathaccent</code>	<code>\mathit</code>
r504 , r532	s28 , t72 , t75 , t521
<code>\mathalpha</code>	<code>\mathnormal</code>
r603 , r762 , t88 , t89 , t90 , t91 , t92 , t93 , t94 , t95 , t96 , t97 , t98 , t99 , t100 , t101 , t102 , t103 , t104 , t105 , t106 , t107 , t108 , t109 , t110 , t111 , t112 , t113 , t114 , t115 , t116 , t117 , t118 , t119 , t120 , t121 , t122 , t123 , t124 , t125 , t126 , t127 , t128 , t129 , t130 , t131 , t132 , t133 , t134 , t135 , t136 , t137 , t138 , t139 , t140 , t141 , t142 , t143 , t144 , t145 , t146 , t147 , t148 , t149 , t216 , t217 , t218 , t219 , t220 , t221 , t222 , t223 , t224 , t225 , t226 , t424 , t425 , t426 , t427 , t428 , t429 , t430 , t431 , t433 , t436	t68
<code>\mathbf</code>	<code>\mathop</code>
s13 , t70	r766 , t259 , t260 , t261 , t262 , t263 , t264 , t265 , t267 , t268 , t269 , t270 , t271 , t272 , t274 , t275 , t444 , t447 , z3 , z4 , z5 , z6 , z7 , z8 , z9 , z10 , z11 , z12 , z13 , z14 , z15 , z16 , z17 , z18 , z19 , z20 , z21 , z22 , z23 , z24 , z25 , z26 , z27 , z28 , z29 , z30 , z31 , z32 , z33 , z34 , z107 , z201
<code>\mathbin</code>	<code>\mathopen</code>
r767 , t151 , t152 , t154 , t276 , t277 , t278 , t279 , t282 , t284 , t286 , t287 , t288 , t289 , t290 , t291 , t292 , t293 , t294 , t295 , t296 , t297 , t298 , t299 , t300 , t301 , t302 , t303 , t304 , t305 , t306 , t307 , t308 , t309 , t310 , t311 , z37	r769 , t160 , t163 , t168 , t174 , t176 , t178 , t470 , t499 , t503 , t507 , t511 , t513 , z41 , z44 , z47 , z50
<code>\mathcal</code>	<code>\mathord</code>
t69	r603 , r765 , t155 , t162 , t165 , t170 , t182 , t183 , t184 , t186 , t187 , t188 , t189 , t190 , t191 , t192 , t193 , t194 , t195 , t196 , t197 , t198 , t199 , t200 , t201 , t202 , t203 , t204 , t205 , t206 , t207 , t208 , t209 , t210 , t211 , t212 , t213 , t214 , t215 , t227 , t229 , t230 , t231 , t232 , t233 , t234 , t235 , t236 , t237 , t238 , t239 , t241 , t242 , t247 , t248 , t249 , t250 , t252 , t253 , t254 , t255 , t256 , t257 , t258 , t432 , t434 , t435 , t455 , t456 , t459 , t460 , t461 , t462 , t474 , t476 , t478 , t481 , t495 , t517 , t518 , t519 , t520
<code>\mathchar</code>	<code>\mathpalette</code>
b221 , r546 , r588 , t228 , t240 , t521	t365 , t369 , t372 , z60 , z69 , z82 , z98
<code>\mathchar@type</code>	<code>\mathparagraph</code>
r532 , r576 , r579 , r588 , r604 , r703 , r763	l264 , m59 , t518
<code>\mathchardef</code>	<code>\mathph@nt</code>
b21 , b22 , b23 , b24 , e3 , e4 , e5 , e6 , l75 , r579	z82 , z88
<code>\mathchoice</code>	<code>\mathpunct</code>
z61	r771 , t153 , t157 , t409 , t410 , t411
<code>\mathclose</code>	<code>\mathrel</code>
r770 , t150 , t159 , t161 , t164 , t169 , t175 , t177 , t179 , t472 , t497 , t501 , t505 , t509 , t515 , z43 , z46 , z49 , z52	r768 , t156 , t158 , t166 , t167 , t180 , t181 , t244 , t312 , t313 , t314 , t315 , t316 , t317 , t318 , t319 , t320 , t321 , t322 , t323 , t324 , t325 , t327 , t329 , t331 , t332 , t333 , t334 , t335 , t336 , t337 , t338 , t339 , t340 , t341 , t343 , t344 , t345 , t346 , t347 , t349 , t351 , t353 , t354 , t355 , t356 , t357 , t358 , t359 , t360 , t361 , t362 , t363 , t365 , t369 , t372 , t379 , t381 ,
<code>\mathcode</code>	
r576 , t171 , t172 , t173	
<code>\mathdollar</code>	
l261 , t518	
<code>\mathellipsis</code>	
l275 , t523	
<code>\mathgroup</code>	
l1104 , o22 , p257 , p263 , p269 , p270 , p281 , s68 , t529	

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- t384, t385, t387, t390, t392,
 t483, t485, t487, t489, t491,
 t493, z42, z45, z48, z51, z107, z201
 \mathring t436
 \mathrm s4, t67
 \mathsection l265, m59, t518
 \mathsf s7, t71, t74
 \mathsm@sh z98, z104
 \mathsterling l273, t518
 \mathstrut z94, z112, z113
 \mathsurround b209
 \mathsymbol r581
 \mathtt s10, t73
 \mathunderscore t518
 \mathversion o253, s50, s52
 \matrix z110, z114
 \max z22
 \maxdeadcycles K7
 \maxdepth
 . b130, k50, K73, K384, K394,
 K428, K533, K542, K582, K733, N9
 \maxdimen b79, b131, b132,
 b188, b226, b244, b252, o478,
 p340, p399, t366, D264, D298,
 K239, K1193, K1220, K1225, N13
 \maybe@ic v46, v47, v65
 \maybe@ic@ v65
 \mb@b B34, B44
 \mb@l B34, B38, B43, D68, D72
 \mb@r B34, B38, B43, D68, D72
 \mb@t B35, B42
 \mbox b221, j13, l247,
 s74, t414, 232, B7, B8, D28, G260
 \mddefault s17, t32, t40
 \mdseries s15, s16, s77, v20
 \meaning a166, a175,
 a246, d201, d281, r331, r344,
 r445, r504, r546, r638, r715, r819
 \medbreak b203
 \medmuskip t531, z36, z38, z145
 \medskip b206, i162
 \medskipamount b205, i163, i165
 \MessageBreak d177, g3, g6, g13, g36,
 g49, g63, g76, g197, g199, g205,
 g217, l126, l852, l855, l879, l880,
 l881, l882, l883, l884, l885, l886,
 l887, l888, l937, l939, l947, l954,
 l1109, o401, p20, p21, p67, p88,
 p281, p450, p474, p520, p537,
 p554, q21, q23, r286, r295,
 r433, v126, y23, K460, K1293,
 L87, L236, L247, L249, L251,
 L262, L318, L319, L321, L322,
 L323, L325, L327, L344, L345,
 L346, L347, L393, L410, L411,
 L443, L471, N73, N74, N75, N77
 \mho s90
 \mid t316
 \min z23
 \minipage B194
 minipage (environment) 233
 \mit s155
 \mkern . t228, t244, t246, t370, t379,
 t421, t422, t423, t451, t452,
 t453, t454, t455, t456, t457,
 t458, z36, z37, z40, z73, z74, F160
 \models t392
 \month a132, c9, L455
 \moveright K504
 \mp t303
 \mscount C347
 \mskip i188,
 z36, z38, z144, z145, z146, z147
 \mu t198
 \multicolumn C203
 \multiput D33, D37
 \multispan C203, C347
 \muskip b29, b50, t451, t452
 \muskipdef b50

 N
 \n@space .. t524, t525, t526, t527, t528
 \nabla t239
 \narrower b214
 \natural t253
 \ne t326
 \nearrow t319
 \NeedsTeXFormat p12, L241, L514
 \neg t250, t251
 \negthinspace i198
 \neq t326
 \new@command
 . d44, d45, d100, d135, d157, d213
 \new@environment d115, d116, d129
 \new@fontshape q1, q14
 \new@mathalphabet r328, r349, r360
 \new@mathgroup o22, r212
 \new@mathversion r11, r170, r172
 \new@symbolfont r213, r241
 \newbox b47, b84,
 b211, e13, z66, A27, B54, C16,
 C17, C18, C311, D6, D325,
 D330, K67, K101, K102, K103
 \newcommand
 23, d44, l4, t29, t30, t31, t32,

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- t33, t34, t35, t36, t37, t38, t39,
t40, t41, D341, K1513, K1516,
K1519, K1520, K1523, K1524
- \newcount [b47](#), b87, b90, b92,
b93, b94, b95, b97, b99, b148,
e7, e8, i62, k9, m25, p25, r18,
r178, z55, z205, z206, A23, A24,
A25, A26, A56, A216, A231,
B235, C11, C12, C13, C14,
C15, C303, C304, C305, D319,
D320, D321, D322, D331, F19,
F123, F124, G3, G165, G166,
G167, G168, K84, K86, K88,
K90, K92, K100, K1282, K1511,
K1514, K1517, K1521, N3, N4, N5
- \newcounter [m10](#), [103](#)
- \newdimen . . [b47](#), b79, b81, b82, b96,
b147, e10, e11, e12, i61, p356,
p357, z53, z274, A9, A10, A11,
A12, A13, A14, A15, A16, A17,
A18, A19, A20, A21, A22, B96,
B97, C3, C5, C6, C7, C8, C143,
C306, C307, C308, C309, D3,
D4, D5, D7, D239, D240, D241,
D242, D243, D244, D323, D324,
D326, D327, D328, D329, G261,
K52, K53, K54, K56, K57, K58,
K59, K60, K61, K62, K63, K64,
K65, K66, K72, K74, K75, K87,
K89, K91, K93, K94, K95, K96,
K97, K98, K99, K1283, K1284
- \newenvironment [23](#), [d115](#), L453
- \newfam [o25](#)
- \newfont [s54](#)
- \newgroup [r38](#)
- \newhelp [b47](#)
- \newif [d139](#), e9, k7,
k8, l896, o179, r6, x3, z75, z76,
z133, z207, A28, A29, A30, A31,
A32, A33, A128, B249, C21,
C221, D76, D233, D234, D235,
D236, F21, F107, K76, K77,
K78, K79, K80, K81, K82, K83, L2
- \newinsert . . [b62](#), B236, G245, K23,
K24, K25, K26, K27, K28, K29,
K30, K31, K32, K33, K34, K35,
K36, K37, K38, K39, K40, K1192
- \newlabel [x22](#), x34
- \newlanguage [b56](#)
- \newlength [n3](#), [106](#)
- \newline [i43](#)
- \newlinechar a19, [d5](#)
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- \newmathalphabet@@ [q99](#)
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- \newmuskip [b47](#)
- \newpage K114, K120, [K131](#)
- \newread [b54](#), [k3](#)
- \newsavebox [232](#), [B54](#)
- \newskip [b47](#),
b80, b83, b145, b146, e14, e15,
e17, i165, i166, i167, i195, n3,
y79, z208, A2, A3, A4, A5, A6,
A7, A8, K1525, K1526, K1527,
K1531, K1532, K1535, K1536,
K1537, K1541, K1542, K1543
- \newtheorem [E1](#)
- \newtie l695, l1036
- \newtoks . . . [b47](#), e16, o263, o264, p201
- \newwrite [b54](#), k4, k5, k6, F137, H4, H21
- \nfss@catcodes
. . . d290, o28, o95, o305, o338,
o339, [o346](#), q10, t19, t24, t54, K3
- \nfss@text l269, l271, [s74](#), v5, [v104](#), x13
- \NG l394, N179
- \ng l412, N179
- \ni t341, t342
- \no@alphabet@error . . [o6](#), r192, r194,
r365, r366, r380, r389, r475, r476
- \noaccents@ [o469](#), t48
- \noalign t245,
t439, t442, t444, t445, t449,
t450, z112, z113, z118, z121,
z135, z247, C202, C327, C346, D75
- \noboundary b98
- \nobreak b191, b194,
[b196](#), i38, i53, i149, i157, i176,
i183, i193, k67, k79, l334, l336,
y69, B288, F73, F157, F158,
F162, G297, J25, J33, K288, K888
- \nobreakdashes [i168](#)
- \nobreakspace [i182](#)
- \nocite [I39](#), [307](#)
- \nocorr [v26](#), v41, v45, v48
- \nocorrlist [v71](#), [v103](#)
- \nofiles [k63](#), [60](#)
- \noindent F122
- \nointerlineskip [b186](#),
t245, t439, t442, t445, t449,
z175, D285, D287, K1180, K1188
- \nolimits t266, t273,
z3, z4, z5, z9, z10, z11, z12, z13,
z14, z15, z16, z17, z18, z19, z20,
z21, z26, z27, z28, z29, z31, z34

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- `\nolinebreak` [i13](#), [48](#)
`\non@alpherr`
 ... [o441](#), [o443](#), [r59](#), [r73](#), [r120](#), [r841](#)
`\nonfrenchspacing` ... [b152](#), [b257](#), [k42](#)
`\nonscript` [z36](#), [z38](#)
`\nonumber` [z234](#), [z257](#), [z258](#)
`\nopagebreak` [i3](#), [48](#)
`\normalbaselines` ... [b156](#), [z108](#), [z110](#)
`\normalbaselineskip`
 ... [b145](#), [b157](#), [p142](#), [B188](#)
`\normalcolor` [z200](#),
 [z270](#), [B47](#), [B227](#), [F163](#), [G93](#),
 [K164](#), [K368](#), [K508](#), [K518](#), [K1483](#)
`\normalfont` [o479](#), [s79](#),
 [v18](#), [y120](#), [z200](#), [z270](#), [F163](#), [G256](#)
`\normallineskip` ... [b145](#), [b156](#), [B187](#)
`\normallineskiplimit` [b145](#), [b157](#), [z136](#)
`\normalmarginpar` [G242](#)
`\normalsfcodes` [k38](#), [k40](#), [k42](#), [k62](#), [K497](#)
`\normalsize` [k36](#),
 [v124](#), [G23](#), [G101](#), [G227](#), [K496](#), [L5](#)
`\not` [t244](#), [t326](#), [t345](#)
`\not@base` [s86](#), [s90](#), [s91](#), [s92](#),
 [s93](#), [s94](#), [s95](#), [s96](#), [s97](#), [s98](#), [s99](#), [s100](#)
`\not@math@alphabet` [s4](#), [s7](#),
 [s10](#), [s13](#), [s16](#), [s19](#), [s22](#), [s25](#), [s28](#), [s33](#)
`\notin` [t369](#)
`\notrace` [K1244](#)
`\nu` [t199](#)
`\null` [b170](#), [l382](#), [l384](#), [l678](#), [l681](#), [x17](#),
 [y108](#), [y132](#), [z91](#), [z110](#), [z128](#), [F157](#)
`\nulldelimiterspace` [b134](#), [t528](#)
`\nullfont` [y51](#)
`\number` [a33](#),
 [d2](#), [d82](#), [m40](#), [o425](#), [o428](#), [p401](#),
 [r51](#), [r69](#), [r89](#), [r110](#), [s71](#), [L424](#), [L455](#)
`\numberline` [F55](#), [F65](#), [F166](#), [G17](#)
`\narrow` [t321](#)
- O**
- `\O` [l199](#), [l302](#), [l396](#), [l617](#), [N178](#)
`\o` [l208](#), [l307](#), [l414](#), [l625](#), [N178](#)
`\o@lign` [b223](#),
 [l292](#), [l299](#), [l372](#), [l380](#), [l607](#), [l614](#)
`\oalign` [b223](#)
`\obeycr` [i204](#)
`\obeylines` [b173](#), [y114](#), [y127](#), [y128](#), [K465](#)
`\obeyspaces` [b173](#), [K465](#)
`\oddsidemargin` [K53](#), [K55](#), [K490](#)
`\odot` [t298](#)
`\OE` [l198](#), [l301](#), [l395](#), [l616](#), [N178](#)
`\oe` [l207](#), [l306](#), [l413](#), [l626](#), [N178](#)
`\of` [z67](#), [z204](#)
- P**
- `\P` [l264](#)
`\p@` [b81](#)
`\p@equation` [z212](#), [z307](#)
`\p@reset@font` [s79](#)
`\p@selectfont` [p117](#)
`\PackageError` ... [g88](#), [l850](#), [l902](#), [l946](#)
`\PackageInfo`
 ... [g88](#), [l879](#), [l892](#), [l893](#), [l953](#), [l1163](#)

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- \PackageWarning [g88](#), [l903](#), [l1107](#)
- \PackageWarningNoLine [g88](#)
- \pagebreak [i3](#), [48](#)
- \pagegoal [K1227](#), [K1234](#)
- \pagenumbering [w5](#), [198](#)
- \pageref [x10](#)
- \pageshrink [K420](#), [K424](#), [K440](#)
- \pagestyle [J2](#)
- \pagetotal [K109](#)
- \paperheight [K74](#)
- \paperwidth [K74](#)
- \par [a67](#), [b11](#), [b166](#), [b174](#), [b175](#), [b190](#),
[b199](#), [b200](#), [b201](#), [b203](#), [b205](#),
[b207](#), [d6](#), [h3](#), [h4](#), [h6](#), [y49](#), [y69](#),
[y106](#), [A63](#), [A110](#), [A126](#), [A151](#),
[A154](#), [B179](#), [B223](#), [C177](#), [C353](#),
[F24](#), [F73](#), [F164](#), [G15](#), [G24](#),
[G143](#), [J48](#), [J49](#), [K143](#), [K205](#), [K1233](#)
- \par@deathcycles [A56](#), [A77](#), [A79](#), [A80](#)
- \paragraphmark [F126](#)
- \parallel [t315](#)
- \parbox [232](#), [B145](#)
- \parboxrestore [B190](#)
- \parfillskip [b144](#), [o478](#),
[y78](#), [y91](#), [y103](#), [A76](#), [B187](#), [F152](#)
- \parindent [b136](#), [b215](#), [b216](#), [y78](#),
[y85](#), [y91](#), [y103](#), [A50](#), [B182](#), [F153](#)
- \parsep [A1](#), [A49](#), [A90](#)
- \parshape [A54](#)
- \parskip [b137](#),
[y70](#), [y101](#), [y103](#), [z316](#), [A49](#),
[A73](#), [A88](#), [A90](#), [A117](#), [A143](#),
[A162](#), [A213](#), [B182](#), [C70](#), [K898](#)
- \partial [t235](#)
- \partopsep [z314](#), [A1](#), [A61](#)
- \PassOptionsToClass [365](#), [L113](#)
- \PassOptionsToPackage [364](#), [L113](#)
- \patch@level [N189](#), [N201](#), [N203](#), [O8](#)
- \patterns [l160](#)
- \penalty [l17](#), [b195](#), [b196](#), [b197](#),
[b198](#), [b199](#), [b200](#), [b204](#), [b206](#),
[b208](#), [i7](#), [i10](#), [i21](#), [i120](#), [i124](#),
[v100](#), [y108](#), [y111](#), [z37](#), [z137](#),
[z247](#), [A180](#), [C58](#), [G120](#), [G124](#),
[G126](#), [K117](#), [K145](#), [K146](#), [K896](#)
- \perp [t355](#)
- \ph@nt [z77](#), [z78](#), [z79](#), [z80](#)
- \phantom [z75](#)
- \Phi [t224](#)
- \phi [t206](#)
- \Pi [t221](#)
- \pi [t201](#)
- \pickup@font [l136](#), [o170](#),
[o270](#), [o412](#), [p122](#), [p285](#), [p287](#), [p289](#)
- \pictur@ [D9](#), [D53](#), [D54](#), [D60](#)
- \picture [D9](#)
- \pm [t304](#)
- \pmatrix [z114](#)
- \pmod [z39](#)
- \poptabs [g244](#), [C129](#)
- \poptracing [p130](#), [p294](#)
- \postdisplaypenalty [i28](#), [z281](#), [z295](#)
- \pounds [l272](#)
- \Pr [z32](#)
- \pr@@@s [z156](#), [z164](#)
- \pr@@@t [z159](#), [z165](#)
- \pr@m@s [z153](#), [z154](#)
- \prec [t332](#)
- \preceq [t335](#)
- \predisplaypenalty [b115](#), [z280](#), [z294](#)
- \preload@sizes [q84](#)
- \pretolerance [b102](#), [o480](#)
- \prevdepth [b186](#), [b190](#),
[b191](#), [i147](#), [i152](#), [z135](#), [G121](#), [G123](#)
- \prim@s [z150](#), [z152](#), [z164](#)
- \prime [t172](#), [t237](#), [z153](#)
- \prime@s [z151](#)
- \process@table [k34](#), [r124](#)
- \ProcessOptions
[l870](#), [l905](#), [p71](#), [L144](#), [L187](#), [L412](#)
- \ProcessOptions* [L144](#)
- \prod [t267](#)
- \propto [t312](#)
- \protect [l5](#),
[d70](#), [d192](#), [d208](#), [d217](#), [d222](#),
[d225](#), [d226](#), [d228](#), [d229](#), [d234](#),
[d235](#), [d240](#), [d243](#), [d244](#), [g213](#),
[g232](#), [g234](#), [g235](#), [g244](#), [g252](#),
[g262](#), [g274](#), [g277](#), [g285](#), [k75](#), [l26](#),
[l32](#), [l53](#), [l60](#), [l164](#), [l172](#), [r394](#),
[r846](#), [s57](#), [v125](#), [x12](#), [C234](#),
[F11](#), [F55](#), [F65](#), [F143](#), [G17](#), [K474](#)
- \protected@edef
. [d227](#), [x37](#), [B243](#), [F43](#),
[G277](#), [N169](#), [N175](#), [N180](#), [N181](#)
- \protected@write
. [k66](#), [k71](#), [x33](#), [F145](#), [H14](#), [H31](#)
- \protected@xdef
. [d227](#), [F10](#), [G263](#), [G287](#), [G303](#)
- \provide@command [d151](#), [d152](#)
- \providecommand [d151](#), [l6](#), [K1266](#)
- \ProvidesClass [364](#), [L100](#)
- \ProvidesFile
. [a36](#), [t551](#), [t553](#), [t554](#), [t555](#), [L102](#)

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N=ltfinal.dtx, O=ltpatch.ltx

- `\ProvidesPackage` [p13](#), [364](#), [L83](#), [L100](#), [L515](#)
`\ProvideTextCommand` [l3](#), [l65](#)
`\ProvideTextCommandDefault` [l62](#)
`\ps@empty` [J10](#), [N15](#)
`\ps@plain` [J13](#)
`\Psi` [t225](#)
`\psi` [t208](#)
`\pushtabs` [g244](#), [C126](#)
`\pushtracing` [p115](#), [p275](#)
`\put` [D29](#), [D197](#), [D198](#), [D199](#),
[D200](#), [D205](#), [D207](#), [D219](#), [D220](#),
[D221](#), [D222](#), [D227](#), [D230](#), [D378](#)
- Q**
- `\qbezier` [260](#), [D341](#)
`\qbeziermax` [D337](#), [D362](#)
`\qqquad` [i201](#)
`\quad` [i201](#), [z109](#), [z111](#), [z120](#), [F94](#)
`\quotedblbase` [l415](#), [l627](#)
`\quotesinglbase` [l416](#)
- R**
- `\r` [b164](#), [b165](#), [l191](#), [l290](#), [l330](#), [l366](#),
[l467](#), [l494](#), [l504](#), [l530](#), [l603](#), [l639](#)
`\r@t` [z66](#)
`\radical` [r713](#), [r715](#), [r745](#)
`\raggedbottom` [J39](#)
`\raggedleft` [y86](#), [y88](#)
`\raggedright` [y80](#), [y82](#)
`\raise` [l329](#), [l332](#), [l579](#), [l641](#),
[l728](#), [s77](#), [t373](#), [t421](#), [t423](#), [z73](#),
[B273](#), [B282](#), [D30](#), [D40](#), [D95](#),
[D183](#), [D262](#), [D279](#), [D305](#), [D389](#)
`\raisebox` [233](#), [B264](#)
`\rangle` [t496](#)
`\rbrace` [l263](#), [t500](#)
`\rbrack` [b162](#)
`\rceil` [t504](#)
`\Re` [t233](#)
`\ref` [x10](#)
`\refstepcounter` [x32](#), [z198](#),
[z296](#), [103](#), [A192](#), [E27](#), [F42](#), [G9](#)
`\relbar` [t384](#), [t392](#), [t394](#), [t400](#)
`\relbar` [t381](#), [t396](#), [t398](#)
`\relpenalty` [b110](#)
`\rem@pt` [o246](#)
`\remove@angles` [p301](#), [p326](#)
`\remove@nil` [r27](#)
`\remove@star` [p301](#), [p309](#)
`\remove@to@nnil` [o245](#), [p301](#), [p329](#), [p458](#)
`\removelastskip` [b202](#), [b204](#), [b206](#), [b208](#)
- `\renew@command` .. [d93](#), [d94](#), [d158](#), [d166](#)
`\renew@environment` [d121](#), [d122](#)
`\renewcommand` [23](#), [d93](#), [z269](#), [z276](#), [z286](#)
`\renewenvironment` [23](#), [d121](#), [z293](#), [z305](#)
`\repeat` [a28](#), [a30](#), [b178](#), [C350](#)
`\RequirePackage`
..... [364](#), [L202](#), [L209](#), [L230](#), [L408](#)
`\RequirePackageWithOptions` [365](#), [L228](#)
`\reserved@a` [a68](#), [a72](#), [a73](#),
[a142](#), [a143](#), [a146](#), [a164](#), [a168](#),
[a190](#), [a197](#), [a200](#), [a202](#), [a203](#),
[a210](#), [a213](#), [a215](#), [a216](#), [a223](#),
[a226](#), [a228](#), [a254](#), [a255](#), [a256](#),
[c5](#), [c11](#), [c26](#), [d85](#), [d89](#), [d102](#),
[d103](#), [d104](#), [d106](#), [d157](#), [d158](#),
[d159](#), [d165](#), [d166](#), [d167](#), [d168](#),
[d171](#), [d190](#), [d199](#), [d204](#), [d255](#),
[d264](#), [f33](#), [f37](#), [g216](#), [i171](#), [i174](#),
[k76](#), [k77](#), [k99](#), [k100](#), [k138](#), [k140](#),
[k145](#), [k147](#), [k149](#), [k155](#), [k159](#),
[k167](#), [k170](#), [k186](#), [k187](#), [k191](#),
[k197](#), [k218](#), [k222](#), [k226](#), [l80](#),
[l82](#), [l90](#), [l107](#), [l112](#), [o38](#), [o41](#),
[o44](#), [o80](#), [o83](#), [o85](#), [o122](#), [o126](#),
[o340](#), [o343](#), [o387](#), [o388](#), [o400](#),
[o403](#), [o408](#), [o433](#), [o436](#), [o437](#),
[o445](#), [p150](#), [p152](#), [p154](#), [p164](#),
[p166](#), [p169](#), [p298](#), [p299](#), [p314](#),
[p315](#), [q43](#), [q47](#), [r275](#), [r284](#),
[r286](#), [r330](#), [r333](#), [r343](#), [r346](#),
[r444](#), [r446](#), [r504](#), [r505](#), [r546](#),
[r547](#), [r638](#), [r639](#), [r715](#), [r716](#),
[r818](#), [r820](#), [r836](#), [r838](#), [r839](#),
[r844](#), [v30](#), [v31](#), [v36](#), [v37](#), [v48](#),
[v51](#), [v70](#), [v77](#), [y41](#), [y42](#), [y54](#),
[y55](#), [y59](#), [y64](#), [y65](#), [z249](#), [z250](#),
[z251](#), [z252](#), [z254](#), [B36](#), [B37](#),
[B40](#), [B70](#), [B76](#), [C211](#), [C215](#),
[C220](#), [C239](#), [C328](#), [C329](#), [D99](#),
[D101](#), [D105](#), [D266](#), [G29](#), [G30](#),
[G32](#), [G33](#), [G59](#), [G63](#), [G69](#), [G72](#),
[G75](#), [G78](#), [K668](#), [K1351](#), [K1353](#),
[K1359](#), [K1362](#), [L77](#), [L80](#), [L81](#),
[L195](#), [L198](#), [L242](#), [L243](#), [L246](#),
[L283](#), [L287](#), [L299](#), [L300](#), [L302](#),
[L312](#), [L352](#), [L517](#), [L519](#), [N16](#),
[N33](#), [N35](#), [N36](#), [N44](#), [N46](#), [N47](#),
[N85](#), [N116](#), [N122](#), [N123](#), [N125](#),
[N127](#), [N131](#), [N138](#), [N140](#), [N141](#),
[N149](#), [N151](#), [N152](#), [N167](#), [N168](#),
[N169](#), [N170](#), [N173](#), [N174](#), [N175](#),
[N176](#), [N202](#), [N205](#), [N206](#), [N223](#)

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<code>\reserved@b</code>	a69, a70, d77, d79, d87, d104, d105, d200, d201, d204, d256, d266, f33, f34, f37, i172, i173, i180, k98, k100, k150, k152, k154, k221, k227, l83, l90, o70, o72, o125, o126, o434, o445, q37, q44, q61, q63, r206, r208, r256, r258, r283, r284, r285, r320, r322, r401, r403, r448, r449, r450, r457, v35, v36, v49, v51, v77, v78, C216, C218, C220, G39, G40, K604, K607, K620, K623, L78, L79, L291, L297, L300, L460, L461, L463, L489, N19, N21, N25, N88, N90, N94, N168, N174, <u>N223</u>	<code>\rhook</code> t387, t388 <code>\right</code> t524, t525, t526, t527, z109, z114, z127 <code>\Rightarrow</code> t325, t394, t406 <code>\rightarrow</code> t349, t350, t352, t386, t396, t404, t455 <code>\rightarrowfill</code> t439, t453 <code>\rightharpoondown</code> t363 <code>\rightharpoonup</code> t362, t374 <code>\righthyphenmin</code> b93, M11 <code>\rightleftharpoons</code> t372 <code>\rightline</code> <u>B289</u> <code>\rightmargin</code> <u>A9</u> , <u>A40</u> , <u>A51</u> <code>\rightmark</code> <u>J34</u> <code>\rightskip</code> b216, y77, y83, y90, y102, A75, B186, F152 <code>\rlap</code> l329, l332, l641, z259, z270, <u>B293</u> , C72 <code>\rlh@</code> t372, t373 <code>\rmdefault</code> s5, s67, <u>t29</u> , t39 <code>\rmfamily</code> s3, s4, v15 <code>\rmoustache</code> t471 <code>\Roman</code> <u>m36</u> , <u>103</u> <code>\roman</code> <u>m35</u> , <u>103</u> <code>\romannumeral</code> m41, m42, A43, A224, A235 <code>\root</code> <u>z66</u> , z204 <code>\rootbox</code> <u>z66</u> <code>\rq</code> <u>b160</u> <code>\rule</code> <u>233</u> , <u>B247</u> , <u>B250</u> , G282
<code>\reserved@c</code>	a70, a75, d261, d264, d266, d269, k210, k211, o71, o72, o435, o438, q38, q45, q51, q58, r24, r28, r207, r208, r257, r258, r321, r322, r402, r403, r425, r434, r449, r463, r628, r644, r653, r681, r692, r731, r744, r746, v50, v52, v59, L437, L438, L439, L449, L465, L472, L497, N23, N28, N38, N92, N113, N114, N115, N117, N118, N119, N120, N121, N124, N126, N133, N143, N225	
<code>\reserved@d</code>	a73, a76, d254, d263, k209, k211, q51, q58, q60, q64, r636, r644, r653, r689, r692, r739, r744, r748, N226	
<code>\reserved@e</code>	i36, i38, i47, i53, q29, q35, q60, q63, q64, r25, r30, N227	
<code>\reserved@f</code>	. . . . . . i37, i38, i53, l846, l847, l848, l849, l851, l858, o165, o167, o173, o174, p338, p349, p353, p361, p367, p370, p421, p458, p461, q17, q28, q35, q61, q63, N228	
<code>\reset@font</code>	. . . . . I20, <u>s79</u> , x13, B240, G100, G226, G272, J14, K495	
<code>\restglb@settings</code>	. . . . . p222, <u>p232</u>	
<code>\restore@mathversion</code>	r63, r66, r86, r94	
<code>\restore@protect</code>	. . . . . <u>d227</u>	
<code>\restorecr</code>	. . . . . <u>i204</u>	
<code>\reversemarginpar</code>	. . . . . <u>G242</u>	
<code>\rfloor</code>	. . . . . <u>t508</u>	
<code>\rgroup</code>	. . . . . <u>t512</u>	
<code>\rhd</code>	. . . . . s99	
<code>\rho</code>	. . . . . t202	
		S
<code>\S</code>	. . . . . l265	
<code>\s@fct@</code>	. . . . . p386, <u>p463</u>	
<code>\s@fct@fixed</code>	. . . . . <u>p542</u>	
<code>\s@fct@gen</code>	. . . . . <u>p479</u>	
<code>\s@fct@genb</code>	. . . . . <u>p488</u>	
<code>\s@fct@sgen</code>	. . . . . <u>p479</u>	
<code>\s@fct@sgenb</code>	. . . . . <u>p488</u>	
<code>\s@fct@sub</code>	. . . . . <u>p501</u>	
<code>\s@fct@subf</code>	. . . . . <u>p530</u>	
<code>\samepage</code>	. . . . . <u>i27</u> , <u>48</u>	
<code>\savebox</code>	. . . . . <u>232</u> , <u>B55</u>	
<code>\sb</code>	. . . . . <u>z142</u>	
<code>\sbox</code> b210, j4, <u>232</u> , A195, B57, <u>B58</u> , B63, B68	
<code>\scan@fontshape</code> q30, <u>q33</u>	
<code>\scan@fontshape</code> q2, q3, q4, q5, q6, q7, <u>q8</u> , q16, <u>q27</u>	
<code>\scdefault</code> s26, <u>t34</u>	
<code>\scriptfont</code> p292	

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`\scriptfont@name` p287, p292
`\scriptscriptfont` p293
`\scriptscriptstyle` z65, z68
`\scriptspace` b135
`\scriptstyle` t243, z64
`\scshape` l254, s24, s25, v23
`\searrow` t320
`\sec` z20
`\secdef` F125
`\sectionmark` F126
`\select@group` o418, o437, r39, r160,
r197, r330, r383, r392, r430, r462
`\selectfont` j7,
l256, l348, l653, l871, l940, l958,
o231, p112, s5, s8, s11, s14,
s17, s20, s23, s26, s29, s60, G258
`\seriesdefault` r163, s82, t38
`\set@mathdelimiter` r690, r706
`\set@color` B46
`\set@display@protect`
d3, d225, g7, g14, g37, g64
`\set@fontsize` . o234, o236, p119, p132
`\set@mathaccent` r507, r515, r531
`\set@mathchar` r565, r575
`\set@mathdelimiter` ... r641, r650, r702
`\set@mathradical` r168, r741
`\set@mathsymbol` r549, r557, r578
`\set@simple@size@args`
o313, p302, p317, p324, p345, p363
`\set@size@funct@args`
o318, p307, p309, p371
`\set@size@funct@args@` ... o319, p371
`\set@typeset@protect` d225,
d244, C179, C205, K480, K482
`\setcounter`
.. k127, m2, m26, 103, A215,
K1512, K1515, K1518, K1522
`\setlanguage` b99
`\setlength` n4, z312, z317, z318, z319,
106, B27, B115, B161, B164,
B209, B254, B255, B256, B271,
B272, B279, B280, B281, C158,
C352, K1528, K1529, K1530,
K1533, K1534, K1538, K1539,
K1540, K1544, K1545, K1546
`\SetMathAlphabet`
.. o14, q131, q132, r399, t74, t75
`\SetMathAlphabet@` ... r337, r406, r415
`\setminus` t307
`\SetSymbolFont` r254, t64, t65, t66
`\SetSymbolFont@` r227, r261, r269
`\settodepth` n6, 106
`\settoheight` n6, 106
`\settowidth` n6, 106
`\sf@size` j6,
l256, o193, o459, p282, p286, G260
`\sfcode` b152, b153, b154,
b155, b239, i178, k39, N42, N147
`\sfdefault` s8, t29
`\sffamily` s6, s7, v16
`\sh@ft` b227
`\shapedefault` r164, s83, t38
`\sharp` t254
`\shipout` K479
`\shortstack` D63
`\showboxbreadth` b124, b244
`\showboxdepth` b125, b244, o480
`\showhyphens` o472
`\showoutput` b241
`\showoverfull` b240, b245, b253
`\Sigma` t222
`\sigma` t203
`\sim` t353, t365
`\simeq` t354
`\sin` z9
`\sinh` z11
`\sixt@n` a18,
b16, b54, b55, o23, r43, r102,
r499, r501, r541, r543, r584,
r586, r624, r626, r632, r634,
r677, r679, r685, r687, r727,
r729, r735, r737, D156, D171,
D173, G58, G80, K747, K793,
K929, K1059, K1122, K1305,
K1314, K1370, K1386, K1418
`\size@update` .. p128, p139, p158, p160
`\sizefn@info`
.. p308, p310, p318, p346, p364
`\skew` t451
`\skip` b28,
b49, b65, B226, G246, K266, K366
`\skip@` b41,
b189, b191, b192, b194, v87, v90
`\skipdef` b45, b49
`\slash` b195
`\sldefault` s23, t34
`\sloppy` B189, J43, J48
`\sloppypar` J48
`\sloppypar (environment)` J48
`\slshape` l339, l644, s21, s22, v22
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`\smallint` t275
`\smallskip` b204, i162
`\smallskipamount` b203, i162, i165

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- \smash . [t381](#), [t453](#), [t454](#), [t457](#), [t458](#), [z95](#)
 - \smile [t358](#)
 - \sp [z142](#)
 - \sp@n [C347](#)
 - \space [b168](#)
 - \spacefactor . . [b193](#), [b194](#), [i67](#), [i72](#),
[i80](#), [i178](#), [i190](#), [i75](#), [i76](#), [G297](#), [G299](#)
 - \spaceskip [s66](#)
 - \spadesuit [t258](#)
 - \span [C351](#)
 - \split@name [o274](#), [o288](#), [o371](#), [p509](#), [p523](#)
 - \splitmaxdepth [b131](#), [G275](#)
 - \splittopskip [b143](#), [G274](#)
 - \sqcap [t290](#)
 - \sqcup [t291](#)
 - \sqrt [z203](#)
 - \sqrtsign [t437](#), [z71](#), [z203](#)
 - \sqsubset [s95](#)
 - \sqsubseq [t313](#)
 - \sqsupset [s96](#)
 - \sqsupseteq [t314](#)
 - \SS [i258](#), [i397](#), [N179](#)
 - \ss [i209](#), [i308](#), [i417](#), [i628](#), [N179](#)
 - \ssf@size [o194](#), [o460](#), [p282](#), [p288](#)
 - \stackrel [z201](#)
 - \star [t311](#)
 - \stepcounter
. [m17](#), [o430](#), [r39](#), [x36](#), [z211](#),
[z254](#), [z306](#), [i03](#), [G262](#), [G286](#), [K525](#)
 - \stop [y49](#)
 - \stretch [i197](#)
 - \strip@prefix
[a58](#), [a175](#), [a246](#), [d201](#), [d280](#), [o415](#)
 - \strip@pt [b231](#),
[o188](#), [o192](#), [o246](#), [o459](#), [o460](#), [p134](#)
 - \strut [b211](#), [z121](#), [z122](#), [C31](#)
 - \strutbox [b211](#), [p143](#),
[B247](#), [C168](#), [C169](#), [G275](#), [G282](#)
 - \sub@sfcnt [o324](#), [p502](#), [p503](#), [p506](#)
 - \subf@sfcnt [o325](#), [p531](#), [p532](#), [p535](#)
 - \subparagraphmark [F126](#)
 - \subsectionmark [F126](#)
 - \subset [t337](#)
 - \subseq [t339](#)
 - \subst@correction [o60](#), [o66](#)
 - \subst@fontshape [q1](#), [q70](#)
 - \subst@size [p437](#)
 - \subsubsectionmark [F126](#)
 - \succ [t331](#)
 - \succeq [t334](#)
 - \sum [t268](#)
 - \sup [z24](#)
 - \suppressfloats [K1268](#)
 - \supset [t336](#)
 - \supseteq [t338](#)
 - \surd [t240](#)
 - \sw@slant [v73](#), [v83](#)
 - \swarrow [t322](#)
 - \symbol [i127](#), [s54](#)
 - \symletters [i1104](#), [s68](#)
 - \symoperators [t529](#)
- T**
- \T [g26](#), [L498](#), [L502](#), [L503](#)
 - \t [i237](#), [i588](#), [i693](#), [i884](#), [i1092](#), [i1093](#)
 - \t@st@ic [v72](#), [v76](#)
 - \tabbing [C62](#), [C145](#)
 - \tabbingsep [C121](#), [C123](#), [C142](#)
 - \tabcolsep [C229](#), [C306](#)
 - \tabskip [b222](#), [z138](#),
[z139](#), [z216](#), [z219](#), [z222](#), [z224](#),
[z310](#), [z323](#), [z326](#), [z328](#), [C149](#), [C174](#)
 - \tabular [C156](#)
 - \tabular* [C157](#)
 - \tabularnewline [C176](#), [C189](#)
 - \tan [z15](#)
 - \tanh [z17](#)
 - \tau [t204](#)
 - \tc@check@accent
. [i962](#), [i1035](#), [i1036](#), [i1037](#)
 - \tc@check@symbol [i962](#),
[i1032](#), [i1033](#), [i1034](#), [i1038](#), [i1039](#),
[i1040](#), [i1041](#), [i1042](#), [i1043](#), [i1044](#),
[i1045](#), [i1046](#), [i1047](#), [i1048](#), [i1049](#),
[i1050](#), [i1051](#), [i1052](#), [i1053](#), [i1054](#),
[i1055](#), [i1056](#), [i1057](#), [i1058](#), [i1059](#),
[i1060](#), [i1061](#), [i1062](#), [i1063](#), [i1064](#),
[i1065](#), [i1066](#), [i1067](#), [i1068](#), [i1069](#),
[i1070](#), [i1071](#), [i1072](#), [i1073](#), [i1074](#),
[i1075](#), [i1076](#), [i1077](#), [i1078](#), [i1079](#),
[i1080](#), [i1081](#), [i1082](#), [i1083](#), [i1084](#),
[i1085](#), [i1086](#), [i1087](#), [i1088](#), [i1089](#)
 - \tc@error [i943](#), [i963](#)
 - \tc@errorwarn [i902](#), [i903](#), [i936](#)
 - \tc@fake@euro [i951](#), [i1031](#)
 - \tc@forcedfalse [i896](#)
 - \tc@forcedtrue [i901](#)
 - \tc@subst [i935](#), [i935](#), [i962](#)
 - \tencirc [u10](#), [D47](#), [D333](#)
 - \tencircw [u10](#), [D49](#)
 - \tenln [u9](#), [D47](#), [D48](#), [D332](#), [D334](#)
 - \tenlnw [u9](#), [D49](#), [D50](#)
 - \TeX [j1](#), [j12](#)
 - \text@command [v8](#), [v29](#)
 - \textacutedbl [i748](#), [i995](#)

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D=lt pictur.dtx, E=ltthm.dtx, F=ltsect.dtx, G=ltfloat.dtx, H=ltidxglo.dtx,
I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx,
N=ltfinal.dtx, O=ltpatch.ltx

`\textascendercompwordmark` . 1698, 1978
`\textasciicircum` 1798, 11019
`\textasciibreve` 1746, 1992
`\textasciicaron` 1747, 1993
`\textasciicircum` 1241, 1418
`\textasciidieresis` 1786, 11009
`\textasciigrave` 1737, 1990
`\textasciimacron` 1793, 11014
`\textasciitilde` 1242, 1419
`\textasteriskcentered`
. 1222, 1564, 1708, 1985
`\textbackslash` 1223, 1420, 1565
`\textbaht` 1772, 11079
`\textbar` 1224, 1421, 1566
`\textbardbl` 1225, 1567, 1752, 1998
`\textbf` v19
`\textbigcircle` 1576, 1725, 11055
`\textblank` 1705, 11040
`\textborn` 1738, 11058
`\textbraceleft` . . 1226, 1262, 1422, 1568
`\textbraceright` . 1227, 1263, 1423, 1569
`\textbrokenbar` 1784, 11007
`\textbullet` 1228, 1570, 1754, 11000
`\textcapitalcompwordmark` . . 1697, 1977
`\textcelsius` 1755, 11001
`\textcent` 1780, 11004
`\textcentoldstyle` 1757, 11066
`\textcircled` 1234, 1238, 1254,
1255, 1577, 1726, 1884, 11090, 11091
`\textcircledP` 1791, 11087
`\textcolonmonetary` 1759, 11067
`\textcompsubstdefault` 1940, 1942
`\textcompwordmark` 1243, 1424
`\textcopyleft` 1789, 11086
`\textcopyright` . . 1238, 1271, 1787, 11010
`\textcurrency` . . 1782, 1880, 1883, 11034
`\textdagger` . . 1230, 1266, 1572, 1750, 1996
`\textdaggerdbl` 1229, 1267, 1571, 1751, 1997
`\textdblhyphen` 1709, 11041
`\textdblhyphenchar` 1745, 11064
`\textdegree` 1794, 11015
`\textdied` 1740, 11060
`\textdiscount` 1774, 11081
`\textdiv` 1811, 11029
`\textdivorced` 1739, 11059
`\textdollar` 1210, 1261, 1337,
1425, 1642, 1706, 1983, 11096, 11098
`\textdollaroldstyle` 1756, 11065
`\textdong` 1768, 11076
`\textdownarrow` 1736, 11057
`\texteightoldstyle` 1719, 11050
`\textellipsis` 1250, 1275
`\textemdash` 1211, 1309, 1426, 1629
`\textendash` 1212, 1310, 1427, 1630
`\textestimated` 1775, 1883, 11033
`\texteuro` 1809, 1881, 11030, 11031
`\textexclamdown`
. 1213, 1311, 1313, 1428, 1631
`\textfiveoldstyle` 1716, 11047
`\textfloatsep`
K546, K559, K1400, K1449, K1525
`\textflorin` 1758, 11002
`\textfont` p291, z148
`\textfont@name` p285, p291
`\textfouroldstyle` 1715, 11046
`\textfraction` K1260, K1392, K1519
`\textfractionsolidus` 1710, 1986
`\textgravedbl` 1749, 1994
`\textgreater` 1236, 1429, 1587
`\textguarani` 1762, 11070
`\textheight` k16,
k17, G155, G156, G159, G182,
K59, K173, K174, K222, K323,
K350, K524, K581, K612, N13, N14
`\texthyphen` 1215, 1316, 1431, 1633
`\texthyphenchar` . . 1214, 1315, 1430, 1632
`\textinterrobang` 1766, 11074
`\textinterrobangdown` 1767, 11075
`\textit` v21
`\textlangle` 1721, 11052
`\textlbrackdbl` 1733, 1988
`\textleaf` 1741, 11061
`\textleftarrow` 1703, 11038
`\textless` 1235, 1432, 1586
`\textlira` 1764, 11072
`\textlnot` 1790, 11012
`\textlquill` 1778, 11084
`\textmarried` 1742, 11062
`\textmd` v19
`\textmho` 1724, 11054
`\textminus` 1722, 1987
`\textmu` 1799, 11020
`\textmusicalnote` 1743, 11063
`\textnaira` 1761, 11069
`\textnineoldstyle` 1720, 11051
`\textnormal` v15
`\textnumero` 1773, 11080
`\textogonekcentered` . . 1383, 1555, 1556
`\textohm` 1732, 1882, 11032
`\textonehalf` 1807, 11026
`\textoneoldstyle` 1712, 11043
`\textonequarter` 1806, 11025
`\textonesuperior` 1803, 11023
`\textopenbullet` 1776, 11082

File Key: a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltdefns.dtx,
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D=ltpictur.dtx, E=ltthm.dtx, F=ltsect.dtx, G=ltfloat.dtx, H=ltidxglo.dtx,
I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx,
N=ltfinal.dtx, O=ltpatch.ltx

- \textordfeminine ... 1259, 1788, 11011
- \textordmasculine .. 1260, 1804, 11024
- \textparagraph 1231, 1264, 1573, 1800, 11021
- \textperiodcentered 1232, 1574, 1801, 11022
- \textpertenthousand 1387, 1770, 11077, 11100
- \textperthousand 1385, 1753, 1999, 11099
- \textpeso 1763, 11071
- \textpilcrow 1771, 11078
- \textpm 1795, 11016
- \textquestiondown 1216, 1312, 1314, 1433, 1634
- \textquotedbl 1436
- \textquotedblleft 1217, 1317, 1434, 1635
- \textquotedblright 1218, 1318, 1435, 1636
- \textquoteleft .. 1219, 1319, 1437, 1637
- \textquoteright . 1220, 1320, 1438, 1638
- \textquotesingle 1707, 1984
- \textquotestraightbase ... 1699, 1979
- \textquotestraightdblbase . 1700, 1980
- \textrangle 1723, 11053
- \textrbrackdbl 1734, 1989
- \textrecipe 1765, 11073
- \textreferencemark 1802, 11088
- \textregistered 1254, 1255, 1792, 11013
- \textrightarrow 1704, 11039
- \textrm v15
- \textrquill 1779, 11085
- \textsc v21
- \textsection 1233, 1265, 1439, 1575, 1785, 11008
- \textservicemark 1777, 11083
- \textsevenoldstyle 1718, 11049
- \textsf v15
- \textsixoldstyle 1717, 11048
- \textsl v21
- \textsterling 1221, 1273, 1344, 1440, 1649, 1781, 11005, 11095, 11097
- \textstyle j15, t377, z63
- \textsuperscript 1257, 1259, 1260, G257
- \textsurd 1805, 11089
- \TextSymbolUnavailable 13, 1605
- \textthreeoldstyle 1714, 11045
- \textthreequarters 1808, 11027
- \textthreequartersemdash .. 1702, 1982
- \textthreesuperior 1797, 11018
- \texttildelow 1744, 1991
- \texttimes 1810, 11028
- \texttrademark 1257, 1769, 11003
- \texttt v15
- \texttwelveudash 1701, 1981
- \texttwooldstyle 1713, 11044
- \texttwosuperior 1796, 11017
- \textunderscore 1244, 1269, 1441
- \textup v21
- \textuparrow 1735, 11056
- \textvisiblespace 1246, 1442
- \textwidth k18, B214, G164, K60, K125, K149, K166, K509, K519, K1479, N14
- \textwon 1760, 11068
- \textyen 1783, 11006
- \textzerooldstyle 1711, 11042
- \tf@size o193, o458, p282, p284
- \TH 1398, N179
- \th 1443, N179
- \thanks 282, F9
- thebibliography (environment) .. 307
- \theequation ... z200, z212, z271, z307
- \thefootnote . G251, G287, G292, G312
- \thempfn B216, G263, G268, G303, G308, G311
- \thempfootnote B216, G253
- \thepage I23, k73, w6, x14, x34, F143, H15, H32, J14, K192, K223, K1165
- \Theta t218
- \theta t194
- \thicklines D46
- \thickmuskip t532, z146
- \thinlines D46
- \thinmuskip i188, t530, z144, z147
- \thinspace i188, i198, z119, z148
- \thispagestyle J6
- \thr@@ b16, p58, p208, p214, p227, p234, p241, p246, z223, z327, A222, A233, D165, D166, D168, D169, D201, D223
- \tilde t427
- \time a126, a130
- \times t310
- \title 282, F3
- \to t350
- \today a131, a135, a143, a146, F8
- \toks b31, b53, r372, r373, r383, r392, N229
- \toks@ .. b41, i170, i171, i176, o123, o127, o129, o132, r183, r187, r193, r196, r201, r242, r243, r245, r246, r276, r278, r282, r299, r302, r361, r373, r374, r375, r421, r423, r429, r437, r441, r453, r456, r459, r467,

File Key: a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltdefns.dtx, e=ltalloc.dtx, f=ltcntrl.dtx, g=lterror.dtx, h=ltpar.dtx, i=ltspace.dtx, j=ltlogos.dtx, k=ltfiles.dtx, l=ltoutenc.dtx, m=ltcounts.dtx, n=ltlength.dtx, o=ltfssbas.dtx, p=ltfssstrc.dtx, q=ltfsscmp.dtx, r=ltfssdcl.dtx, s=ltfssini.dtx, t=fontdef.dtx, u=preload.dtx, v=ltfntcmd.dtx, w=ltpageno.dtx, x=ltxref.dtx, y=ltmiscen.dtx, z=ltmath.dtx, A=ltlists.dtx, B=ltboxes.dtx, C=lttab.dtx, D=lt pictur.dtx, E=ltthm.dtx, F=ltsect.dtx, G=ltfloat.dtx, H=ltidxglo.dtx, I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx, N=ltfinal.dtx, O=ltpatch.ltx

- r469, r794, r796, r798, r801,
r803, r806, r809, r841, r842,
L128, L129, L131, L132, L371, L372
- \toksdef b46, b53
- \tolerance b103, o480, J44, J52
- \top t241
- \topfigrule K545, K1547
- \topfraction G171, K1513
- \topmargin K52, K503
- \topsep z312, A2, A59
- \topskip b142, k49, A1, K109
- \totalheight B17, B18, B19
- \tr@ce ... K188, K215, K274, K303,
K348, K407, K422, K423, K424,
K425, K436, K437, K438, K439,
K440, K450, K599, K616, K632,
K634, K720, K724, K736, K737,
K738, K739, K745, K748, K756,
K760, K771, K776, K781, K782,
K783, K784, K791, K794, K802,
K811, K817, K822, K827, K833,
K834, K839, K844, K845, K846,
K853, K857, K862, K866, K871,
K882, K883, K885, K903, K912,
K918, K927, K930, K936, K946,
K950, K959, K965, K970, K975,
K979, K983, K984, K991, K995,
K999, K1006, K1015, K1019,
K1023, K1024, K1028, K1029,
K1035, K1041, K1051, K1057,
K1061, K1062, K1067, K1068,
K1074, K1077, K1078, K1079,
K1086, K1087, K1088, K1096,
K1100, K1112, K1113, K1120,
K1123, K1131, K1135, K1139,
K1140, K1144, K1145, K1201,
K1206, K1217, K1227, K1234,
K1244, K1289, K1302, K1303,
K1307, K1310, K1312, K1315,
K1318, K1320, K1361, K1368,
K1373, K1379, K1384, K1388,
K1394, K1402, K1403, K1410,
K1415, K1420, K1422, K1428,
K1430, K1437, K1464, K1465,
K1474, K1490, K1495, K1503
- \tracefloats K1244
- \tracefloatvals K1244
- \tracingall b248
- \tracingcommands b249
- \tracingfonts p17, p54, p58,
p86, p116, p125, p148, p178,
p192, p208, p214, p227, p234,
p241, p246, p255, p268, p276, p279
- \tracinglostchars b119, b250
- \tracingmacros b251
- \tracingoff p116, p276
- \tracingon p117, p277
- \tracingonline b240
- \tracingoutput b243
- \tracingpages b250
- \tracingparagraphs b251
- \tracingrestores b251
- \tracingstats b249, N2
- \triangle t247
- \triangleleft t276, t390
- \triangleright t277, t390
- \trivlist y73, y80, y86,
y100, z297, A89, C69, E35, E37
- \try@load@fontshape
.... o291, o331, p510, r132, r149
- \try@simple@size ... o312, p312, p453
- \try@simples .. p401, p405, p412, p421
- \try@size@range o320, p101, p312, p392
- \try@size@substitution .. p103, p397
- \try@sizes o20, o464
- \tryif@simple p414, p420
- \tryis@simple p419
- \ttdefault s11, t29
- \ttfamily s9, s10, v17, y120
- \tw@ b16
- \two@digits a33,
a132, a133, d2, p498, L424, L455
- \twocolumn K147
- \type@restoreinfo p156, p161
- \typein 24, 24, d18
- \typeout 24, a20, a63,
a119, a144, a146, a158, a173,
a180, a191, a204, a217, a230,
a244, c13, c28, d3, d22, g77,
k65, k172, k173, k178, k215,
k225, k228, o285, s106, s113,
s124, s135, s145, t9, t44, H8,
H25, K1245, L95, N64, N183,
N190, N202, N203, N211, O16

U

- \u l192, l288,
l368, l446, l453, l473, l480, l601
- \uccode N30, N40,
N49, N51, N55, N57, N135,
N145, N154, N156, N160, N162
- \uchyph b120
- \unboldmath s51

File Key: a=ltldirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltdefns.dtx,
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o=ltfssbas.dtx, p=ltfssstrc.dtx, q=ltfsscmp.dtx, r=ltfssdcl.dtx, s=ltfssini.dtx,
t=fontdef.dtx, u=preload.dtx, v=ltfntcmd.dtx, w=ltpageno.dtx, x=ltxref.dtx,
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D=ltpictur.dtx, E=ltthm.dtx, F=ltsect.dtx, G=ltfloat.dtx, H=ltidxglo.dtx,
I=ltbibl.dtx, J=ltpage.dtx, K=ltoutput.dtx, L=ltclass.dtx, M=lthyphen.dtx,
N=ltfinal.dtx, O=ltpatch.ltx

- `\UndeclareTextCommand` [1146](#), [11095](#),
[11096](#), [11097](#), [11098](#), [11099](#), [11100](#)
`\undefinedpagestyle` [J4](#), [J8](#)
`\underbar` [b210](#)
`\underbrace` [t447](#)
`\underline` [b210](#), [233](#), [B259](#), [B260](#)
`\unhcopy` [b212](#), [C313](#), [D391](#)
`\unitlength`
[B33](#), [B43](#), [D5](#), [D20](#), [D21](#), [D22](#),
[D23](#), [D30](#), [D31](#), [D34](#), [D35](#), [D42](#),
[D78](#), [D136](#), [D189](#), [D191](#), [D204](#),
[D209](#), [D211](#), [D226](#), [D228](#), [D231](#),
[D268](#), [D298](#), [D309](#), [D345](#), [D346](#),
[D348](#), [D349](#), [D352](#), [D353](#), [D355](#),
[D356](#), [D365](#), [D367](#), [D369](#), [D371](#), [N6](#)
`\unlhd` [s98](#)
`\unpenalty` [v98](#), [y116](#)
`\unrestored@protected@xdef`
[d227](#), [G268](#), [G292](#), [G308](#), [J21](#), [J35](#)
`\unrhd` [s100](#)
`\unvcopy` [z123](#)
`\Uparrow` [t488](#)
`\uparrow` [t482](#)
`\upbracefill` [t450](#), [t466](#)
`\update@ucllc@with@cyrillic`
[l814](#), [l842](#), [l866](#), [l872](#)
`\updefault` [s20](#), [t34](#), [t41](#)
`\Updownarrow` [t492](#)
`\updownarrow` [t486](#)
`\uplus` [t292](#)
`\upper@bound` .. [p339](#), [p340](#), [p341](#), [p355](#)
`\uppercase` [N169](#)
`\upshape` [l341](#), [l579](#),
[l646](#), [l728](#), [s18](#), [s19](#), [s32](#), [s77](#), [v24](#)
`\Upsilon` [t223](#)
`\upsilon` [t205](#)
`\use@mathgroup`
[o424](#), [o442](#), [o444](#), [p253](#),
[r50](#), [r343](#), [r445](#), [r448](#), [r819](#), [r843](#)
`\usebox` [B81](#)
`\usecounter` [A215](#), [A228](#)
`\usefont` [o53](#), [o230](#), [s67](#), [s80](#)
`\usepackage` [L202](#), [L232](#)
`\UseTextAccent`
[l115](#), [l143](#), [l963](#), [l1091](#), [l1093](#)
`\UseTextSymbol` . [l115](#), [l141](#), [l962](#), [l1031](#)
- V**
- `\v` [l193](#), [l289](#), [l367](#), [l449](#),
[l450](#), [l451](#), [l455](#), [l457](#), [l460](#), [l462](#),
[l464](#), [l470](#), [l476](#), [l477](#), [l478](#), [l482](#),
[l484](#), [l487](#), [l489](#), [l491](#), [l497](#), [l602](#)
`\v@false` [z78](#)
`\v@true` [z77](#), [z79](#)
`\vadjust` . [i10](#), [i38](#), [i47](#), [i139](#), [i155](#), [G126](#)
`\valign` [l955](#)
`\value` [I9](#), [m14](#), [l03](#)
`\varbigtriangledown` [t280](#)
`\varbigtriangleup` [t281](#)
`\varepsilon` [j15](#), [t210](#)
`\varphi` [t215](#)
`\varpi` [t212](#)
`\varrho` [t213](#)
`\varsigma` [t214](#)
`\vartheta` [t211](#)
`\vbadness` [b105](#)
`\vdash` [t318](#)
`\vdots` [t418](#)
`\vec` [t432](#)
`\vector` [g262](#), [D133](#)
`\vee` [t284](#), [t285](#)
`\verb` [y130](#), [y132](#), [y141](#)
`\verb@balance@group`
[y124](#), [y125](#), [y140](#), [y142](#)
`\verb@egroup` .. [y125](#), [y129](#), [y140](#), [y143](#)
`\verb@eol@error` [y126](#), [y134](#)
`\verbatim` [y118](#)
`verbatim*` (environment) [y121](#)
`\verbatim@font` [y114](#), [y120](#), [y135](#)
`\verbatim@nolig@list` [y145](#), [y151](#)
`\version@elt` [r9](#), [r22](#), [r23](#), [r180](#), [r181](#),
[r225](#), [r245](#), [r336](#), [r374](#), [r466](#), [r799](#)
`\version@list` [r7](#),
[r12](#), [r23](#), [r173](#), [r181](#), [r230](#), [r251](#),
[r270](#), [r341](#), [r386](#), [r416](#), [r471](#), [r812](#)
`\Vert` [t477](#), [t479](#)
`\vert` [t480](#)
`\vfil` [b199](#),
[l956](#), [l958](#), [D287](#), [K144](#), [K335](#), [K506](#)
`\vfilneg` [b199](#)
`\vfuzz` [b128](#), [J47](#), [J54](#)
`\vgl@` [b189](#), [b190](#)
`\vglue` [b189](#)
`\vline` [C334](#)
`\voidb@x` [b81](#), [b220](#), [n7](#)
`\vphantom` [z75](#), [z94](#)
`\vrule` . [b193](#), [i193](#), [l247](#), [l249](#), [p144](#),
[t464](#), [t465](#), [t467](#), [t468](#), [B90](#),
[B92](#), [B129](#), [B136](#), [B258](#), [B288](#),
[C168](#), [C201](#), [C315](#), [C334](#), [D127](#),
[D177](#), [D180](#), [D196](#), [D203](#), [D218](#),
[D225](#), [D287](#), [D375](#), [K1189](#), [K1483](#)
`\vspace` [i132](#), [i162](#), [i163](#), [i164](#)
`\vsplit` [K306](#)

File Key: a=ltmdirchk.dtx, b=ltplain.dtx, c=ltvers.dtx, d=ltdefns.dtx,
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o=ltfssbas.dtx, p=ltfssstrc.dtx, q=ltfsscmp.dtx, r=ltfssdcl.dtx, s=ltfssini.dtx,
t=fontdef.dtx, u=preload.dtx, v=ltfntcmd.dtx, w=ltpageno.dtx, x=ltxref.dtx,
y=ltmiscen.dtx, z=ltmath.dtx, A=ltlists.dtx, B=ltboxes.dtx, C=lttab.dtx,
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N=ltfinal.dtx, O=ltpatch.ltx

W		
<code>\warn@rel@i</code>	q15, q19, q71, q75, q80, q85, q109, q131	
<code>\wedge</code>	t282, t283	
<code>\widehat</code>	t435	
<code>\widetilde</code>	t434	
<code>\widowpenalty</code>	b112	
<code>\width</code>	B14	
<code>\wlog</code> ...	a47, b40, b61, b69, L97, N236	
<code>\wp</code>	t232	
<code>\wr</code>	t296	
<code>\wrong@fontshape</code>	o295, o385	
X		
<code>\x</code>	o250, o251	
<code>\x@protect</code>	d205, d216	
<code>\Xi</code>	t220	
<code>\xi</code>	t200	
Y		
<code>\year</code>	a132, c6, L455	
<code>\yxdim</code>	D323	
Z		
<code>\Z</code>	N44, N122, N149	
<code>\z</code>	N33, N123, N138	
<code>\z@</code>	b81	
<code>\z@skip</code>	b81	
<code>\zap@space</code>	k84, L117, L265, L282, L299	
<code>\zeta</code>	t192	