

# The microtype package

Subliminal refinements towards typographical perfection

— IMPLEMENTATION —

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

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

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

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

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**User manual** (external document)

## 1 Implementation

The docstrip modules in this file are:

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

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

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

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

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

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

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

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

debug: Code for additional output in the log file.

Used for – surprise! – debugging purposes.

luafile: Lua functions (microtype.lua).

config: Surrounds all configuration modules.

cfg-t: Surrounds (Latin) text configurations.

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

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

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

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

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

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

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

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

Contributed by *Harald Harders*.

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

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

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

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

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

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

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

cfg-e: Surrounds Euro symbol configurations.

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

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

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

And now for something completely different.

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

## 1.1 Preliminaries

`\MT@MT` This is us.

```
2 \def\MT@MT
3 <package> {microtype}
4 <letterspace> {letterspace}
```

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

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

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

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

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

```

54 </package>
55 \newcommand*\lssstyle{}
56 \newcommand\textls[2][{}{}
57 \def\textls#1#{}
58 \newcommand*\lslig[1]{#1}
59 <*package>
60 }

```

These commands also have a starred version.

```

61 \def\DeclareMicrotypeSet#1#{\@gobbletwo}
62 \def\DeclareMicrotypeVariants#1#{\@gobble}

```

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

```

63 \@onlypreamble\DeclareMicrotypeSet
64 \@onlypreamble\UseMicrotypeSet
65 \@onlypreamble\DeclareMicrotypeSetDefault
66 \@onlypreamble\DisableLigatures
67 \@onlypreamble\DeclareMicrotypeVariants
68 \@onlypreamble\DeclareMicrotypeBabelHook

```

Don't load letterspace.

```

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

```

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

```

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

```

`\MT@warning` Communicate.

```

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

```

### 1.1.1 Debugging

`\tracingmicrotype` Cases for `\tracingmicrotype`:

```

\MT@dinfo 0: almost none
\MT@dinfo@nl 1: + sets & lists
2: + heirs
3: + slots

```

## 4: + factors

```

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

```

\tracingmicrotypeinpdf

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

Cases for \tracingmicrotypeinpdf:

1: show new fonts

2: + show known fonts

```

102 \newcount\tracingmicrotypeinpdf

```

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

```

\tracingmicrotypeinpdf=2

```

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

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

```

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

```

\iftracingmicrotypeinpdfall

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

```

109 \newif\iftracingmicrotypeinpdfall

```

\MT@show@pdfannot

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

```

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

```

```

125 \iftracingmicrotypeinpdfall\kern1pt \fi
126 \global\MT@inannotfalse
127 \fi
128 }
129 </debug>
130 </package>
131 </package|letterspace>

```

### 1.1.2 Visual debugging

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

```

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

```

The following commands are configurable:

```

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

```

```

147 \newif\ifShowGlyphIndex
148 \newif\ifShowMissingGlyphs
149 \newcommand*\GlyphScaleFactor{2}
150 \newcommand*\Showbaselinecolor{\color{black!40}}
151 \newcommand*\Showposcolor{\color{green!50}}
152 \newcommand*\Shownegcolor{\color{red!50}}
153 \ifluatex
154 \def\MTS@printtext#1{{\usefont{TU}{lmr}{m}{n}#1}}
155 \else
156 \def\MTS@printtext#1{{\usefont{T1}{cmr}{m}{n}#1}}
157 \fi
158 \def\MTS@show@index#1{\ifShowGlyphIndex{\tiny$_{#1}$}
159 % \ifluatex^{\mathrm{#1}}
160 % \MT@lua{tex.print(luaotfload.aux.name_of_slot(tonumber([[#1]]))}}\fi
161 $}\fi\space}
162 \def\MTS@crulefill{\leaders\hrule height \dimexpr1ex/2+.4pt depth -\dimexpr1ex/2\hfill}

163 \g@addto@macro\MT@setupfont{\MTS@Prot\MTS@Char}
164 \let\MTS@Prot\relax
165 \let\MTS@Char\relax

166 \def\MTS@setup{%
167 \fboxsep=0pt
168 \fboxrule=.1pt
169 \raggedright
170 \let\MTS@glyphlist\@gobble
171 \def\MT@feat{pr}%
172 }

```



`\ShowProtrusion`      Activate the sleeper command, then trigger the setup.

```
173 \newcommand*\ShowProtrusion{%
174   \begingroup
175     \MTS@setup
176     \let\MTS@Prot\MTS@Prot@do
177     \def\MT@cat{c}%
178     \selectfont
179 }
```

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

```
180 \def\MTS@Prot@do{%
181   \MT@ltx@pickupfont
182   \let\MT@pr@split@val\MTS@pr@split@val
183   \let\MT@load@list\MTS@load@list
184   \let\MT@set@pr@prefixes@\MTS@set@pr@prefixes@
185   \MTS@show@pr
186   \endgroup
187   \aftergroup\selectfont
188 }
```

`\ShowCharacterInheritance`

```
189 \newcommand*\ShowCharacterInheritance{%
190   \begingroup
191     \MTS@setup
192     \let\MTS@Char\MTS@Char@do
193     \def\MT@cat{inh}%
194     \selectfont
195 }
```

`\MTS@Char@do`

```
196 \def\MTS@Char@do{%
197   \MT@ltx@pickupfont
198   \let\MT@set@pr@prefixes@\MTS@set@pr@prefixes@
199   \MTS@show@inheritance
200   \endgroup
201   \aftergroup\selectfont
202 }
```

`\ShowProtrusionLineGlyph`      By glyph.

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

`\ShowProtrusionLineIndex`      By glyph number.

```
207 \newcommand*\ShowProtrusionLineIndex[1]{%
208   {\MTS@setup
209     \MTS@showprotrusionline{#1}}%
210 }
```

`\MTS@showprotrusionline`

```
\MTS@lpcode 211 \def\MTS@showprotrusionline#1{%
\MTS@rprcode 212   \edef\MTS@lpcode{\number\lpcode\font#1}%
213   \edef\MTS@rprcode{\number\rprcode\font#1}%
214   \char#1%
215   lorem ipsum dolor sit amet, \MTS@crulefill\ %
216   \MTS@printtext{\ifnum\MTS@lpcode=z@Showbaselinecolor\fi[\MTS@lpcode]}
217   \fbox{\char#1}\MTS@show@index{\number#1}
218   \MTS@printtext{\ifnum\MTS@rprcode=z@Showbaselinecolor\fi[\MTS@rprcode]}
219   \MTS@crulefill\ you know the rest%
220   \char#1\par
221   \ShowDummyLine
222 }
```

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

```
223 \newcommand*\ShowDummyLine{%
224   {\fontencoding{\encodingdefault}\fontseries{\seriesdefault}\fontshape{\shapedefault}%
225    \selectfont\noindent
226    here is the beginning of a line, \dotfill and here is its end}\par
227 }
```

`\ShowProtrusionAll`

```
228 \newcommand*\ShowProtrusionAll{%
229   {\MTS@setup
230    \MTS@lede{}}%
231   \MT@do@font{\iffontchar\font\@tempcnta\MTS@showprotrusionline{\@tempcnta}\fi}}%
232 }
```

`\ShowProtrusionDefined`

```
233 \newcommand*\ShowProtrusionDefined{%
234   {\MTS@setup
235    \MTS@lede{defined}%
236    \let\MTS@first\@gobble
237    \let\MTS@second\@firstofone
238    \MT@do@font{%
239      \MTS@firstorsecond
240      \MTS@temp{%
241        \iffontchar\font\@tempcnta\MTS@showprotrusionline{\@tempcnta}\else
242        \MT@warningn1{Glyph \the\@tempcnta\space is missing in font
243                     \MessageBreak\font@name}%
244        \fi}}}%
245 }
```

`\ShowProtrusionMissing`

```
246 \newcommand*\ShowProtrusionMissing{%
247   {\MTS@setup
248    \MTS@lede{missing}%
249    \let\MTS@first\@firstofone
250    \let\MTS@second\@gobble
251    \MT@do@font{%
252      \MTS@firstorsecond
253      \iffontchar\font\@tempcnta\MTS@temp{\MTS@showprotrusionline{\@tempcnta}}\fi}}%
254 }
```

`\MTS@lede`

```
255 \def\MTS@lede#1{%
256   \selectfont
257   \edef\MTS@font{\expandafter\string\font@name}%
258   \MTS@printtext{All glyphs \MT@ifempty{#1}{in}{#1 in protrusion list for}
259                 font \texttt{\MTS@font}:}\par
260   \ShowDummyLine
261 }
```

`\MTS@firstorsecond`

```
262 \def\MTS@firstorsecond{%
263   \let\MTS@temp\MTS@first
264   \ifnum\lcode\font\@tempcnta=z@ \else
265     \let\MTS@temp\MTS@second
266   \fi
267   \ifnum\rpcode\font\@tempcnta=z@ \else
268     \let\MTS@temp\MTS@second
269   \fi
270 }
```

`\MTS@charwd`      Display the glyph with protrusion.

`\MTS@lp@`      271 \newdimen\MTS@charwd

`\MTS@rp@`

`\MTS@show@char@pr`

```

272 \newdimen\MTS@lp@
273 \newdimen\MTS@rp@
274 \def\MTS@show@char@pr#1{%
275   \xdef\MTS@glyphlist{\MTS@glyphlist,#1}%
276   \scalebox{\GlyphScaleFactor}{\strut\escapechar~\
277     \MTS@charwd=\fontcharwd\MT@font#1\relax

```

The baseline rule.

```

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

```

Left protrusion.

```

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

```

Right protrusion.

```

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

```

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

```

287   \fbox{\char#1}}\,%
288   \MTS@show@index{#1}%
289 }

```

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

```

\MTS@show@char@x 290 \def\MTS@show@char#1{\scalebox{\GlyphScaleFactor}{%
291   \strut\fbox{\char#1}}\MTS@show@index{#1}}
292 \def\MTS@show@char@x#1{\xdef\MTS@glyphlist{\MTS@glyphlist,#1}\MTS@show@char{#1}}

```

\MTS@show@missing

```

293 \def\MTS@show@missing{%
294   \MT@ifdefined@c@T\MT@pr@inh@name{%
295     \MTS@lp@=\z@ \MTS@rp@=\z@
296     \par \MTS@printtext{Glyphs not included in configuration (with defined heirs):}%
297     \MT@do@font{%
298       \edef\MT@temp{\the\@tempcnta}%
299       \MT@ifdefined@n@T\MT@inh@\MT@pr@inh@name @\MT@temp @{%
300         \MT@exp@one@n\MT@in@clist\MT@temp\MTS@glyphlist
301         \ifMT@inlist@else \newline
302         \llap{\MTS@show@char@pr{\MT@temp} \MTS@printtext{=} }%
303         \MT@exp@cs\MT@map@tlist@c
304         {\MT@inh@\MT@pr@inh@name @\the\@tempcnta @}%
305         \MTS@show@char@x
306       \fi
307     }%
308   }%
309 }%
310 \MTS@show@missing@
311 }

```

\MTS@show@missing@

```

312 \def\MTS@show@missing@{%
313   \par \MTS@printtext{Other glyphs not in configuration:}\newline
314   \MT@do@font{%
315     \edef\MT@temp{\the\@tempcnta}%
316     \MT@exp@one@n\MT@in@clist\MT@temp\MTS@glyphlist
317     \ifMT@inlist@else
318       \MTS@show@char\MT@temp
319     \fi
320   }%
321 }

```

`\MTS@show@inheritance`

```

322 \def\MTS@show@inheritance{%
323   \MT@get@inh@list
324   \MTS@printtext{Character inheritance for font \texttt{\MT@font}':}\\
325   \MT@ifdefined@c@TF\MT@listname{%
326     \MTS@printtext{First matching list is for \texttt{\@tempa}':\\
327       \texttt{\MT@listname}:}\par\leavevmode
328     \MT@do@font{%
329       \MT@ifdefined@n@T{MT@inh@MT@listname @\the\@tempcnta @}{%
330         \newline
331         \xdef\MTS@glyphlist{\MTS@glyphlist,\the\@tempcnta}%
332         \llap{\MTS@show@char{\the\@tempcnta}\MTS@printtext{= }}%
333         \MT@exp@cs\MT@map@tlist@c
334           {MT@inh@MT@listname @\the\@tempcnta @}%
335         \MTS@show@char@x
336       }%
337     }%
338     \MT@ifdefined@n@T{MT@inh@MT@listname @prefixes}{%
339       \par \MTS@printtext{(with prefixes:)}%
340       \@tempcntb=\z@
341       \let\MTS@show@char@pr\MTS@show@char@x
342       \MT@set@pr@prefixheirs}%
343     \ifShowMissingGlyphs\MTS@show@missing@fi
344   }%
345   \MTS@printtext{NOT DEFINED}%
346 }%
347 \par
348 }
349 </show>

```

### 1.1.3 Requirements

Back to the user packages.

`\MT@plain` The letterspace package works with:

0: miniltx

1: eplain

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

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

```

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

```

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

```

371 \def\MT@requires@latex#1{%
372   \ifnum\MT@plain<#1 \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi
373 }
374 \langleplain\rangle

For definitions that depend on e-TeX features.

375 \ifcase 0%
376   \ifx\TeXversion\undefined 1\else
377     \ifx\TeXversion\relax 1\else
378       \ifcase\TeXversion 1\fi
379     \fi
380   \fi
381 \else
382   \catcode`\^^Q=9 \catcode`\^^X=14
383 \fi
384 \langleletterspace\rangle^^Q\MT@warning@nl{This package requires the etex extensions.
385 \langleletterspace\rangle^^Q      \MessageBreak Exiting}\MT@restore@catcodes\endinput
386 \langledebug\rangle\MT@edinfo@nl{0}{this is
387 \langledebug\rangle^^Q not
388 \langledebug\rangle etex}

```

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

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

```

389 \def\MT@clear@options{%
390 \langleplain\rangle \MT@requires@latex1{%
391   \AtEndOfPackage{\let\unprocessedoptions\relax\MT@restore@catcodes}%
392   \let\CurrentOption\empty
393 \langleplain\rangle }\relax
394 }

```

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

```

395 \ifx\normalpdftexversion\undefined \else
396   \let\pdftexversion\normalpdftexversion
397   \let\pdftexrevision\normalpdftexrevision
398   \let\pdfoutput\normalpdfoutput
399 \fi

```

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

```

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

```

```

420 \ifx\directlua\@undefined \else
421 \ifx\directlua\relax \else
422 \def\MT@engine{lua}
423 \MT@engine@unfitfalse

```

Since approx. LuaTeX 0.80, `\pdfTeXversion` is let to `\luatexversion`, so that we would be fooled into thinking that pdfTeX is too old.

```

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

```

`\MT@pdfTeX@no`

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

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

---

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

```

452 <pdf-
453 <debug>\MT@info@n1{0}{this is pdftex \the\pdftexversion(\pdftexrevision)}
454 \def\MT@pdftex@no{8}
455 \ifnum\pdftexversion = 140
456   \ifnum\pdftexrevision < 23
457     \def\MT@pdftex@no{7}
458     \ifnum\pdftexrevision < 4
459       \def\MT@pdftex@no{6}
460     \fi
461   \fi
462 \else
463   \ifnum\pdftexversion < 140
464     \def\MT@pdftex@no{5}
465     \ifnum\pdftexversion < 130
466       \def\MT@pdftex@no{4}
467       \ifnum\pdftexversion < 120
468         \def\MT@pdftex@no{3}
469         \ifnum\pdftexversion = 14
470           \ifnum \expandafter`\pdftexrevision < `h
471             \def\MT@pdftex@no{2}
472           \fi
473         \fi
474       \fi
475     \fi
476   \fi
477 \fi
478 <debug>\MT@info@n1{0}{pdftex no.: \MT@pdftex@no}
479 </pdf-

```

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

```

480 <xe-
481 <debug>\MT@info@n1{0}{this is xetex (\the\XeTeXversion\XeTeXrevision)}
482 %\ifdim 0\XeTeXrevision pt < 0.9997pt
483 % \def\MT@xetex@no{1}
484 %\else
485 % \def\MT@xetex@no{2}
486 %\fi
487 <debug>\MT@info@n1{0}{xetex no.: \MT@xetex@no}
488 </xe-

```

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

- 0: N/A
- 1:  $\text{\LuaTeX}$  (< 0.36)
- 2: + `\directlua` without state number ( $\geq 0.36$ )
- 3: + `\letterspacefont`; non-automatic expansion doesn't work anymore, and automatic expansion in DVI mode is realised by modifying the tracking, not the glyphs<sup>2</sup> ( $\geq 0.62$ )
- 4: + almost all of the  $\text{\pdfTeX}$  primitives have been renamed ( $\geq 0.85$ )
- 5: + default `\efcode = 1000`; `\protrusionboundary` [doesn't seem to work] ( $\geq 0.90$ )
- 6: + `\glet` ( $\geq 1.10$ )

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

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

```

489 <lua-
490 <debug>\MT@info{n10}{this is luatex (\the\luatexversion)}

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

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

509 <debug>\MT@info{n1}{0}{luatex no.: \MT@luatex@no}
510 </lua-

```

Abort if no capable engine found.

```

511 <*package|letterspace>
512 \ifMT@engine@unfit
513   \MT@warning{n1}{You
514     \ifx\MT@engine\relax
515       don't seem to be using pdftex%
516 <package>      , luatex or xetex%
517 <letterspace>   \space or luatex%
518     .\MessageBreak `~\MT@MT' only works with these engines.%
519   \else
520     are using a \MT@engine tex version older than
521 <package>      \MT@engine@minversion
522 <letterspace>   \MT@pdf@or@lua{1.40}{0.62}%
523     .\MessageBreak `~\MT@MT' does not work with this version.%
524     \MessageBreak Please install a newer version of \MT@engine tex.%
525   \fi
526   \MessageBreak I will quit now}
527 \MT@clear@options
528 \endinput\fi
529 </package|letterspace>

```

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

```

530 <*package|letterspace>
531 \RequirePackage{keyval}[1997/11/10]
532 <*package>
533 ^^X\RequirePackage{etoolbox}

\MT@toks    We need a token register,

534 \newtoks\MT@toks

\MT@tempbox our own box,

535 \newbox\MT@tempbox

\ifMT@if@   and a scratch if.

536 \newif\ifMT@if@

```



### 1.1.4 Declarations

```

\ifMT@protrusion      These are the global switches ...
\ifMT@expansion 537 \newif\ifMT@protrusion
\ifMT@auto      538 \newif\ifMT@expansion
\ifMT@selected  539 \newif\ifMT@auto
\ifMT@draft      540 \newif\ifMT@selected
\ifMT@noligatures 541 \newif\ifMT@noligatures
\ifMT@draft      542 \newif\ifMT@draft
\ifMT@disable    543 \newif\ifMT@disable
\ifMT@spacing    544 \newif\ifMT@spacing
\ifMT@kerning    545 \newif\ifMT@kerning
\ifMT@tracking   546 \newif\ifMT@tracking
\ifMT@tracking   547 \newif\ifMT@babel
\ifMT@babel      [This line intentionally left blank.]
\MT@pr@level     ... and numbers.
\MT@ex@level     548 \let\MT@pr@level\tw@
\MT@pr@factor    549 \let\MT@ex@level\tw@
\MT@ex@factor    550 \let\MT@pr@factor\@m
\MT@sp@factor    551 \let\MT@ex@factor\@m
\MT@kn@factor    552 \let\MT@sp@factor\@m
\MT@kn@factor    553 \let\MT@kn@factor\@m

\MT@pr@unit      Default unit for protrusion settings is character width, for spacing space, for kerning
\MT@sp@unit      (and tracking) 1 em.
\MT@kn@unit      554 \let\MT@pr@unit\@empty
                    555 \let\MT@sp@unit\m@ne
                    556 \def\MT@kn@unit{1em}

\MT@stretch      Expansion settings.
\MT@shrink       557 \let\MT@stretch\m@ne
\MT@step         558 \let\MT@shrink \m@ne
                    559 \let\MT@step \m@ne

\MT@pr@min       Minimum and maximum values allowed by pdfTeX.
\MT@pr@max       560 \def\MT@pr@min{-\@m}
\MT@ex@min       561 \let\MT@pr@max\@m
\MT@ex@max       562 \let\MT@ex@min\z@
\MT@sp@min       563 \let\MT@ex@max\@m
\MT@sp@max       564 \def\MT@sp@min{-\@m}
\MT@sp@max       565 \let\MT@sp@max\@m
\MT@kn@min       566 \def\MT@kn@min{-\@m}
\MT@kn@max       567 \let\MT@kn@max\@m
\MT@kn@max       568 </package>
\MT@tr@min       569 \def\MT@tr@min{-\@m}
\MT@tr@max       570 \let\MT@tr@max\@m
\MT@tr@max       571 <*package>

\MT@factor@default Default factor.
                    572 \def\MT@factor@default{1000 }

\MT@stretch@default Default values for expansion.
\MT@shrink@default 573 \def\MT@stretch@default{20 }
                    574 \def\MT@shrink@default{20 }

\MT@letterspace   Default value for letterspacing (in thousandths of 1 em).
\MT@letterspace@default 575 </package>
                    576 \let\MT@letterspace\m@ne
                    577 \def\MT@letterspace@default{100}
                    578 <*package>

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

```

```

579 \newif\ifMT@document
580 </package>
581 </package|letterspace>

```

### 1.1.5 Auxiliary macros

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

```

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

```

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

```

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

```

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

```

596 <lua->\@ifl@t@r\fmtversion{2017/01/01}\relax{\RequirePackage{luaotfload}}
597 <letterspace>\MT@pdf@or@lua\relax{
598 <letterspace>\ifx\newluafunction\@undefined \input ltluatex \fi
599 <lua-|letterspace>\MT@lua{require("microtype")}
600 <letterspace>}

```

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

```

601 <*luafile>
602
603 function microtype.info(...)
604   luatexbase.module_info("microtype",...)
605 end
606
607 local find      = string.find
608 local match     = string.match
609 local tex_write = tex.write
610
611 local catpackage
612 if luatexbase.registernumber then
613   catpackage = luatexbase.registernumber("catcodetable@atletter") -- LaTeX
614 else
615   catpackage = luatexbase.catcodetables.CatcodeTableLaTeXAtLetter -- luatexbase
616 end
617 function microtype.sprint (...)
618   tex.sprint(catpackage, ...)
619 end
620

```

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

```

621 if not math.tointeger or not pcall(math.tointeger,0) then

```

```

622 math.mininteger=-0x4FFFFFFFFF
623 math.maxinteger=0x4FFFFFFFFF
624 local floor=math.floor
625 function math.tointeger(n)
626     local f=floor(n)
627     return f==n and f or nil
628 end
629 end
630
631 (luafile)

    To be continued, but first back to primitives.
\MT@glet    Here's the forgotten one (finally implemented in LuaTeX).
632 (lua-)\MT@requires@luatex6{\let\MT@glet\glet}\relax
633 (package|letterspace)
634 \def\MT@glet{\global\let}

\MT@exp@cs    Commands to create command sequences. Those that are going to be defined
\MT@exp@gcs    globally should be created inside a group so that the save stack won't explode.
635 \def\MT@exp@cs#1#2{\expandafter#1\csname#2\endcsname}
636 (package)
637 \def\MT@exp@gcs#1#2{\begingroup\expandafter\endgroup\expandafter#1\csname#2\endcsname}

\MT@def@n    This is \@namedef and global.
\MT@gdef@n    638 \def\MT@def@n{\MT@exp@cs\def}
639 \def\MT@gdef@n{\MT@exp@gcs\gdef}

\MT@edef@n    Its expanding versions.
\MT@xdef@n    640 (package)
641 \def\MT@edef@n{\MT@exp@cs\edef}
642 (package)
643 \def\MT@xdef@n{\MT@exp@gcs\xdef}

\MT@let@nc    \let a \csname sequence to a command.
\MT@glet@nc    644 \def\MT@let@nc{\MT@exp@cs\let}
645 \def\MT@glet@nc{\MT@exp@gcs\MT@glet}

\MT@let@cn    \let a command to a \csname sequence.
646 (package)
647 \def\MT@let@cn#1#2{\expandafter\let\expandafter#1\csname #2\endcsname}
648 (package)

\MT@let@nn    \let a \csname sequence to a \csname sequence.
\MT@glet@nn    649 \def\MT@let@nn{\MT@exp@cs\MT@let@cn}
650 \def\MT@glet@nn{\MT@exp@gcs{\global\expandafter\MT@let@cn}}

\MT@font    Remove trailing space from the font name.
651 \def\MT@font{\expandafter\string\MT@font}

\MT@exp@one@n    Expand the second token once and enclose it in braces.
652 (package)
653 \def\MT@exp@one@n#1#2{\expandafter#1\expandafter{#2}}

\MT@exp@two@c    Expand the next two tokens after (#1) once.
654 \def\MT@exp@two@c#1{\expandafter\expandafter\expandafter#1\expandafter}
655 (package)

\MT@exp@two@n    Expand the next two tokens after (#1) once and enclose them in braces.
656 \def\MT@exp@two@n#1#2#3{%
657     \expandafter\expandafter\expandafter
658     #1\expandafter\expandafter\expandafter
659     {\expandafter#2\expandafter}\expandafter{#3}}

```

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

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

`\MT@ifdefined@c@TF`

`\MT@ifdefined@n@T`

`\MT@ifdefined@n@TF`

```

660 \def\MT@ifdefined@c@T#1{%
661 ^^X \ifdefined#1\expandafter\@firstofone\else\expandafter\@gobble\fi
662 ^^Q \ifx#1\@undefined\expandafter\@gobble\else\expandafter\@firstofone\fi
663 }
664 </package>
665 \def\MT@ifdefined@c@TF#1{%
666 ^^X \ifdefined#1\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
667 <package>^^Q \ifx#1\@undefined
668 <package>^^Q \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi
669 }
670 \def\MT@ifdefined@n@T#1{%
671 ^^X \ifcsname#1\endcsname\expandafter\@firstofone\else\expandafter\@gobble\fi
672 <package>^^Q \begingroup\MT@exp@two@c\endgroup\ifx\csname #1\endcsname\relax
673 <package>^^Q \expandafter\@gobble\else\expandafter\@firstofone\fi
674 }
675 \def\MT@ifdefined@n@TF#1{%
676 ^^X \ifcsname#1\endcsname\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
677 <package>^^Q \begingroup\MT@exp@two@c\endgroup\ifx\csname #1\endcsname\relax
678 <package>^^Q \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi
679 }
680 <*package>

```

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

`\MT@detokenize@c`

`\MT@rem@last@space`

```

681 \def\MT@detokenize@n#1{%
682 ^^X \expandafter\MT@rem@last@space\detokenize{#1} \@nil
683 ^^Q \string#1%
684 }
685 \def\MT@detokenize@c#1{%
686 ^^X \MT@exp@one@n\MT@detokenize@n#1%
687 ^^Q \MT@exp@two@c\MT@rem@last@space\strip@prefix\meaning#1 \@nil
688 }
689 \def\MT@rem@last@space#1 #2{#1%
690 \ifx\@nil#2\else \space
691 \expandafter\MT@rem@last@space\expandafter#2\fi
692 }

```

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

```

693 </package>
694 \begingroup
695 \catcode`\%=12
696 \catcode`\&=14
697 \gdef\MT@ifempty#1{&
698 \if %#1%&
699 \expandafter\@firstoftwo
700 \else
701 \expandafter\@secondoftwo
702 \fi
703 }
704 \endgroup
705 <*package>

```

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

```

706 </package>
707 </package|letterspace>
708 <pdf->\MT@requires@pdftex{
709 <letterspace>\MT@pdf@or@lua{

```

```

710 <pdf-letterspace>
711 \def\MT@ifint#1{%
712   \ifcase\pdfmatch{^-[0-9]+ *$}{#1}\relax
713   \expandafter\@secondoftwo
714   \else
715   \expandafter\@firstoftwo
716   \fi
717 }
718 }{
719 </pdf-letterspace>
720 <pdf-xe-letterspace>
721 \def\MT@ifint#1{%
722   \if!\ifnum9<1#1!\else?\fi
723   \expandafter\@firstoftwo
724   \else
725   \expandafter\@secondoftwo
726   \fi
727 }
728 </pdf-xe-letterspace>
729 <pdf-letterspace>}
730 <lua->\def\MT@ifint#1{\csname\MT@lua{microtype.if_int}([#1])\endcsname}
731 <luafile>
732 local function if_int(s)
733   if find(s,"^-[0-9]+ *$") then
734     tex_write("@firstoftwo")
735   else
736     tex_write("@secondoftwo")
737   end
738 end
739 microtype.if_int = if_int
740
741 </luafile>

```

`\MT@ifdimen` Test whether argument is dimension (or number). (nd and nc are new Didot resp. Cicero, added in pdfTeX 1.30; px is a pixel.)

```

742 <pdf->
743 \MT@requires@pdftex6{
744 \def\MT@ifdimen#1{%
745   \ifcase\pdfmatch{^[0-9]+([.][0-9]+)?|([.][0-9]+)%
746   (em|ex|cm|mm|in|pc|pt|dd|cc|bp|sp|nd|nc|px)? *$}{#1}\relax
747   \expandafter\@secondoftwo
748   \else
749   \expandafter\@firstoftwo
750   \fi
751 }
752 }{
753 </pdf->
754 <pdf-xe->
755 \def\MT@ifdimen#1{%
756   \setbox\z@=\hbox{%
757     \MT@count=1#1\relax
758     \ifnum\MT@count=\@ne
759       \aftergroup\@secondoftwo
760     \else
761       \aftergroup\@firstoftwo
762     \fi
763   }%
764 }
765 </pdf-xe->
766 <pdf->}
767 <lua->\def\MT@ifdimen#1{\csname\MT@lua{microtype.if_dimen}([#1])\endcsname}
768 <luafile>
769 local function if_dimen(s)
770   if (find(s,"^-[0-9]+(%a*) *$") or
771       find(s,"^-[0-9]*[.][0-9]+(%a*) *$")) then

```

```

772     tex_write("@firstoftwo")
773   else
774     tex_write("@secondoftwo")
775   end
776 end
777 microtype.if_dimen = if_dimen
778
779 </luafile>

\MT@ifdim    Compare floating point numbers.

780 <*package>
781 \def\MT@ifdim#1#2#3{%
782   \ifdim #1\p@ #2 #3\p@
783     \expandafter\@firstoftwo
784   \else
785     \expandafter\@secondoftwo
786   \fi
787 }
788 </package>

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

789 <pdf-xe->
790 <pdf->\MT@requires@pdftex5{
791 \def\MT@ifstreq#1#2{%
792   \ifnum
793     <pdf->      \pdfstrcmp
794     <xe->      \strcmp
795     {#1}{#2}=\z@
796     \expandafter\@firstoftwo
797   \else
798     \expandafter\@secondoftwo
799   \fi
800 }
801 </pdf-xe->
802 <*pdf->
803 }{
804 \def\MT@ifstreq#1#2{%
805   \edef\MT@res@a{#1}%
806   \edef\MT@res@b{#2}%
807   \ifx\MT@res@a\MT@res@b
808     \expandafter\@firstoftwo
809   \else
810     \expandafter\@secondoftwo
811   \fi
812 }
813 }
814 </pdf->
815 <lua->\def\MT@ifstreq#1#2{\csname\MT@lua{microtype.if_str_eq}([[#1]],[[#2]])\endcsname}
816 <*luafile>
817 local function if_str_eq(s1, s2)
818   if s1 == s2 then
819     tex_write("@firstoftwo")
820   else
821     tex_write("@secondoftwo")
822   end
823 end
824 microtype.if_str_eq = if_str_eq
825
826 </luafile>

\MT@xadd    Add item to a list.

827 <*package>
828 \def\MT@xadd#1#2{%
829   \ifx#1\relax
830     \xdef#1{#2}%

```

```

831 \else
832 \xdef#1{#1#2}%
833 \fi
834 }

\MT@xaddb      Add item to the beginning.
835 \def\MT@xaddb#1#2{%
836 \ifx#1\relax
837 \xdef#1{#2}%
838 \else
839 \xdef#1{#2#1}%
840 \fi
841 }
842 /package

\MT@map@clist@n      Run <#2> on all elements of the comma list <#1>. This and the following is modelled
\MT@map@clist@c      after LATEX3 commands.
\MT@map@clist@      843 <package>|letterspace
\MT@clist@function  844 \def\MT@map@clist@n#1#2{%
845 \ifx\@empty#1\else
\MT@clist@break    846 \def\MT@clist@function##1{#2}%
847 \MT@map@clist@#1,\@nil,\@nnil
848 \fi
849 }

850 \def\MT@map@clist@c#1{\MT@exp@one@n\MT@map@clist@n#1}
851 \def\MT@map@clist@c#1,%
852 \ifx\@nil#1%
853 \expandafter\MT@clist@break
854 \fi
855 \MT@clist@function{#1}%
856 \MT@map@clist@
857 }
858 \let\MT@clist@function\@gobble
859 \def\MT@clist@break#1\@nnil{}
860 <package>

\MT@map@tlist@n      Execute <#2> on all elements of the token list <#1>. \MT@tlist@break can be used
\MT@map@tlist@c      to jump out of the loop.
\MT@map@tlist@      861 \def\MT@map@tlist@n#1#2{\MT@map@tlist@#2#1\@nnil}
\MT@tlist@break      862 \def\MT@map@tlist@c#1#2{\expandafter\MT@map@tlist@\expandafter#2#1\@nnil}
863 \def\MT@map@tlist@#1#2{%
864 \ifx\@nnil#2\else
865 #1{#2}%
866 \expandafter\MT@map@tlist@
867 \expandafter#1%
868 \fi
869 }
870 \def\MT@tlist@break#1\@nnil{\fi}

\ifMT@inlist@      Test whether item <#1> is in comma list <#2>. Using \pdfmatch would be slower.
\MT@in@clist      871 \newif\ifMT@inlist@
872 \def\MT@in@clist#1#2{%
873 \def\MT@res@a#1,#1,##2##3\@nnil{%
874 \ifx##2\@empty
875 \MT@inlist@false
876 \else
877 \MT@inlist@true
878 \fi
879 }%
880 \expandafter\MT@res@a\expandafter,#2,#1,\@empty\@nnil
881 }

\MT@rem@from@clist      Remove item <#1> from comma list <#2>. This is basically \@removeelement from

```

ltnctr1.dtx. Using \pdfmatch and \pdflastmatch here would be really slow!

```
882 \def\MT@rem@from@clist#1#2{%
883   \def\MT@res@a##1,##2\MT@res@a{##1,##2\MT@res@b}%
884   \def\MT@res@b##1,\MT@res@b##2\MT@res@b{\ifx,##1\empty\else##1\fi}%
885   \xdef#2{\MT@exp@two@c\MT@res@b\MT@res@a\expandafter,#2,\MT@res@b,##1,\MT@res@a}%
886 }
```

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

```
887 \def\MT@in@tlist#1#2{%
888   \MT@inlist@false
889   \def\MT@res@a{#1}%
890   \MT@map@tlist@c#2\MT@in@tlist@
891 }
892 \def\MT@in@tlist@#1{%
893   \edef\MT@res@b{#1}%
894   \ifx\MT@res@a\MT@res@b
895     \MT@inlist@true
896     \expandafter\MT@tlist@break
897   \fi
898 }
```

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

```
\MT@in@rlist@      \MT@size@name
\MT@in@rlist@@ 899 \def\MT@in@rlist#1{%
\MT@size@name 900   \MT@inlist@false
901   \MT@map@tlist@c#1\MT@in@rlist@
902 }
903 \def\MT@in@rlist@#1{\expandafter\MT@in@rlist@@#1}
904 \def\MT@in@rlist@@#1#2#3{%
905   \MT@ifdim{#2}=\m@ne{%
906     \MT@ifdim{#1}=\MT@size
907     \MT@inlist@true
908     \relax
909   }%
910   \MT@ifdim\MT@size<{#1}\relax{%
911     \MT@ifdim\MT@size<{#2}%
912     \MT@inlist@true
913     \relax
914   }%
915 }%
916 \ifMT@inlist@
917   \def\MT@size@name{#3}%
918   \expandafter\MT@tlist@break
919 \fi
920 }
```

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

```
\MT@iterate
\MT@repeat 921 </package>
922 \def\MT@loop#1\MT@repeat{%
923   \def\MT@iterate{#1\relax\expandafter\MT@iterate\fi}%
924   \MT@iterate \let\MT@iterate\relax
925 }
926 \let\MT@repeat\fi
```

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

```
927 \def\MT@while@num#1#2#3{%
928   \@tempcnta#1\relax
929   \MT@loop #3%
930   \advance\@tempcnta \@ne
931   \ifnum\@tempcnta < #2\MT@repeat
932 }
```



933 *</package|letterspace>*

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

```

934 <letterspace>\MT@pdf@or@lua{\let\MT@if@luaotf@font\@secondoftwo}{
935 <*lua-|letterspace>
936 \def\MT@if@luaotf@font{\csname\MT@lua{%
937   microtype.if_luaotf_font()
938   }\endcsname
939 }
940 </lua-|letterspace>
941 <letterspace>}
942 <*luafile>
943 local function if_luaotf_font()
944   local thefont = font.getfont(font.current())
945   if thefont and ( thefont.format == "opentype" or thefont.format == "truetype" )
946     then tex.write("@firstoftwo")
947     else tex.write("@secondoftwo")
948   end
949 end
950 microtype.if_luaotf_font = if_luaotf_font
951
952 </luafile>

```

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

953 *<pdf-|letterspace>*\def\MT@do@font{\MT@while@num\z@\cc@lvi}

resp. for the whole font for LuaTeX, if it's a Unicode font.

```

954 <*lua->
955 \def\MT@do@font#1{%
956   \MT@if@luaotf@font{%
957     \def\MT@do@font@function{#1}%
958     \MT@lua{microtype.do_font()}%
959   }{\MT@while@num\z@\cc@lvi{#1}}%
960 }
961 </lua->

```

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

```

962 <*luafile>
963 local function do_font()
964   local thefont = font.getfont(font.current())
965   if thefont then
966     for i,v in next,thefont.characters do
967       if v.index == nil or ( v.index > 0 and i < 1114112 ) then
968         microtype.sprint([[ \@tempcnta=]]..i..[[\relax\MT@do@font@function]])
969       end
970     end
971   end
972 end
973 microtype.do_font = do_font
974
975 </luafile>

```

The XeTeX variant (it's slow ...!).

```

976 <*xe->
977 \def\MT@do@font#1{%
978   \@tempcnta=\z@
979   \MT@loop
980     \iffontchar\MT@font\@tempcnta #1\fi
981     \advance\@tempcnta\@ne
982     \ifnum\@tempcnta < \XeTeXlastfontchar\MT@font \MT@repeat

```

```

983 }
984 /xe-
985 *package

```

`\MT@count` Increment macro  $\langle\#1\rangle$  by one. Saves using up too many counters. The e-TeX way is slightly faster.

```

986 \newcount\MT@count
987 \def\MT@increment#1{%
988   ^^X \edef#1{\number\numexpr #1 + 1\relax}%
989   ^^Q \MT@count=#1\relax
990   ^^Q \advance\MT@count \@ne
991   ^^Q \edef#1{\number\MT@count}%
992 }

```

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

```

993 \def\MT@scale#1#2#3{%
994   ^^Q \multiply #1 #2\relax
995   \ifnum #3 = \z@
996     ^^X #1=\numexpr #1 * #2\relax
997   \else
998     ^^X #1=\numexpr #1 * #2 / #3\relax
999   ^^Q \divide #1 #3\relax
1000   \fi
1001 }

```

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

```

\MT@abbr@pr 1002 \def\MT@abbr@pr{protrusion}
\MT@abbr@ex 1003 \def\MT@abbr@ex{expansion}
\MT@abbr@pr@c 1004 \def\MT@abbr@pr@c{protrusion codes}
\MT@abbr@ex@c 1005 \def\MT@abbr@ex@c{expansion codes}
\MT@abbr@pr@inh 1006 \def\MT@abbr@pr@inh{protrusion inheritance}
\MT@abbr@ex@inh 1007 \def\MT@abbr@ex@inh{expansion inheritance}
\MT@abbr@n 1008 \def\MT@abbr@n{noligatures}
\MT@abbr@sp 1009 \def\MT@abbr@sp{spacing}
\MT@abbr@sp@c 1010 \def\MT@abbr@sp@c{interword spacing codes}
\MT@abbr@sp@inh 1011 \def\MT@abbr@sp@inh{interword spacing inheritance}
\MT@abbr@kn 1012 \def\MT@abbr@kn{kerning}
\MT@abbr@kn@c 1013 \def\MT@abbr@kn@c{kerning codes}
\MT@abbr@kn@inh 1014 \def\MT@abbr@kn@inh{kerning inheritance}
\MT@abbr@kn@c 1015 \def\MT@abbr@kn@c{tracking}
\MT@abbr@kn@inh 1016 \def\MT@abbr@kn@c{tracking amount}

```

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

```

\MT@rbba@protrusion 1017 \def\MT@rbba@protrusion{pr}
\MT@rbba@expansion 1018 \def\MT@rbba@expansion{ex}
\MT@rbba@spacing 1019 \def\MT@rbba@spacing{sp}
\MT@rbba@kerning 1020 \def\MT@rbba@kerning{kn}
\MT@rbba@tracking 1021 \def\MT@rbba@tracking{tr}

```

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

```

\MT@features@long 1022 \def\MT@features{pr,ex,sp,kn,tr}
1023 \def\MT@features@long{protrusion,expansion,spacing,kerning,tracking}

```

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

```

1024 \def\MT@is@feature#1#2{%

```

```

1025 \MT@in@clist{#1}\MT@features@long
1026 \ifMT@inlist@
1027 \expandafter\@firstofone
1028 \else
1029 \MT@error{`#1' is not an available micro-typographic\MessageBreak
1030 feature. Ignoring #2}{Available features are: `~\MT@features@long'.}%
1031 \expandafter\@gobble
1032 \fi
1033 }

```

### 1.1.6 Compatibility

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

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

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

```

1034 \@ifl@aded{tex}{wordcount}{%
1035 \MT@warning@nl{Detected the `wordcount' utility.\MessageBreak
1036 Disabling `~\MT@MT', since it wouldn't work}%
1037 \MT@clear@options\endinput}\relax

```

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

```

1038 \@ifclassloaded{minimal}{%
1039 \MT@warning@nl{Detected the `minimal' class.\MessageBreak
1040 Expect lots of warnings and some malfunctions.\MessageBreak
1041 You might want to use a proper class instead}%
1042 }\relax

```

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

```

1043 </package>
1044 <*package|letterspace>
1045 <plain>\MT@requires@latex{
1046 \let\MT@setup@~\empty

```

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

```

1047 \def\MT@addto@setup{\g@addto@macro\MT@setup@}

```

Don't hesitate with `miniltx`.

```

1048 <plain>{\let\MT@addto@setup\@firstofone}

```

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

```

1049 \def\MT@with@package@T#1{\@ifpackageloaded{#1}\@firstofone\@gobble}
1050 </package|letterspace>
1051 <*package>

```

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

```

1052 \def\MT@with@babel@and@T#1{%
1053 \MT@ifdefined@n@T{opt@babel.\@pkgextension}{%
1054 \expandtwoargs\MT@in@clist{#1}
1055 {\csname opt@babel.\@pkgextension\endcsname,\@classoptionslist}%

```

```

1056 \ifMT@inlist@expandafter\@secondoftwo\else\expandafter\@firstofone\fi
1057 } \@gobble
1058 }

```

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

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

```

1059 </package>
1060 <pdf->\MT@requires@pdftex5{
1061 <*pdf-|lua-|xe->
1062 \def\MT@ledmac@setup{%
1063 \ifMT@protrusion
1064 \MT@ifdefined@c@TF\l@dunhbox@line{%

```

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

```

1065 \MT@info@nl{Patching ((r)e)ledmac to enable character protrusion}%
1066 \let\MT@led@unhbox@line\l@dunhbox@line
1067 \renewcommand*{\l@dunhbox@line}[1]{%
1068 \ifhbox##1%
1069 \kern\leftmarginkern##1%
1070 \expandafter\MT@led@unhbox@line\expandafter##1\expandafter
1071 \kern\rightmarginkern##1%
1072 \fi
1073 }%
1074 }{%
1075 \MT@warning@nl{%
1076 Character protrusion in paragraphs with line\MessageBreak
1077 numbering will only work if you update ledmac,\MessageBreak
1078 or use one of its successors, eledmac or reledmac}%
1079 }%
1080 \fi
1081 }
1082 </pdf-|lua-|xe->
1083 <*pdf->
1084 }{
1085 \def\MT@ledmac@setup{%
1086 \ifMT@protrusion
1087 \MT@warning@nl{%
1088 The pdftex version you are using does not allow\MessageBreak
1089 character protrusion in paragraphs with line\MessageBreak
1090 numbering by the '~((r)e)ledmac' package.\MessageBreak
1091 Upgrade pdftex to version 1.30 or later}%
1092 \fi
1093 }
1094 }
1095 </pdf->

```

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

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

```

1096 <*package|letterspace>
1097 <*package>
1098 \def\MT@restore@p@h{\chardef\%~\% \chardef\#~\# }

```

`\ifMT@fontspec` Two new conditionals for use with Xe<sub>La</sub>TeX or Lua<sub>La</sub>TeX.

```
\ifMT@xunicode 1099 \newif\ifMT@fontspec
1100 \MT@with@package@T{fontspec}\MT@fontspectrue
1101 \newif\ifMT@xunicode
1102 \MT@with@package@T{xunicode}\MT@xunicodetrue
```

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

```
1103 \ifl@t@r\fmtversion{2020/10/01}
1104 {\IfFormatAtLeastTF{2021/11/15}
1105 {\AddToHook{package/fontspectrue}\MT@fontspectrue}}
1106 {\AddToHook{package/after/fontspectrue}\MT@fontspectrue}}\relax
```

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

`\MT@tikz@setup`

```
1107 \let\MT@maybe@gobble@with@tikz\@firstofone
1108 \def\MT@tikz@setup{%
1109   \def\MT@maybe@gobble@with@tikz{%
1110     \ifnum\tikz@expandcount>\z@
1111       \expandafter\@gobble
1112     \else
1113       \expandafter\@firstofone
1114     \fi}}
```

`\MT@setupfont@hook`

This hook will be executed every time a font is set up (inside a group).

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

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

```
1115 \def\MT@setupfont@hook{%
```

Spanish (as well as Galician and Mexican) `babel` modify `\%`, storing the original meaning in `\percentsign`.

```
1116 \MT@if@false
1117 \MT@with@babel@and@T{spanish}\MT@if@true
1118 \MT@with@babel@and@T{galician}\MT@if@true
1119 \MT@with@babel@and@T{mexican}\MT@if@true
1120 \ifMT@if\MT@ifdefined@c@T\percentsign{\let\%\percentsign}\fi
```

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

```
1121 \MT@with@package@T{csquotes}{%
1122   \@ifpackage@later{csquotes}{2005/05/11}\@disablequotes\relax}%
```

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

```
1123 \MT@if@false
1124 \MT@with@package@T{hyperref}\MT@if@true
1125 \MT@with@package@T{tex4ht}\MT@if@true
1126 \MT@with@package@T{mathastext}\MT@if@true
1127 \ifMT@if\MT@restore@p@h\fi
1128 \MT@with@package@T{tikz}\MT@tikz@setup
1129 }
```

Check again at the end of the preamble.

```

1130 </package>
1131 \MT@addto@setup{%
1132 (*package)

```

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

```

1133 \MT@with@package@T{pdfcpot}{%
1134 \MT@error{Detected the `pdfcpot' package!\MessageBreak
1135 \MT@MT' and `pdfcpot' may not be used together}{%
1136 The `pdfcpot' package provides an interface to character protrusion.\MessageBreak
1137 So does the `MT@MT' package. Using both packages at the same\MessageBreak
1138 time will almost certainly lead to undesired results. Have your choice!}%
1139 }%
1140 \MT@with@package@T {ledmac}\MT@ledmac@setup
1141 \MT@with@package@T {eledmac}\MT@ledmac@setup
1142 \MT@with@package@T{reledmac}\MT@ledmac@setup
1143 \MT@with@package@T{xunicode}\MT@xunicodetrue
1144 \MT@with@package@T{fontspec}\MT@fontspectrue

```

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

```

1145 \MT@gllet\MT@setupfont@hook\@empty

```

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

```

1146 %\gdef\MT@setupfont@hook{\tracingnone
1147 % \MT@info{Silently doing my `magic' (Mittelbach) for font\MessageBreak\MT@font}}%
1148 \MT@if@false
1149 \MT@with@babel@and@T{spanish} \MT@if@true
1150 \MT@with@babel@and@T{galician}\MT@if@true
1151 \MT@with@babel@and@T{mexican} \MT@if@true
1152 \ifMT@if@
1153 \g@addto@macro\MT@setupfont@hook{%
1154 \MT@ifdefined@c@T\percentsign{\let\%\percentsign}}%
1155 \fi
1156 \MT@with@package@T{csquotes}{%
1157 \ifpackage@later{csquotes}{2005/05/11}{%
1158 \g@addto@macro\MT@setupfont@hook\@disablequotes
1159 ^^X\apptocmd\csq@bqgroup{\let\MT@csq@eqgroup\csq@eqgroup}\relax\relax
1160 }{%
1161 \MT@warning@nl{%
1162 Should you receive warnings about unknown slot\MessageBreak
1163 numbers, try upgrading the `csquotes' package}%
1164 }%
1165 }%

```

We disable microtype's additions inside hyperref's \pdfstringdef, which redefines lots of commands. hyperref doesn't work with plain TeX, so in that case we don't bother.

```

1166 \MT@if@false
1167 </package>
1168 (plain) \MT@requires@latex2{
1169 \MT@with@package@T{hyperref}{%
1170 \pdfstringdefDisableCommands{%
1171 (*package)
1172 \MT@ltx@pickupfont
1173 \let\textmicrotypecontext\@secondoftwo
1174 \let\microtypecontext\@gobble
1175 </package>
1176 \def\lstyle{\pdfstringdefWarn\lstyle}%
1177 \def\textls#1#\pdfstringdefWarn\textls}%
1178 }%
1179 (package) \MT@if@true
1180 }%
1181 (plain) }\relax
1182 (*package)

```

```

1183 \MT@with@package@T{tex4ht}{%
1184   \def\MT@apply@patch#1{\MT@info{Not applying patch `#1' (for tex4ht)}}%
1185   \def\MT@undo@patch#1{\MT@info{Not undoing patch `#1' (for tex4ht)}}%
1186   \MT@if@true
1187 }%
1188 \MT@with@package@T{mathastext}\MT@if@true
1189 \ifMT@if@{g@addto@macro\MT@setupfont@hook\MT@restore@p@h\fi

```

The listings package makes numbers and letters active,

```

1190 \MT@with@package@T{listings}{%
1191   \g@addto@macro\MT@cfg@catcodes{%
1192     \MT@while@num{"30"}{"3A"}{\catcode\@tempcnta=12\relax}%
1193     \MT@while@num{"41"}{"5B"}{\catcode\@tempcnta=11\relax}%
1194     \MT@while@num{"61"}{"7B"}{\catcode\@tempcnta=11\relax}%
1195   }%

```

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

```

1196   \g@addto@macro\MT@setupfont@hook{%
1197     \catcode`\=\z@

```

Inside a listing, \space is redefined.

```

1198   \def\space{ }%

```

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

```

1199   \let\lst@ProcessLetter\@empty
1200 }%
1201 }%

```

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

```

1202 </package>
1203 \ifx\SOUL@\@undefined\else
1204   \soulregister\lsstyle 0%
1205   \soulregister\textls 1%
1206   \ifx\XeTeXrevision\@undefined
1207     \let\MT@SOUL@doword\SOUL@doword
1208     \def\SOUL@doword{\pdfadjustspacing=\z@ \MT@SOUL@doword}%
1209     \fi
1210   \fi
1211 <*/package>
1212 \MT@with@package@T{tikz}\MT@tikz@setup

```

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

```

1213 \MT@with@package@T{pinyin}{%
1214   \let\MT@orig@py@macron\py@macron
1215   \ifpackageversion{pinyin}{2005/08/11}{% 4.6.0
1216     \def\py@macron#1#2{%
1217       \MT@ltx@pickupfont
1218       \MT@orig@py@macron{#1}{#2}%
1219       \MT@MT@pickupfont}%
1220   }{%
1221     \def\py@macron#1{%
1222       \MT@ltx@pickupfont
1223       \MT@orig@py@macron{#1}%
1224       \MT@MT@pickupfont}%
1225   }%

```

1226 }%

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

```
1227 \MT@with@package@T{unicode-math}{%
1228 \MT@let@enc{__um__sub__or__super:n}\relax
1229 }%
1230 </package>
1231 }
1232 <*package>
```

### 1.1.7 Protrusion patches

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

```
\MT@patch@info 1233 \newif\ifMT@patch@ok
\MT@patch@warn 1234 \def\MT@patch@info#1{\MT@info{Applying patch `#1'}}
\MT@patch@undef 1235 \def\MT@patch@warn#1{\MT@warning{Unable to apply patch `#1'}}
\MT@patch@info@undo 1236 \def\MT@patch@undef#1{\MT@warning{Patch `#1' undefined. Cannot apply it}}
1237 \def\MT@patch@info@undo#1{\MT@info{Reverting patch `#1'}}
```

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

```
\MT@define@patch
1238 \let\MT@patches@def\gobble
1239 \def\MT@define@patch#1#2#3{%
1240 \g@addto@macro\MT@patches@def{,#1}%
1241 \MT@def@n{\MT@patch@#1}{#2}%
1242 \MT@def@n{\MT@patch@undo@#1}{#3}%
1243 }
```

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

```
\MT@redefine@patch
1244 \let\MT@redefined@patches\empty
1245 \def\MT@redefine@patch#1#2#3{%
1246 \g@addto@macro\MT@redefined@patches{%
1247 \MT@def@n{\MT@patch@#1}{#2}%
1248 \MT@def@n{\MT@patch@undo@#1}{#3}%
1249 }%
1250 }
```

Both macros are only allowed in the preamble.

```
1251 \@onlypreamble\MT@define@patch
1252 \@onlypreamble\MT@redefine@patch
```

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

```
\MT@patch@patch
1253 \def\MT@append@patch#1#2{%
1254 \MT@remember@patch{#1}%
1255 \apptocmd#1{#2}\relax\MT@patch@okfalse
1256 }
1257 \def\MT@patch@patch#1#2#3{%
1258 \MT@remember@patch{#1}%
1259 \patchcmd#1{#2}{#3}\relax\MT@patch@okfalse
1260 }
```

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

```
1261 \def\MT@remember@patch#1{%
1262 \MT@ifdefined@n@TF{\MT@patch@saved@string#1}\relax
1263 {\MT@let@nc{\MT@patch@saved@string#1}#1%
```



```

1264 \MT@exp@cs@g@addto@macro{MT@patch@undo@@\MT@patch@name}%
1265 {\MT@let@cn#1{MT@patch@saved@string#1}}}%
1266 }

```

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

`\MT@apply@patch`

```

1267 \let\MT@patches@applied\@gobble
1268 \def\MT@apply@patch#1{%
1269   \MT@patch@oktrue
1270   \MT@ifdefined@n@TF{MT@patch@@#1}
1271   {\MT@in@clist{#1}\MT@patches@applied
1272    \ifMT@inlist@
1273      \MT@warning{Patch `#1' has already been applied,\MessageBreak
1274                cannot reapply it}%
1275    \else
1276      \let\MT@restore@catcodes\@empty
1277      \MT@with@babel@and@T{spanish} {\MT@fix@catcode{62}{12}}% >
1278      \MT@with@babel@and@T{galician}{\MT@fix@catcode{62}{12}}% >
1279      \def\MT@patch@name{#1}%
1280      \g@addto@macro\MT@patches@applied{,#1}%
1281      \nameuse{MT@patch@@#1}%
1282      \nameuse{MT@patch@ifMT@patch@ok info\else warn\fi}{#1}%
1283      \MT@restore@catcodes
1284      \fi}
1285      {\MT@patch@undef{#1}}}%
1286 }

```

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

```

1287 \def\MT@undo@patch#1{%
1288   \MT@in@clist{#1}\MT@patches@applied
1289   \ifMT@inlist@
1290     \MT@rem@from@clist{#1}\MT@patches@applied
1291     \nameuse{MT@patch@undo@@#1}%
1292     \MT@patch@info@undo{#1}%
1293   \else
1294     \MT@warning{Patch `#1' hasn't been applied,\MessageBreak cannot revert it}%
1295   \fi
1296 }

```

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

```

1297 {\catcode`\#=12
1298 \MT@addto@setup{%

```

Now for the actual patches:

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

- for the base classes

```

1299 \MT@define@patch{item}{%
1300   \MT@append@patch\@item\leftprotrusion
1301   \MT@patch@patch\@item{\everypar}{\everypar{\leftprotrusion}}%

```

- beamer patches it too

```

1302 \ifclassloaded{beamer}
1303 {\MT@append@patch\beamer@callorigitem\leftprotrusion
1304  \MT@patch@patch\beamer@callorigitem\ignorespaces{\ignorespaces\leftprotrusion}}

```

- the `simplecv` class

```

1305 {\ifclassloaded{simplecv}

```

```

1306      {\MT@append@patch\@topic@item\leftprotrusion}
1307      {}}%
1308  }{}%

```

toc: TOC and friends

```

1309      \MT@define@patch{toc}{%
1310      \MT@append@patch\numberline\leftprotrusion

```

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

```

1311      \@ifclassloaded{memoir}
1312      {\MT@append@patch\booknumberline\leftprotrusion
1313      \MT@append@patch\partnumberline\leftprotrusion
1314      \MT@append@patch\chapternumberline\leftprotrusion
1315      \MT@append@patch\cftbookafterpnum\noprotrusion
1316      \MT@append@patch\cftpartafterpnum\noprotrusion
1317      \MT@append@patch\cftchapterafterpnum\noprotrusion
1318      \MT@append@patch\cftsectionafterpnum\noprotrusion
1319      \MT@append@patch\cftsubsectionafterpnum\noprotrusion
1320      \MT@append@patch\cftsubsubsectionafterpnum\noprotrusion
1321      \MT@append@patch\cftparagraphafterpnum\noprotrusion
1322      \MT@append@patch\cftsubparagraphafterpnum\noprotrusion
1323      \MT@append@patch\cftfigureafterpnum\noprotrusion
1324      \MT@append@patch\cfttableafterpnum\noprotrusion}
1325      {}}%
1326  }{}%

```

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

```

1327  %   \@ifpackageloaded{tocbasic}
1328  %   {\MT@define@patch{toc}
1329  %   {\MT@append@patch\numberline\leftprotrusion
1330  %   \setuptoc{toc}{noprotusion}%
1331  %   \setuptoc{lof}{noprotusion}%
1332  %   \setuptoc{lot}{noprotusion}}
1333  %   {\unsettoc{toc}{noprotusion}%
1334  %   \unsettoc{lof}{noprotusion}%
1335  %   \unsettoc{lot}{noprotusion}}}%

```

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

eqnum: equation numbers

- IEEEtran

```

1336      \MT@define@patch{eqnum}{%
1337      \@ifclassloaded{IEEEtran}
1338      {\MT@patch@patch\theequationdis{({}\leftprotrusion{({}}}%
1339      \MT@patch@patch\theequationdis{({}\rightprotrusion{({}}}%
1340      \MT@patch@patch\theIEEEsubequationdis{({}\leftprotrusion{({}}}%
1341      \MT@patch@patch\theIEEEsubequationdis{({}\rightprotrusion{({}}}%
1342      {}}%

```

- \eqref relies on \tagform@, so we have to have it use the original definition.

```

1343      \@ifpackageloaded{amsmath}
1344      {\MT@patch@patch\tagform@{({}\leftprotrusion{({}}}%
1345      \MT@patch@patch\tagform@{({}\rightprotrusion{({}}}%
1346      \MT@patch@patch\eqref{\tagform@}{\@nameuse{MT@patch@saved@string\tagform@}}%

```

- If the user has altered the tags' appearance via mathtools's `\newtagform` interface, our patch won't have any effect. We don't issue a warning because `\(left|right)protrusion` might have been specified appropriately in `\newtagform`. We could also patch the latter command (or, to be more precise, `\MT_define_tagform:nwnn`), but the timing is a bit tricky, so for now info it is.

```

1347 \MT@with@package@T{mathtools}{%
1348 \ifMT@patch@ok\else \MT@patch@oktrue
1349 \MT@info@n1{The 'eqnum' patch may not be effective because you are\MessageBreak
1350 using the mathtools package. Make sure to insert\MessageBreak
1351 ~\backslashchar leftprotrusion' and
1352 ~\backslashchar rightprotrusion' as\MessageBreak
1353 appropriate in mathtools's ~\backslashchar newtagform' command}%
1354 \fi}}
1355 {\MT@patch@patch\@eqnnum{}}{\leftprotrusion{}}}%
1356 \MT@patch@patch\@eqnnum{}}{\rightprotrusion{}}}%
1357 }{}%

```

footnote: footnote text (only visible with block paragraphs)

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

```

1358 \MT@define@patch{footnote}{%
1359 \ifpackage@loaded{hyperref}
1360 {\ifHy@hyperfootnotes\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi}
1361 \@secondoftwo
1362 {\MT@patch@patch\@footnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}%
1363 \MT@patch@patch\@footnotetext{\@empty\ignorespaces}{\@empty\ignorespaces\leftprotrusion}%
1364 \MT@patch@patch\@mpfootnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}%
1365 \MT@patch@patch\@mpfootnotetext
1366 {\expandafter\hyper@@anchor\expandafter
1367 {\Hy@footnote@currentHref}{\relax}}\ignorespaces}
1368 {\expandafter\hyper@@anchor\expandafter
1369 {\Hy@footnote@currentHref}{\relax}}\ignorespaces\leftprotrusion}}

```

- `memoir` additionally allows footnotes in the margins

```

1370 {\@ifclassloaded{memoir}
1371 {\MT@patch@patch\@footnotetext{\foottextfont #1}{\foottextfont\leftprotrusion #1}%
1372 \MT@patch@patch\@mpfootnotetext{\foottextfont #1}{\foottextfont\leftprotrusion #1}}
1373 {\MT@patch@patch\@mpfootnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}%

```

- the KOMA classes (which load `scrkbase`)

```

1374 \ifpackage@loaded{scrkbase}
1375 {\MT@patch@patch\scr@saved@footnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}}%

```

- the base classes

```

1376 {\MT@patch@patch\@footnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}}}%
1377 }{}%

```

Finally, execute any redefinitions.

```

1378 \MT@redefined@patches
1379 }

```

```

1380 </package>
1381 </package|letterspace>

```

## 1.2 Font setup

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

```

1382 <package>\expandafter\ifx\the\font\nullfont\normalfont\fi

```

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

```
1383 <pdf-|lua-|xe-
1384 \def\MT@setupfont{%
```

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

```
1385 <xe-|lua-| \MT@font
```

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

```
1386 \MT@setupfont@hook}
```

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

```
1387 <pdf-| \MT@requires@pdftex7{
1388 <pdf-|lua-| \g@addto@macro\MT@setupfont\MT@copy@font
1389 <pdf-|} \relax
```

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

```
1390 \g@addto@macro\MT@setupfont{%
1391 \MT@exp@two@c\MT@split@name\string\MT@font/\@nil
```

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

```
1392 \MT@exp@one@n\MT@find@file\MT@family
1393 \ifx\MT@familyalias\@empty \else
1394 \MT@exp@one@n\MT@find@file\MT@familyalias\fi
```

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

```
1395 % \ifx\cf@encoding\cf@encoding\else\@enc@update\fi
1396 }
```

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

```
1397 <pdf-| \MT@requires@pdftex6
1398 <lua-| \MT@requires@luatex3
1399 <pdf-|lua-| { \g@addto@macro\MT@setupfont\MT@tracking} \relax
1400 \g@addto@macro\MT@setupfont{%
1401 \MT@check@font
1402 \ifMT@inlist@
1403 <debug| \MT@show@pdfannot2%
1404 \else
1405 \MT@vinfo{Setting up font ` \MT@font' \on@line}%
1406 \MT@info@nottracking
```

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

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

```
1407 \MT@protrusion
1408 <pdf-|lua-| \MT@expansion
1409 }
```

Interword spacing and kerning (pdfTeX 1.40).

```
1410 <pdf-|
1411 \MT@requires@pdftex6{
1412 \g@addto@macro\MT@setupfont{\MT@spacing\MT@kerning}
```

```
1413 }\relax
1414 </pdf->
```

Disable ligatures (pdfTeX 1.30).

```
1415 <pdf->\MT@requires@pdftex5{
1416 <pdf-|lua->\g@addto@macro\MT@setupfont\MT@noligatures
1417 <pdf->}\relax
1418 \g@addto@macro\MT@setupfont{%
```

Debugging.

```
1419 <debug>\MT@show@pdfannot1%
```

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

```
1420 \MT@register@font
1421 \fi
1422 }
1423 </pdf-|lua-|xe->
```

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

```
1424 <*pdf-|lua->
1425 \let\MT@copy@font\relax
1426 <pdf->\MT@requires@pdftex7{
1427 \def\MT@copy@font{%
```

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

```
1428 \xdef\MT@font@copy{\csname\MT@font/\MT@pr@context/\MT@ex@context\endcsname}%
1429 \expandafter\ifx\MT@font@copy\relax
```

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

```
1430 \edef\MT@font@orig{\csname\expandafter\string\font@name @orig\endcsname}%
1431 \expandafter\ifx\MT@font@orig\relax
1432 \MT@exp@two@c\MT@gl@et\MT@font@orig\font@name
1433 \else
1434 \MT@exp@two@c\let\font@name\MT@font@orig
1435 \fi
1436 <pdf-> \global\MT@exp@two@c\pdfcopyfont\MT@font@copy\font@name
```

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

```
1437 <lua-> \MT@exp@two@c\MT@lua@copyfont\meaning\font@name\@nil
1438 <debug>\MT@dinfol{creating new copy: \MT@font@copy}%
```

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

```
1439 \MT@map@clist@c\MT@active@features{%
1440 \MT@exp@cs\ifx\MT@nameuse\MT@abbr@##1}\relax\else
1441 \def\@tempa{##1}%
1442 \MT@exp@cs\MT@map@tlist@c\MT@##1@doc@contexts\MT@rem@from@list
1443 \fi
1444 }%
1445 \fi
1446 \MT@exp@two@c\let\MT@font\MT@font@copy
```

We only need the font identifier for letterspacing.

```
1447 \let\font@name\MT@font@copy
```

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

```
1448 \aftergroup\let\aftergroup\font@name\aftergroup\MT@font@copy
1449 }
```

\MT@rem@from@list

```
1450 \def\MT@rem@from@list#1{%
1451   \MT@exp@cs\ifx{MT@tempa @#1font@list}\relax\else
1452     \expandafter\MT@exp@one@n\expandafter\MT@rem@from@clist\expandafter
1453       \MT@font \csname MT@tempa @#1font@list\endcsname
1454   \fi
1455 }
1456 \pdf-}\relax
```

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

```
1457 \lua-}\def\MT@lua@copyfont #1 #2 #3\@nil{%
1458 \lua-}\global\expandafter\font\MT@font@copy=#3\relax}
1459 \pdf-|\lua-}
```

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

```
\SetExpansion
[ stretch = 30,
  shrink   = 60,
  step     = 5 ]
{ encoding = *,
  size     = 10.001 }
{ }
\newcommand{\expandpar}[1]{%
  \fontsize{10.001}{\baselineskip}\selectfont #1\par}
% ...
\expandpar{This paragraph contains an 'unnecessary' widow.}
```

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

\MT@fix@fontdimen@six  
  \MT@dimen@six

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

```
1460 \pdf-|\lua-|\xe-}
1461 \def\MT@fix@fontdimen@six{%
1462   \ifnum\fontdimen6\MT@font=z@
1463     \fontdimen6\MT@font=%
1464   \pdf-}\pdffontsize\MT@font
1465   \lua-}\MT@requires@luatex4{\pdffeedback fontsize}{\pdffontsize}\MT@font
1466   \xe-}\MT@size pt
1467   \MT@info{Fixing zero \backslashchar fontdimen 6 for font '\MT@font'\MessageBreak
1468     (new value: \the\fontdimen6\MT@font)}%
1469   \pdf-}\MT@requires@pdftex8\relax{\MT@glet@nc{\MT@font-fake6}\@empty}%

```

```

1470 \fi
1471 \edef\MT@dimen@six{\number\fontdimen6\MT@font}%
1472 }
1473 </pdf-|lua-|xe->

\MT@split@name      Split up the font name ((#6) may be a protrusion/expansion context and/or a
\MT@encoding        letterspacing amount). With fontspec we also need to remove its internal instance
\MT@family          counter.
\MT@series          1474 <*package>
\MT@shape            1475 \def\MT@split@name#1/#2/#3/#4/#5/#6\@nil{%
1476 \def\MT@encoding{#1}%
\MT@size            1477 \ifMT@fontspec
1478 \edef\MT@family{\MT@scrubfeature#2}\relax}%
1479 \else
1480 \def\MT@family{#2}%
1481 \fi
1482 \def\MT@series {#3}%
1483 \def\MT@shape {#4}%
1484 \def\MT@size {#5}%
1485 \MT@fix@fontdimen@six

\MT@familyalias     Alias family?
1486 \MT@ifdefined@n@TF{MT@\MT@family @alias}%
1487 {\MT@let@cn\MT@familyalias{MT@\MT@family @alias}}%
1488 {\let\MT@familyalias\@empty}%
1489 }

\MT@scrubfeature     Remove one resp. all feature counters (fontspec).
\MT@scrubfeatures    1490 \def\MT@scrubfeature#1(#2)#3\relax{#1}
1491 \def\MT@scrubfeatures#1(#2)#3\relax{%
1492 #1%
1493 \ifx\relax#3\relax\else
1494 \MT@scrubfeatures#3\relax
1495 \fi
1496 }

\ifMT@do             We check all features of the current font against the lists of the currently active
\MT@feat             font set, and set \ifMT@do accordingly.
\MT@maybe@do        1497 \newif\ifMT@do
1498 \def\MT@maybe@do#1{%
    (but only if the feature isn't globally set to false)
1499 \csname ifMT@\csname MT@abbr@#1\endcsname\endcsname

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

1500 \MT@dotrue
1501 \edef\@tempa{\csname MT@#1@setname\endcsname}%
1502 \MT@map@clist@n{font,encoding,family,series,shape,size}{%
1503 \MT@ifdefined@n@TF{MT@checklist@#1}%
1504 {\csname MT@checklist@#1\endcsname}%
1505 {\MT@checklist@{#1}}}%
1506 {#1}%
1507 }%
1508 \else
1509 \MT@dofalse
1510 \fi
1511 \ifMT@do

    \MT@feat stores the current feature.
1512 \def\MT@feat{#1}%
1513 \csname MT@set@#1@codes\endcsname

```

```

1514 \else
1515 \MT@ifstreq{#1}{tr}%
1516 {\let\MT@info@nottracking\MT@info@nottracking}%
1517 {\MT@vinfo{... No \@nameuse{MT@abbr@#1}}}%
1518 \fi
1519 }

```

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

```

\MT@info@nottracking@ 1520 \let\MT@info@nottracking\relax
1521 \def\MT@info@nottracking@{\MT@vinfo{... No tracking}}

```

\MT@dinfo@list

```

1522 <debug>\def\MT@dinfo@list#1#2#3{\MT@dinfo@n1{1}{\@nameuse{MT@abbr@#1}: #2
1523 <debug> \ifx\#3\list empty\else \@nameuse{MT@#2}' #3 list\fi}}

```

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

```

1524 \def\MT@checklist@#1#2{%
1525 <!debug> \MT@ifdefined@n@T
1526 <debug> \MT@ifdefined@n@TF
1527 {MT@#2list@#1@ \@tempa}%

```

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

```

1528 \expandafter\MT@exp@one@n\expandafter\MT@in@clist
1529 \csname MT@#1\expandafter\endcsname
1530 \csname MT@#2list@#1@ \@tempa\endcsname
1531 \ifMT@inlist@
1532 <debug>\MT@dinfo@list{#2}{#1}{in}%
1533 \MT@dotrue
1534 \else
1535 <debug>\MT@dinfo@list{#2}{#1}{not in}%
1536 \MT@dofalse
1537 \expandafter\MT@clist@break
1538 \fi
1539 }%

```

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

```

1540 <debug> {\MT@dinfo@list{#2}{#1}{}}%
1541 }

```

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

```

1542 \def\MT@checklist@family#1{%
1543 <!debug> \MT@ifdefined@n@T
1544 <debug> \MT@ifdefined@n@TF
1545 {MT@#1list@family@ \@tempa}%
1546 \MT@exp@two@n\MT@in@clist
1547 \MT@family{\csname MT@#1list@family@ \@tempa\endcsname}%
1548 \ifMT@inlist@
1549 <debug>\MT@dinfo@list{#1}{family}{in}%
1550 \MT@dotrue
1551 \else
1552 <debug>\MT@dinfo@list{#1}{family}{not in}%
1553 \MT@dofalse
1554 \ifx\MT@familyalias\empty \else
1555 \MT@exp@two@n\MT@in@clist
1556 \MT@familyalias{\csname MT@#1list@family@ \@tempa\endcsname}%
1557 \ifMT@inlist@
1558 <debug> \MT@dinfo@list{#1}{family alias}{in}%
1559 \MT@dotrue
1560 <debug>\else\MT@dinfo@list{#1}{family alias}{not in}%
1561 \fi
1562 \fi
1563 }%

```



```

1564 \ifMT@do \else
1565 \expandafter\MT@clist@break
1566 \fi
1567 }%
1568 <debug> {\MT@info@list{#1}{family}}}%
1569 }

```

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

```

1570 \def\MT@checklist@size#1{%
1571 <!debug> \MT@ifdefined@n@T
1572 <debug> \MT@ifdefined@n@TF
1573 {\MT@#1list@size@%tempa}%
1574 \MT@exp@cs\MT@in@rlist{MT@#1list@size@%tempa}%
1575 \ifMT@inlist@
1576 <debug>\MT@info@list{#1}{size}{in}%
1577 \MT@dotrue
1578 \else
1579 <debug>\MT@info@list{#1}{size}{not in}%
1580 \MT@dofalse
1581 \expandafter\MT@clist@break
1582 \fi
1583 }%
1584 <debug> {\MT@info@list{#1}{size}}}%
1585 }

```

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

```

1586 \def\MT@checklist@font#1{%
1587 <!debug> \MT@ifdefined@n@T
1588 <debug> \MT@ifdefined@n@TF
1589 {\MT@#1list@font@%tempa}%

```

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

```

1590 \edef\@tempb{\MT@encoding/\MT@family/\MT@series/\MT@shape/\MT@size}%
1591 \expandafter\MT@exp@one@n\expandafter\MT@in@clist\expandafter
1592 \@tempb \csname MT@#1list@font@%tempa\endcsname
1593 \ifMT@inlist@
1594 <debug>\MT@info@list{#1}{font}{in}%
1595 \expandafter\MT@clist@break
1596 \else
1597 <debug>\MT@info@list{#1}{font}{not in}%
1598 \MT@dofalse
1599 \fi
1600 }%
1601 <debug> {\MT@info@list{#1}{font}}}%
1602 }

```

### 1.2.1 Protrusion

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

```

1603 \newif\ifMT@nofamily

```

`\MT@protrusion` Set up for protrusion?

```

1604 \def\MT@protrusion{\MT@maybe@do{pr}}
1605 </package>

```

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

```

1606 <*pdf-|lua-|xe-|show>
1607 <show>\def\MTS@show@pr
1608 <pdf-|lua-|xe-|\def\MT@set@pr@codes
1609 {%

```

```
1610 <pdf-|lua-|xe- > \MT@nofamilyfalse
```

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

```
1611 <show> \MTS@printtext{Protrusion settings for font `texttt{\MT@font}':}\
1612 \MT@if@list@exists{%
1613 <*pdf-|lua-|xe- >
1614 \ifMT@nofamily
1615 \MT@ifdefined@n@TF{\MT@encoding-\MT@family-settings}\relax{%
1616 \MT@info@n{Loading generic protrusion settings for font family\MessageBreak
1617 \MT@family' (encoding: \MT@encoding).\MessageBreak
1618 For optimal results, create family-specific settings.\MessageBreak
1619 See the microtype manual for details}%
1620 \MT@glet@nc{\MT@encoding-\MT@family-settings}\@empty
1621 }%
1622 \fi
1623 </pdf-|lua-|xe- >
1624 <show> \MTS@printtext{First matching list is for `texttt{\@tempa}':\\texttt{\MT@pr@c@name}}%
1625 \MT@get@opt
1626 \MT@reset@pr@codes
```

Get the name of the inheritance list and parse it.

```
1627 \MT@get@inh@list
```

Set an input encoding?

```
1628 \MT@set@inputenc{c}%
```

Load additional lists?

```
1629 \MT@load@list\MT@pr@c@name
1630 \MT@set@listname
```

Load the main list.

```
1631 \MT@let@cn\@tempc{\MT@pr@c@\MT@pr@c@name}%
1632 \expandafter\MT@set@codes\@tempc,\relax,%
1633 <show> \vrule width 4cm height .5pt \
1634 <show> \MTS@printtext{End of list `texttt{\MT@pr@c@name}'}\\[.5em]
1635 <show> \MT@ifdefined@c@T\MT@pr@inh@name{%
1636 <show> \MT@ifdefined@n@T\MT@inh@\MT@pr@inh@name @prefixes}{%
1637 <show> \par \MTS@printtext{(with prefixes:)}%
1638 <show> \@tempcntb=\z@
```

Set unconditional heirs.

```
1639 \MT@set@pr@prefixheirs
1640 <show> }%
1641 <show> \ifShowMissingGlyphs\MTS@show@missing\fi
1642 }%
1643 <show> {\MTS@printtext{NOT DEFINED}%
1644 \MT@reset@pr@codes
1645 <show> }\par
1646 }
```

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

```
1647 <*pdf-|lua-|xe- >
1648 \def\MT@set@all@pr#1#2{%
1649 <debug>\MT@info@n{3}{-- lp/rp: setting all to #1/#2}%
1650 \let\MT@temp\@empty
1651 \MT@i fempty{#1}\relax{\g@addto@macro\MT@temp{\lrcode\MT@font\@tempcnta=#1}}%
1652 \MT@i fempty{#2}\relax{\g@addto@macro\MT@temp{\rprcode\MT@font\@tempcnta=#2}}%
1653 \MT@do@font\MT@temp
1654 }
```

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

```

1655 \def\MT@reset@pr@codes@{\MT@set@all@pr@z@z@}
1656 \let\MT@reset@pr@codes\relax

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

1657 \def\MT@the@pr@code{\@tempcntb}
1658 <pdf-|lua->
1659 <pdf->\MT@requires@pdftex6
1660 <lua->\MT@requires@luatex3
1661 {\def\MT@the@pr@code@tr{%
1662   \numexpr\@tempcntb+\MT@letterspace@/2\relax
1663 }
1664 }\relax
1665 </pdf-|lua->

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

1666 \def\MT@set@codes#1,{%
1667   \ifx\relax#1\@empty\else
1668     \MT@split@codes #1==\relax
1669     \expandafter\MT@set@codes
1670   \fi
1671 }

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

1672 \def\MT@split@codes#1=#2=#3\relax{%
1673   \def\@tempa{#1}%
1674   \ifx\@tempa\@empty \else
1675     \MT@get@slot
1676     <pdf-|lua-> \ifnum\MT@char > \m@ne
1677     <xe-> \ifx\MT@char\@empty \else
1678       \MT@get@char@unit
1679       \csname MT@\MT@feat @split@val\endcsname#2\relax
1680     \fi
1681   \fi
1682 }

\MT@pr@split@val

1683 \def\MT@pr@split@val#1,#2\relax
1684 </pdf-|lua-|xe->
1685 <show>\def\MTS@pr@split@val#1,#2\relax
1686   {\def\@tempb{#1}%
1687   \MT@ifempty\@tempb
1688   <pdf-|lua-|xe-> \relax
1689   <show> {\MTS@lp@=\z@ \let\MTS@lpcode\@empty}%
1690   {\MT@scale@to@em
1691   <pdf-|lua-|xe-> \lpcode\MT@font\MT@char=\MT@the@pr@code
1692   <show> \MTS@lp@=\dimexpr\@tempcntb em/1000\relax\relax
1693   <show> \edef\MTS@lpcode{[\@tempb] \the\@tempcntb/\the\MTS@lp@}%
1694   <debug>\MT@info@n1{4}{;;; lp (\MT@char): \number\lpcode\MT@font\MT@char: [#1]}%
1695   }%
1696   \def\@tempb{#2}%
1697   \MT@ifempty\@tempb
1698   <pdf-|lua-|xe-> \relax
1699   <show> {\MTS@rp@=\z@ \let\MTS@rpcode\@empty}%
1700   {\MT@scale@to@em
1701   <pdf-|lua-|xe-> \rpcode\MT@font\MT@char=\MT@the@pr@code
1702   <show> \MTS@rp@=\dimexpr\@tempcntb em/1000\relax\relax
1703   <show> \edef\MTS@rpcode{[\@tempb] \the\@tempcntb/\the\MTS@rp@}%
1704   <debug>\MT@info@n1{4}{;;; rp (\MT@char): \number\rpcode\MT@font\MT@char: [#2]}%
1705   }%
1706   <show> \llap{\MTS@show@char@pr\MT@char\quad}%
1707   <show> \parbox[b]{}[b]{3.5cm}{\MTS@printtext%
```

```

1708 <show> \footnotesize\makebox[.4cm][l]{L:} \MT@ifempty{\MTS@lpcode}{---}{\MTS@lpcode}\
1709 <show> \makebox[.4cm][r]{R:} \MT@ifempty{\MTS@rprcode}{---}{\MTS@rprcode}}}%
1710 <show> \parbox[t][t]{\dimexpr\textwidth-3.5cm}{%

```

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

```

1711 \MT@ifdefined@c@T\MT@pr@inh@name{%
1712 \MT@ifdefined@n@T\MT@inh@MT@pr@inh@name @\MT@char @}{%
1713 \MT@exp@cs\MT@map@tlist@c
1714 {MT@inh@MT@pr@inh@name @\MT@char @}{%
1715 <pdf-|lua-xe- \MT@set@pr@heirs
1716 <show> \MTS@show@char@pr
1717 }%
1718 }%
1719 <show> }\newline
1720 }
1721 <*pdf-|lua-xe-

```

`\MT@scale@to@em`

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

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

```

1722 <pdf- \MT@requirespdfTeX3{
1723 \def\MT@scale@to@em{%
1724 \@tempcntb=\MT@count\relax

```

For really huge fonts (100 pt or so), an arithmetic overflow could occur with vanilla TeX. Using eTeX, this can’t happen, since the intermediate value is 64 bit, which could only be reached with a character width larger than `\maxdimen`.

```

1725 \MT@scale@tempcntb \@tempb \MT@dimen@six
1726 \ifnum\@tempcntb=z@ \else
1727 \MT@scale@factor
1728 \fi
1729 }

```

`\MT@get@charwd`

Get the width of the character. When using eTeX, we can employ `\fontcharwd` instead of building scratch boxes.

```

1730 \def\MT@get@charwd{%
1731 <*pdf-
1732 ^^X \MT@count=\fontcharwd\MT@font\MT@char\relax
1733 ^^Q \setbox\z@=\hbox{\MT@font \char\MT@char}%
1734 ^^Q \MT@count=\wd\z@
1735 </pdf-
1736 <lua- \MT@count=\fontcharwd\MT@font\MT@char\relax

```

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

```

1737 <*xe-
1738 \ifnum\MT@char@<z@
1739 \setbox\z@=\hbox{\MT@font \XeTeXglyph-\MT@char@}%
1740 \MT@count=\wd\z@
1741 \else
1742 \MT@count=\fontcharwd\MT@font\MT@char@\relax
1743 \fi
1744 </xe-

```

```

1745 \ifnum\MT@count=\z@ \MT@info@missing@char \fi
1746 }

```

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

```

1747 <pdf-
1748 \MT@requires@pdftex6{
1749   \g@addto@macro\MT@get@charwd{%
1750     \MT@ifdefined@cT\MT@letterspace@
1751     {\advance\MT@count-\dimexpr\MT@letterspace@ sp *\dimexpr 1em/1000\relax}%
1752   }
1753 }\relax
1754 }{

```

No adjustment with versions 0.14f and 0.14g.

```

1755 \def\MT@scale@to@em{%
1756   \MT@count=\@tempb\relax
1757   \ifnum\MT@count=\z@ \else
1758     \MT@scale@factor
1759   \fi
1760 }

```

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

```

1761 \def\MT@get@charwd{\MT@count=\MT@dimen@six}
1762 }
1763 </pdf-
1764 </pdf-|lua-|xe-
1765 </pdf-|lua-|xe-|show

```

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

```

1766 <package
1767 \def\MT@get@font@dimen#1{%
1768   \ifnum\fontdimen#1\MT@font=\z@
1769     \MT@warning@n1{Font '\MT@font' does not specify its\MessageBreak
1770       \@backslashchar fontdimen #1 (it's zero)! \MessageBreak
1771       You should use a different 'unit' for \MT@curr@list@name}%
1772   \else
1773     \MT@count=\fontdimen#1\MT@font
1774   \fi
1775 }

```

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

```

1776 \def\MT@info@missing@char{%
1777   \MT@info@n1{Character '\the\MT@toks'
1778   ^^X \ifnum\MT@char@<\z@ is missing\else
1779   ^^X \iffontchar\MT@font\MT@char@
1780     has a width of 0pt
1781   ^^X \else is missing\fi\fi
1782   ^^Q \MessageBreak (it's probably missing)
1783   \MessageBreak in font '\MT@font'. \MessageBreak
1784   Ignoring protrusion settings for this character}%
1785 }

```

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

```

1786 \def\MT@scale@factor{%
1787   \ifnum\csname MT@\MT@feat @factor@\endcsname=\@m \else
1788     \expandafter\MT@scale\expandafter \@tempcntb
1789     \csname MT@\MT@feat @factor@\endcsname \@m
1790   \fi
1791   \ifnum\@tempcntb>\csname MT@\MT@feat @max\endcsname\relax
1792     \MT@exp@cs\MT@warn@code@too@large{MT@\MT@feat @max}%
1793   \else
1794     \ifnum\@tempcntb<\csname MT@\MT@feat @min\endcsname\relax

```

```

1795     \MT@exp@cs\MT@warn@code@too@large{MT@\MT@feat @min}%
1796     \fi
1797     \fi
1798 }

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

1799 \def\MT@warn@code@too@large#1{%
1800     \@tempcnta=#1\relax
1801     \ifnum\csname MT@\MT@feat @factor@\endcsname=\@m \else
1802         \expandafter\MT@scale\expandafter\@tempcnta\expandafter
1803         \@m \csname MT@\MT@feat @factor@\endcsname
1804     \fi
1805     \MT@scale\@tempcnta \MT@dimen@six \MT@count
1806     \MT@warning@n1{The \@nameuse{MT@abbr@\MT@feat} code \@tempb\space
1807         is too large for character\MessageBreak
1808         ``the\MT@toks' in \MT@curr@list@name.\MessageBreak
1809         Setting it to the maximum of \number\@tempcnta}%
1810     \@tempcntb=#1\relax
1811 }

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

1812 \def\MT@get@opt{%
1813     \MT@set@listname

\MT@pr@factor@            Apply a factor?

\MT@sp@factor@            1814 \MT@ifdefined@n@TF{MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @factor}{%
\MT@kn@factor@            1815     \MT@let@nn{MT@\MT@feat @factor@}%
                           1816     {MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @factor}%
                           1817     \MT@vinfo{... : Multiplying \@nameuse{MT@abbr@\MT@feat} codes by
                           1818         \number\csname MT@\MT@feat @factor@\endcsname/1000}%
                           1819     }{%
                           1820     \MT@let@nn{MT@\MT@feat @factor@}{MT@\MT@feat @factor}%
                           1821     }%

\MT@pr@unit@              The unit can only be evaluated here, since it might be font-specific. If it's \@empty,
\MT@sp@unit@              it's relative to character widths, if it's -1, relative to space dimensions.

\MT@kn@unit@            1822 \MT@ifdefined@n@TF{MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @unit}{%
                           1823     \MT@let@nn{MT@\MT@feat @unit@}%
                           1824     {MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @unit}%
                           1825     \MT@exp@cs\ifx{MT@\MT@feat @unit@}\@empty
                           1826         \MT@vinfo{... : Setting \@nameuse{MT@abbr@\MT@feat} codes
                           1827             relative to character widths}%
                           1828     \else
                           1829         \MT@exp@cs\ifx{MT@\MT@feat @unit@}\m@ne
                           1830         \MT@vinfo{... : Setting \@nameuse{MT@abbr@\MT@feat} codes
                           1831             relative to width of space}%
                           1832     \fi
                           1833     \fi
                           1834     }{%
                           1835     \MT@let@nn{MT@\MT@feat @unit@}{MT@\MT@feat @unit}%
                           1836     }%

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

1837     \let\MT@get@char@unit\relax
1838     \let\MT@get@space@unit@gobble
1839     \MT@exp@cs\ifx{MT@\MT@feat @unit@}\@empty
1840     \let\MT@get@char@unit\MT@get@charwd

```

```

1841 \else
1842 \MT@exp@cs\ifx{MT@MT@feat @unit@}\m@ne
1843 \let\MT@get@space@unit\MT@get@font@dimen
1844 \else
1845 \MT@exp@cs\MT@get@unit{MT@MT@feat @unit@}%
1846 \fi
1847 \fi

```

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

```

1848 \MT@ifdefined@n@T{MT@MT@feat @c@\csname MT@MT@feat @c@name\endcsname @preset}{%
1849 \csname MT@preset@MT@feat\endcsname
1850 \MT@let@nc{MT@reset@MT@feat @codes}\relax
1851 }%
1852 }

```

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

```

1853 \def\MT@get@unit#1{%
1854 \expandafter\MT@get@unit@#1 e!\@nil
1855 \ifx\x\@empty\else\let#1\x\fi
1856 \@defaultunits\@tempdima#1 pt\relax\@nnil
1857 \ifdim\@tempdima=\z@
1858 \MT@warning@n1{%
1859 Cannot set \@nameuse{MT@abbr@MT@feat} factors relative to zero\MessageBreak
1860 width. Setting factors of list \@nameuse{MT@MT@feat @c@name}'\MessageBreak
1861 relative to character widths instead}%
1862 \let#1\@empty
1863 \let\MT@get@char@unit\MT@get@charwd
1864 \else
1865 \MT@vinfo{... : Setting \@nameuse{MT@abbr@MT@feat} factors relative
1866 to \the\@tempdima}%
1867 \MT@count=\@tempdima\relax
1868 \fi
1869 }
1870 \def\MT@get@unit@#1e#2#3\@nil{%
1871 \ifx\#3\\\let\x\@empty \else
1872 \if m#2%
1873 \edef\x{#1\fontdimen6\MT@font}%
1874 \else
1875 \if x#2%
1876 \edef\x{#1\fontdimen5\MT@font}%
1877 \fi
1878 \fi
1879 \fi
1880 }

```

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

```

1881 \def\MT@set@inputenc#1{%

```

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

```

1882 \def\MT@cat{#1}%
1883 \edef\@tempa{MT@MT@feat @#1@\csname MT@MT@feat @#1@name\endcsname @inputenc}%
1884 \MT@ifdefined@n@T\@tempa\MT@set@inputenc@
1885 }

```

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

```

1886 \MT@addto@setup{%
1887 \@ifpackageloaded{inputenc}{%
1888 \ifpackageafter{inputenc}{2006/02/22}{%
1889 \def\MT@set@inputenc@{%

```

```

1890      \MT@ifstreq\inputencodingname{\csname\@tempa\endcsname}\relax
1891      \MT@load@inputenc
1892    }%
1893  }%
1894    \let\MT@set@inputenc@MT@load@inputenc
1895  }%
1896  }%
1897    \def\MT@set@inputenc@{%
1898      \MT@warning@n1{Key `inputenc' used in \MT@curr@list@name, but the `inputenc'
1899        \MessageBreak package isn't loaded. Ignoring input encoding}%
1900    }%
1901  }%
1902 }

```

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

```

1903 \def\MT@load@inputenc{%
1904   \MT@cfg@catcodes
1905   <debug>\MT@edinfo@n1{1}{loading input encoding: \@nameuse{\@tempa}}%
1906   \inputencoding{\@nameuse{\@tempa}}%
1907 }

```

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

```

1908 \def\MT@set@pr@heirs#1{%
1909   \lcode\MT@font #1=\lcode\MT@font\MT@char\relax
1910   \rcode\MT@font #1=\rcode\MT@font\MT@char\relax
1911   <debug>\MT@edinfo@n1{2}{-- heir of \MT@char: #1}%
1912   <debug>\MT@edinfo@n1{4}{;;; lp/rp (#1): \number\lcode\MT@font\MT@char/%
1913     <debug> \number\rcode\MT@font\MT@char}%
1914 }

```

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

```

1915 \def\MT@set@pr@prefixheirs{%
1916   \MT@ifdefined@c@T\MT@pr@inh@name{%
1917     \MT@ifdefined@nT\MT@inh@\MT@pr@inh@name @prefixes}{%
1918       \MT@exp@cs\MT@map@tlist@c
1919       {MT@inh@\MT@pr@inh@name @prefixes}%
1920       \MT@set@pr@prefixes
1921     }%
1922   }%
1923 }
1924 </package>

```

`\MT@set@pr@prefixes` Add `charwidth(inheriting char)-charwidth(base char)` to either left or right side or half the amount to both sides. For  $\text{\TeX}$ , we may have to translate to glyph numbers because `\fontcharwd` doesn't have the nice feature of understanding the 'U' or '/' prefixes.

```

\MT@set@pr@prefixes@
1925 <*pdf-|lua-|xe-|show>
1926 <pdf-|lua-|xe->\def\MT@set@pr@prefixes#1{\MT@set@pr@prefixes@#1}
1927 <pdf-|lua-|xe->\def\MT@set@pr@prefixes@#1#2#3#4%
1928 <show>\def\MTS@set@pr@prefixes@#1#2#3#4%
1929   {%
1930   <show> \MTS@lp@=\z@ \MTS@rp@=\z@
1931   <show> \ifnum#1=\@tempcntb \else
1932   <show> \par\leavevmode
1933   <show> \llap{\MTS@show@char@pr{#1} \MTS@printtext{=} }%
1934   <show> \fi
1935   <*xe->
1936   \edef\@tempa{\expandafter\ifx\@car#1\@nil U@gobble#1\else\number\XeTeXglyphindex"#1" \fi}%
1937   \edef\@tempb{\expandafter\ifx\@car#2\@nil U@gobble#2\else\number\XeTeXglyphindex"#2" \fi}%
1938   </xe->
1939   \@tempcnta=\z@
1940   \ifnum#3>\z@
1941     \@tempcnta=\numexpr

```



```

1942 <pdf-|lua-|show>      (\fontcharwd\MT@font#2-\fontcharwd\MT@font#1)%
1943 <xe->                  (\fontcharwd\MT@font\@tempb-\fontcharwd\MT@font\@tempa)%
1944      *#3/\MT@dimen@six\relax
1945      \fi
1946 <pdf-|lua-|xe->        \lcode\MT@font #2=\numexpr\lcode\MT@font#1+\@tempcnta\relax
1947 <show> \MTS@lp@=\dimexpr\numexpr\lcode\MT@font#1+\@tempcnta\relax em/1000\relax
1948      \@tempcnta=\z@
1949      \ifnum#4>\z@
1950      \@tempcnta=\numexpr
1951 <pdf-|lua-|show>      (\fontcharwd\MT@font#2-\fontcharwd\MT@font#1)%
1952 <xe->                  (\fontcharwd\MT@font\@tempb-\fontcharwd\MT@font\@tempa)%
1953      *#4/\MT@dimen@six\relax
1954      \fi
1955 <pdf-|lua-|xe->        \rcode\MT@font #2=\numexpr\rcode\MT@font#1+\@tempcnta\relax
1956 <show> \MTS@rp@=\dimexpr\numexpr\rcode\MT@font#1+\@tempcnta\relax em/1000\relax
1957 <debug>\MT@edinfo@n1{2}{-- (prefix) heir of #1: #2}%
1958 <debug>\MT@edinfo@n1{4}{;;; lp/rp (#2): \number\lcode\MT@font#2/%
1959 <debug> \number\rcode\MT@font#2}%
1960 <show> \MTS@show@char@pr{#2}%
1961 <show> \@tempcntb=#1\relax
1962 }
1963 </pdf-|lua-|xe-|show>

```

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

```

\MT@preset@pr@ 1964 <*package>
1965 \def\MT@preset@pr{%
1966   \expandafter\expandafter\expandafter\MT@preset@pr@
1967   \csname MT@pr@c@\MT@pr@c@name @preset\endcsname\@nil
1968 }
1969 \def\MT@preset@pr@#1,#2\@nil{%
1970   \ifx\MT@pr@unit@\empty
1971     \MT@warn@preset@tewidth{pr}%
1972     \let\MT@preset@aux\MT@preset@aux@factor
1973   \else
1974     \def\MT@preset@aux{\MT@preset@aux@space2}%
1975   \fi
1976   \MT@ifempty{#1}{\let\@tempa\@empty}{\MT@preset@aux{#1}\@tempa}%
1977   \MT@ifempty{#2}{\let\@tempb\@empty}{\MT@preset@aux{#2}\@tempb}%
1978   \MT@set@all@pr\@tempa\@tempb
1979 }

```

`\MT@preset@aux` Auxiliary macro for presetting. Store value `(#1)` in macro `(#2)`.

```

\MT@preset@aux@factor 1980 \def\MT@preset@aux@factor#1#2{%
\MT@preset@aux@space 1981   \@tempcntb=#1\relax
1982   \MT@scale@factor
1983   \edef#2{\number\@tempcntb}%
1984 }
1985 \def\MT@preset@aux@space#1#2#3{%
1986   \def\@tempb{#2}%
1987   \MT@get@space@unit#1%
1988   \MT@scale@to@em
1989   \edef#3{\number\@tempcntb}%
1990 }

```

`\MT@warn@preset@tewidth`

```

1991 \def\MT@warn@preset@tewidth#1{%
1992   \MT@warning@n1{%
1993     Cannot preset characters relative to their widths\MessageBreak
1994     for \@nameuse{MT@abbr@#1} list \@nameuse{MT@#1@c@name}'.
1995     Presetting them\MessageBreak relative to lem instead}%
1996 }

```

`\noprotusion` This command may be used to inhibit protrusion on either side. It's part of L<sup>A</sup>T<sub>E</sub>X since 2018-12-01. We provide it for older releases.

```

1997 \MT@ifdefined@c@TF\noprotusion\relax{

```

```

1998 \DeclareRobustCommand\noprotrusion{\leavevmode\kern-\p@\kern\p@}
1999 }

\noprotrusionifhmode    Same, but only if we're already in hmode.

2000 \DeclareRobustCommand\noprotrusionifhmode{\relax\ifhmode\kern-\p@\kern\p@\fi}

\leftprotrusion        This command may be used to add protrusion on the left hand side. We try to
                        reconstruct the next glyph (possibly a ligature).3

2001 \DeclareRobustCommand\leftprotrusion{%
2002   \MT@toks{}\%
2003   \MT@prot@get@firstchar
2004 }

\MT@prot@l            This probably doesn't need to be \long any longer.

2005 \def\MT@prot@l#1{%
2006   \MT@get@prot{#1}{left}%
2007   #1%
2008 }

\rightprotrusion       Unfortunately, there's no way to retrieve anything that's already been typeset, so
\MT@prot@r             the counterpart cannot be defined symmetrically.

2009 \DeclareRobustCommand\rightprotrusion{\MT@prot@r}
2010 \def\MT@prot@r#1{%
2011   {#1}%
2012   \MT@get@prot{#1}{right}%
2013 }

\MT@get@prot          Typeset the text inside a box and get the left and right margin kerns. We add an
                        extra \vbox in case we're inside a tabular. \@newlistfalse is meant to make \
work in centering etc. We set various penalties to zero to allow linebreaking, and
                        don't bother if the split box is overfull (but shouldn't we? – after all, that's how
the penalties bug was discovered ...). (We no longer reset counters etc., since we
                        don't typeset groups anymore.)

\MT@prot@hook          Furthermore, we have a hook for compatibility fixes (not used at the moment),
\MT@csq@eqgroup        and a command for csquotes's grouping (because we actually typeset the quote
                        character, instead of disabling quotes altogether (as we suggested for [issue #1],
                        which was wrong)).

\MT@noindent          Finally, LATEX's new paragraph hooks require special attention, as they're (cur-
                        rently?) unable to distinguish between real typesetting and trial runs. In our
case, fortunately, we really don't want to trigger the hooks. Also, we don't need a
\RawParEnd at the end (as suggested in ltpara), I think, as none of our commands
                        are \long anymore.

2014 \let\MT@prot@hook\empty
2015 \let\MT@csq@eqgroup\relax
2016 \ifx\RawNoindent\undefined
2017   \let\MT@noindent\noindent
2018 \else
2019   \let\MT@noindent\RawNoindent
2020 \fi
2021 \def\MT@get@prot#1#2{%
2022   \begingroup
2023     \setbox\MT@tempbox\vbox{%
2024       \everypar{}\%
2025       \parfillskip=\z@skip
2026       \hbadness\@M

```

3 Lua<sub>T</sub><sub>E</sub>X offers the command `\protrusionboundary`, which could potentially be very helpful here, but it doesn't seem to do what it promises (not even the example from the manual works as advertised). Maybe *Marcel Krüger*'s attempt at a `betterprotrusionboundary` (<https://tex.stackexchange.com/a/629080>) could be an option.

```

2027 \clubpenalty\z@
2028 \widowpenalty\z@
2029 \interlinepenalty\z@
2030 \@newlistfalse
2031 \MT@prot@hook
2032 \MT@noindent #1\MT@csq@eqgroup}%
2033 \vbadness=\@M
2034 \splittopskip=\z@
2035 \vfuzz=\maxdimen
2036 \setbox\MT@tempbox\vbox{%
2037 \ifvbox\MT@tempbox
2038 \global\setbox\MT@tempbox=\vsplit\MT@tempbox to \normalbaselineskip
2039 \unvbox\MT@tempbox
2040 \global\setbox\MT@tempbox=\lastbox
2041 \fi
2042 }%
2043 \endgroup
2044 \leavevmode
2045 \ifhbox\MT@tempbox
2046 \@tempdima=\@nameuse{#2margin kern}\MT@tempbox\relax
2047 \expandafter\ifdim\@tempdima=\z@ \else
2048 \MT@vinfo{|<< adding #2 margin kern for `#1':\MessageBreak
2049 \the\@tempdima \on@line}%
2050 \kern\@tempdima
2051 \fi
2052 \fi
2053 }

```

\MT@prot@ifx Test next token.

```

2054 \def\MT@prot@ifx#1{%
2055 \ifx\MT@prot@next#1\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
2056 }

```

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

```

2057 \def\MT@prot@ifcat#1{%
2058 \ifcat#1\noexpand\MT@prot@next\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
2059 }

```

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

```

\MT@prot@ifmacro@
\MT@prot@ifmacro@@
\MT@prot@ifmacro@@@
2060 ^^X\def\MT@prot@ifmacro{%
2061 ^^X \expandafter\MT@prot@ifmacro@\meaning\MT@prot@next\@nil
2062 ^^X}
2063 ^^X\edef\MT@prot@ifmacro@#1\@nil{%
2064 ^^X \noexpand\MT@prot@ifmacro@@#1{}\detokenize{macro:->}\noexpand\@nil
2065 ^^X}
2066 ^^X\edef\MT@temp{%
2067 ^^X \def\noexpand\MT@prot@ifmacro@@#1\detokenize{macro:->}##2\noexpand\@nil{%
2068 ^^X \noexpand\ifx\relax##1\relax
2069 ^^X \unexpanded{\expandafter\@firstofone\else\expandafter\@gobble\fi}%
2070 ^^X }%
2071 ^^X}
2072 ^^X\MT@temp
2073 ^^Q\let\MT@prot@ifmacro\@gobble

```

\MT@prot@iffirstcmd Test whether the first token in \MT@prot@next (once expanded) is the command *<#1>*. Since \MT@prot@next may also be user-defined (or whatever), we have to use our own, \long version of \@car.

```

2074 \def\MT@prot@iffirstcmd#1{%
2075 \ifx\relax#1\expandafter\@secondoftwo\else
2076 \MT@exp@two@car\ifx\MT@car\MT@prot@next\relax\@nil#1%
2077 \expandafter\expandafter\expandafter\@firstoftwo
2078 \else
2079 \expandafter\expandafter\expandafter\@secondoftwo

```

```

2080     \fi
2081     \fi
2082 }

\MT@car      A long car.
2083 \long\def\MT@car#1#2\@nil{#1}

\MT@prot@iflicrcmd      Fun with LICR: Test if the first command of the third command of the first command
                        is \@text@composite, in which case also grab the next token, otherwise it should
                        be a text command.
2084 \def\MT@getthird#1#2#3#4\@nil{#3}
2085 \def\MT@prot@iflicrcmd#1{%
2086     \MT@exp@cs\MT@prot@iffirstcmd{#1-cmd}{%
2087         \expandafter\expandafter\expandafter\let
2088             \expandafter\expandafter\expandafter\@tempa
2089             \expandafter\MT@getthird\MT@prot@next\relax\@nil
2090         \MT@exp@two@c\ifx\@car\@tempa\relax\@nil\@text@composite
2091         \def\MT@temp*##1##2{\MT@prot@l{##1##2}}%
2092     }else
2093         \def\MT@temp*##1{\MT@prot@l{##1}}%
2094     \fi
2095     \@gobble
2096 } \@firstofone
2097 }

\MT@prot@group      If we have a group, we inject \MT@prot@get@firstchar at the beginning again and
                    don't bother about the rest. This still allows, e.g., \verb, verbatim or lstlistings
                    material. The downside of being this cautious is that we'll miss lots of cases.
2098 \def\MT@prot@group{\bgroup\afterassignment\MT@prot@get@firstchar\let\MT@temp= }

\MT@prot@get@firstchar      Scan token by token.
\MT@prot@get@nextchar
2099 \def\MT@prot@get@firstchar{\futurelet\MT@prot@next\MT@prot@get@firstchar}
2100 \def\MT@prot@get@nextchar{\futurelet\MT@prot@next\MT@prot@get@nextchar}

\MT@prot@get@first@char      If next char is {, treat what follows as an argument, else continue until we find a
                        beginning char.
2101 \def\MT@prot@get@first@char{%
2102     \MT@prot@ifcat\bgroup{%
2103         \def\MT@temp*{\MT@prot@group}%
2104     }{%
2105         \MT@prot@ifx\ignorespaces{%
2106             \def\MT@temp*##1{\MT@prot@get@firstchar}%
2107         }{%
2108             \MT@prot@ifx\relax{%
2109                 \def\MT@temp*##1{\MT@prot@get@firstchar}%
2110             }{%
2111                 \MT@prot@ifx\sptoken{%
2112                     \def\MT@temp* {\MT@prot@get@firstchar}%
2113                 }{%
2114                     \MT@prot@ifcat{a}{%
2115                         \def\MT@temp*{\MT@prot@addtoken@first}%
2116                     }{%
2117                         \MT@prot@ifcat{!}{%
2118                             \def\MT@temp*{\MT@prot@addtoken@first}%
2119                         }{%
2120                             \def\MT@temp*{}%
2121                             \MT@prot@ifmacro{%
2122                                 \MT@prot@iffirstcmd\UTFviii@two@octets{%
2123                                     \def\MT@temp*##1##2{\MT@prot@l{##1##2}}%

```

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

```

2124         }{%
2125         \MT@prot@iffirstcmd\UTFviii@three@octets{%
2126         \def\MT@temp*##1##2##3{\MT@prot@1{##1##2##3}}%
2127         }{%
2128         \MT@prot@iffirstcmd\UTFviii@four@octets{%
2129         \def\MT@temp*##1##2##3##4{\MT@prot@1{##1##2##3##4}}%
2130         }{%

```

(this is for csquotes)

```

2131         \MT@prot@iffirstcmd\csqqQ{\def\MT@temp*##1{\MT@prot@1{##1}}}%
2132         \MT@prot@iflicrcmd{T1}{%
2133         \MT@prot@iflicrcmd{TU}{%
2134         \MT@prot@iflicrcmd{LY1}{%
2135         \MT@prot@iflicrcmd{OT1}{%
2136         \MT@prot@iflicrcmd{T2A}\relax % should we add more encodings?
2137         }%
2138         }%
2139         }%
2140         }%
2141         }%
2142         }%
2143         }%
2144         }%
2145         }%
2146         }%
2147         }%
2148         }%
2149         }%
2150         }%
2151         }%
2152         \MT@temp*%
2153     }

```

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

```

2154 \def\MT@prot@get@next@char{%
2155 \def\MT@temp*{\MT@prot@addtoken@next}%
2156 \MT@prot@ifcat{a}\relax{%
2157 \MT@prot@ifcat{!}\relax{%
2158 \def\MT@temp*{\MT@prot@1{\the\MT@toks}}%
2159 }%
2160 }%
2161 \MT@temp*%
2162 }

```

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

```

2163 \def\MT@prot@addtoken@first#1{%
2164 \edef\MT@temp{\MT@toks={\the\MT@toks\noexpand#1}}\MT@temp
2165 \MT@prot@get@nextchar
2166 }
2167 \<pdf-|lua-|xe-

```

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

```

2168 \<pdf-|lua-|xe-
2169 \def\MT@prot@addtoken@next#1{%
2170 \edef\MT@temp{\MT@toks={\the\MT@toks\noexpand#1}}\MT@temp
2171 \setbox\MT@tempbox\hbox{\the\MT@toks
2172 \<pdf-|xe- \relax
2173 \lua- } \setbox\MT@tempbox\hbox{\unhbox\MT@tempbox
2174 \ifnum\lastnodetype=7 \aftergroup\@firstoftwo\else\aftergroup\@secondoftwo\fi}%
2175 \MT@prot@get@nextchar
2176 {\MT@prot@1{\the\MT@toks}}%
2177 }

```

2178 `</pdf-|lua-|xe->`

### 1.2.2 Expansion

`\MT@expansion` Set up for expansion?

2179 `<*pdf-|lua->`

2180 `\def\MT@expansion{\MT@maybe@do{ex}}`

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

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

```
2181 \def\MT@set@ex@codes@{%
2182   \MT@if@list@exists{%
2183     \MT@get@ex@opt
2184     \let\MT@get@char@unit\relax
2185     \MT@reset@ef@codes
2186     \MT@get@inh@list
2187     \MT@set@inputenc{c}%
2188     \MT@load@list\MT@ex@cc@name
2189     \MT@set@listname
2190     \MT@let@cn\@tempc\MT@ex@cc\MT@ex@cc@name}%
2191     \expandafter\MT@set@codes\@tempc,\relax,%
2192     \MT@expandfont
2193   }\relax
2194 }
2195 </pdf-|lua->
```

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

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

```
2196 <package>\newif\ifMT@nonselected
2197 <*pdf-|lua->
2198 \def\MT@set@ex@codes@n{%
2199   \MT@nonselectedtrue
2200   \MT@if@list@exists
2201     \MT@get@ex@opt
2202   {%
2203     \let\MT@stretch@ \MT@stretch
2204     \let\MT@shrink@ \MT@shrink
2205     \let\MT@step@ \MT@step
2206     \let\MT@auto@ \MT@auto
2207     \let\MT@ex@factor@ \MT@ex@factor
2208   }%
2209   \MT@reset@ef@codes
2210   \MT@expandfont
2211   \MT@nonselectedfalse
2212 }
```

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

2213 `\let\MT@set@ex@codes\MT@set@ex@codes@n`

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

2214 `<*lua->`

2215 `\MT@requires@luatex3{`

2216 `\MT@requires@luatex4{\let\pdffontexpand\expandglyphsinfont}\relax`

```

2217 \ifnum\luatexversion<79
2218 \def\MT@expandfont{%
2219   \pdffontexpand\MT@font \MT@stretch@ \MT@shrink@ \MT@step@ autoexpand\relax
2220 }
2221 \else
2222 \def\MT@expandfont{%
2223   \pdffontexpand\MT@font \MT@stretch@ \MT@shrink@ \MT@step@\relax
2224 }
2225 \fi
2226 }{
2227 /lua-
2228 \def\MT@expandfont{%
2229   \pdffontexpand\MT@font \MT@stretch@ \MT@shrink@ \MT@step@ \MT@auto@\relax
2230 }
2231 /lua-}

```

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

```

2232 \def\MT@set@all@ex#1{%
2233 <debug>\MT@info{n1}{3}{-- ex: setting all to \number#1}%
2234   \MT@do@font{\efcode\MT@font\@tempcnta=#1\relax}%
2235 }
2236 \def\MT@reset@ef@codes@{\MT@set@all@ex\MT@ex@factor@}

```

`\MT@reset@ef@codes`      However, this is only necessary for pdf<sub>T</sub>E<sub>X</sub> versions prior to 1.20, or Lua<sub>T</sub>E<sub>X</sub> < 0.90  
 (actually, I think, 0.87).

```

2237 <pdf->\MT@requires@pdftex4
2238 <lua->\MT@requires@luatex5
2239 {
2240   \def\MT@reset@ef@codes{%
2241     \ifnum\MT@ex@factor@=\@m \else
2242       \MT@reset@ef@codes@
2243     \fi
2244   }
2245 }{
2246   \let\MT@reset@ef@codes\MT@reset@ef@codes@
2247 }

```

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

```

2248 \def\MT@ex@split@val#1\relax{%
2249   \@tempcntb=#1\relax

```

Take an optional factor into account.

```

2250   \ifnum\MT@ex@factor@=\@m \else
2251     \MT@scale\@tempcntb \MT@ex@factor@ \@m
2252   \fi
2253   \ifnum\@tempcntb > \MT@ex@max
2254     \MT@warn@ex@too@large\MT@ex@max
2255   \else
2256     \ifnum\@tempcntb < \MT@ex@min
2257       \MT@warn@ex@too@large\MT@ex@min
2258     \fi
2259   \fi
2260   \efcode\MT@font\MT@char=\@tempcntb
2261 <debug>\MT@info{n1}{4}{::: ef (\MT@char): \number\efcode\MT@font\MT@char: [#1]}%

```

Heirs, heirs, I love thy heirs.

```

2262 \MT@ifdefined@c@T\MT@ex@inh@name{%
2263   \MT@ifdefined@nT{MT@inh@MT@ex@inh@name @\MT@char @}{%
2264     \MT@exp@cs\MT@map@tlist@c{MT@inh@MT@ex@inh@name @\MT@char @}\MT@set@ex@heirs
2265   }%
2266 }%
2267 }

```

```

\MT@warn@ex@too@large
2268 \def\MT@warn@ex@too@large#1{%
2269   \MT@warning@n1{Expansion factor \number\@tempcntb\space too large for
2270     character\MessageBreak ``the\MT@toks' in \MT@curr@list@name.\MessageBreak
2271     Setting it to the maximum of \number#1}%
2272   \@tempcntb=#1\relax
2273 }

\MT@get@ex@opt    Apply different values to this font?
\MT@ex@factor@ 2274 \def\MT@get@ex@opt{%
\MT@stretch@ 2275   \MT@set@listname
2276   \MT@ifdefined@n@TF{MT@ex@cc@MT@ex@cc@name @factor}{%
\MT@shrink@ 2277     \MT@let@cn\MT@ex@factor@{MT@ex@cc@MT@ex@cc@name @factor}%
\MT@step@ 2278     \MT@vinfo{... : Multiplying expansion factors by \number\MT@ex@factor@/1000}%
\MT@auto@ 2279   }{%
2280     \let\MT@ex@factor@\MT@ex@factor
2281   }%
2282   \MT@get@ex@opt@{stretch}{Setting stretch limit to \number\MT@stretch@}%
2283   \MT@get@ex@opt@{shrink} {Setting shrink limit to \number\MT@shrink@}%
2284   \MT@get@ex@opt@{step} {Setting expansion step to \number\MT@step@}%
2285   \lua- \MT@requires@luatex3\relax{%
2286     \MT@get@ex@opt@{auto}{\MT@ifstreq{\MT@auto@}{autoexpand}{En}{Dis}abling automatic expansion}%
2287     \lua- }%
2288     \MT@ifdefined@n@T{MT@ex@cc@MT@ex@cc@name @preset}{%
2289       \MT@preset@ex
2290       \let\MT@reset@ef@codes\relax
2291     }%
2292 }

\MT@get@ex@opt@
2293 \def\MT@get@ex@opt@#1#2{%
2294   \MT@ifdefined@n@TF{MT@ex@cc@MT@ex@cc@name @#1}{%
2295     \MT@let@nn{MT@#1@}{MT@ex@cc@MT@ex@cc@name @#1}%
2296     \MT@vinfo{... : #2}%
2297   }{%
2298     \MT@let@nn{MT@#1@}{MT@#1}%
2299   }%
2300 }

\MT@set@ex@heirs
2301 \def\MT@set@ex@heirs#1{%
2302   \efcode\MT@font#1=\efcode\MT@font\MT@char
2303   \debug\MT@dinfnl{2}{-- heir of \MT@char: #1}%
2304   \debug\MT@dinfnl{4}{::: ef (#1) \number\efcode\MT@font\MT@char}%
2305 }

\MT@preset@ex
2306 \def\MT@preset@ex{%
2307   \@tempcntb=\csname MT@ex@cc@MT@ex@cc@name @preset\endcsname\relax
2308   \MT@scale@factor
2309   \MT@set@all@ex@\@tempcntb
2310 }
2311 \pdf-|lua-

```

### 1.2.3 Interword spacing (glue)

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

```

2312 \pdf-
2313 \MT@requires@pdftex6{
2314 \def\MT@spacing{\MT@maybe@do{sp}}

```

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

```

2315 \def\MT@set@sp@codes{%

```



```

2316 \MT@if@list@exists{%
2317 \MT@get@opt
2318 \MT@reset@sp@codes
2319 \MT@get@inh@list
2320 \MT@set@inputenc{c}%
2321 \MT@load@list\MT@sp@c@name
2322 \MT@set@listname
2323 \MT@let@cn\@tempc\MT@sp@c@\MT@sp@c@name}%
2324 \expandafter\MT@set@codes\@tempc,\relax,%
2325 }\MT@reset@sp@codes
2326 }

```

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

```

2327 \def\MT@sp@split@val#1,#2,#3\relax{%
2328 \def\@tempb{#1}%
2329 \MT@ifempty\@tempb\relax{%
2330 \MT@get@space@unit2%
2331 \MT@scale@to@em
2332 \knbscode\MT@font\MT@char=\@tempcntb
2333 <debug>\MT@info@nl{4}{;;; knbs (\MT@char): \number\knbscode\MT@font\MT@char: [#1]}%
2334 }%
2335 \def\@tempb{#2}%
2336 \MT@ifempty\@tempb\relax{%
2337 \MT@get@space@unit3%
2338 \MT@scale@to@em
2339 \stbscode\MT@font\MT@char=\@tempcntb
2340 <debug>\MT@info@nl{4}{;;; stbs (\MT@char): \number\stbscode\MT@font\MT@char: [#2]}%
2341 }%
2342 \def\@tempb{#3}%
2343 \MT@ifempty\@tempb\relax{%
2344 \MT@get@space@unit4%
2345 \MT@scale@to@em
2346 \shbscode\MT@font\MT@char=\@tempcntb
2347 <debug>\MT@info@nl{4}{;;; shbs (\MT@char): \number\shbscode\MT@font\MT@char: [#3]}%
2348 }%
2349 \MT@ifdefined@c@T\MT@sp@inh@name{%
2350 \MT@ifdefined@nT\MT@inh@\MT@sp@inh@name @\MT@char @}%
2351 \MT@exp@cs\MT@map@tlist@c\MT@inh@\MT@sp@inh@name @\MT@char @\MT@set@sp@heirs
2352 }%
2353 }%
2354 }

```

\MT@set@sp@heirs

```

2355 \def\MT@set@sp@heirs#1{%
2356 \knbscode\MT@font#1=\knbscode\MT@font\MT@char
2357 \stbscode\MT@font#1=\stbscode\MT@font\MT@char
2358 \shbscode\MT@font#1=\shbscode\MT@font\MT@char
2359 <debug>\MT@info@nl{2}{-- heir of \MT@char: #1}%
2360 <debug>\MT@info@nl{4}{;;; knbs/stbs/shbs (#1): \number\knbscode\MT@font\MT@char/%
2361 <debug> \number\stbscode\MT@font\MT@char/\number\shbscode\MT@font\MT@char}%
2362 }

```

\MT@set@all@sp

```

\MT@reset@sp@codes 2363 \def\MT@set@all@sp#1#2#3{%
\MT@reset@sp@codes@ 2364 <debug>\MT@info@nl{3}{-- knbs/stbs/shbs: setting all to #1/#2/#3}%
2365 \let\MT@temp\empty
2366 \MT@ifempty{#1}\relax{\g@addto@macro\MT@temp{\knbscode\MT@font\@tempcnta=#1\relax}}%
2367 \MT@ifempty{#2}\relax{\g@addto@macro\MT@temp{\stbscode\MT@font\@tempcnta=#2\relax}}%
2368 \MT@ifempty{#3}\relax{\g@addto@macro\MT@temp{\shbscode\MT@font\@tempcnta=#3\relax}}%
2369 \MT@do@font\MT@temp
2370 }
2371 \def\MT@reset@sp@codes@{\MT@set@all@sp\z@\z@\z@}
2372 \let\MT@reset@sp@codes\relax

```

```

\MT@preset@sp
\MT@preset@sp@ 2373 \def\MT@preset@sp{%
2374   \expandafter\expandafter\expandafter\MT@preset@sp@
2375   \csname MT@sp@ec@MT@sp@ec@name @preset\endcsname\@nil
2376 }
2377 \def\MT@preset@sp@#1,#2,#3\@nil{%
2378   \ifx\MT@sp@unit@empty
2379     \MT@warn@preset@towidth{sp}%
2380     \MT@ifempty{#1}{\let\@tempa@empty}{\MT@preset@aux@factor{#1}\@tempa}%
2381     \MT@ifempty{#2}{\let\@tempc@empty}{\MT@preset@aux@factor{#2}\@tempc}%
2382     \MT@ifempty{#3}{\let\@tempb@empty}{\MT@preset@aux@factor{#3}\@tempb}%
2383   \else
2384     \MT@ifempty{#1}{\let\@tempa@empty}{\MT@preset@aux@space2{#1}\@tempa}%
2385     \MT@ifempty{#2}{\let\@tempc@empty}{\MT@preset@aux@space3{#2}\@tempc}%
2386     \MT@ifempty{#3}{\let\@tempb@empty}{\MT@preset@aux@space4{#3}\@tempb}%
2387   \fi
2388   \MT@set@all@sp@tempa@tempc@tempb
2389 }
2390 }\relax

```

### 1.2.4 Additional kerning

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

```

2391 \MT@requires@pdftex6{
2392 \def\MT@kerning{\MT@maybe@do{kn}}

```

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

```

2393 \def\MT@set@kn@codes{%
2394   \MT@if@list@exists{%
2395     \MT@get@opt
2396     \MT@reset@kn@codes
2397     \MT@get@inh@list
2398     \MT@set@inputenc{c}%
2399     \MT@load@list\MT@kn@cc@name
2400     \MT@set@listname
2401     \MT@let@cn\@tempc{MT@kn@cc@MT@kn@cc@name}%
2402     \expandafter\MT@set@codes\@tempc,\relax,%
2403   }\MT@reset@kn@codes
2404 }

```

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

```

2405 \def\MT@kn@split@val#1,#2\relax{%
2406   \def\@tempb{#1}%
2407   \MT@ifempty\@tempb\relax{%
2408     \MT@get@space@unit2%
2409     \MT@scale@to@em
2410     \knbcode\MT@font\MT@char=\@tempcntb
2411   <debug>\MT@info@n1{4}{;;; knbc (\MT@char): \number\knbcode\MT@font\MT@char: [#1]}%
2412   }%
2413   \def\@tempb{#2}%
2414   \MT@ifempty\@tempb\relax{%
2415     \MT@get@space@unit2%
2416     \MT@scale@to@em
2417     \knaccode\MT@font\MT@char=\@tempcntb
2418   <debug>\MT@info@n1{4}{;;; knac (\MT@char): \number\knaccode\MT@font\MT@char: [#2]}%
2419   }%
2420   \MT@ifdefined@c@T\MT@kn@inh@name{%
2421     \MT@ifdefined@n@T{MT@inh@MT@kn@inh@name @\MT@char @}{%
2422       \MT@exp@cs\MT@map@tlist@c{MT@inh@MT@kn@inh@name @\MT@char @}\MT@set@kn@heirs
2423     }%
2424   }%
2425 }

```

```

\MT@set@kn@heirs
2426 \def\MT@set@kn@heirs#1{%
2427   \knbccode\MT@font#1=\knbccode\MT@font\MT@char
2428   \knaccode\MT@font#1=\knaccode\MT@font\MT@char
2429   (debug)\MT@info@n1{2}{-- heir of \MT@char: #1}%
2430   (debug)\MT@info@n1{4}{;;; knbc (#1): \number\knbccode\MT@font\MT@char/%
2431   (debug)                                \number\knaccode\MT@font\MT@char}%
2432 }

\MT@set@all@kn
\MT@reset@kn@codes 2433 \def\MT@set@all@kn#1#2{%
\MT@reset@kn@codes@ 2434 (debug)\MT@info@n1{3}{-- knac/knbc: setting all to #1/#2}%
2435   \let\MT@temp\@empty
2436   \MT@ifempty{#1}\relax{\g@addto@macro\MT@temp{\knbccode\MT@font\@tempcnta=#1\relax}}%
2437   \MT@ifempty{#2}\relax{\g@addto@macro\MT@temp{\knaccode\MT@font\@tempcnta=#2\relax}}%
2438   \MT@do@font\MT@temp
2439 }
2440 \def\MT@reset@kn@codes@{\MT@set@all@kn\z\z@}
2441 \let\MT@reset@kn@codes\relax

\MT@preset@kn
\MT@preset@kn@ 2442 \def\MT@preset@kn{%
2443   \expandafter\expandafter\expandafter\MT@preset@kn@
2444   \csname MT@kn@c@\MT@kn@c@name @preset\endcsname\@nil
2445 }
2446 \def\MT@preset@kn@#1,#2\@nil{%
2447   \ifx\MT@kn@unit@\@empty
2448     \MT@warn@preset@tewidth{kn}%
2449     \let\MT@preset@aux\MT@preset@aux@factor
2450   \else
2451     \def\MT@preset@aux{\MT@preset@aux@space2}%
2452   \fi
2453   \MT@ifempty{#1}{\let\@tempa\@empty}{\MT@preset@aux{#1}\@tempa}%
2454   \MT@ifempty{#2}{\let\@tempb\@empty}{\MT@preset@aux{#2}\@tempb}%
2455   \MT@set@all@kn\@tempa\@tempb
2456 }
2457 }\relax
2458 (pdf-)

```

### 1.2.5 Tracking

This only works with pdfTeX 1.40 or LuaTeX 0.62.

```

2459 (*pdf-|lua-)
2460 (pdf-)\MT@requires@pdftex6
2461 (lua-)\MT@requires@luatex3
2462 {

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

\MT@tr@font@list 2463 \let\MT@tr@font@list\@empty
2464 \def\MT@tracking@{%
2465   \MT@exp@one@n\MT@in@clist\MT@font\MT@tr@font@list
2466   \ifMT@inlist@\else
2467     \MT@maybe@do@tr{%
2468       \ifMT@do@\else
2469         \xdef\MT@tr@font@list{\MT@tr@font@list\MT@font,}%
2470       \fi
2471     \fi
2472 }
2473 (/pdf-|lua-)
2474 (pdf-|lua-|letterspace)\let\MT@tracking
2475 (pdf-|lua-) \MT@tracking@
2476 (letterspace) \relax

```

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

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

```

2477 <pdf-|lua-|letterspace>
2478 \def\MT@set@tr@codes{%
2479 <pdf-|lua-|
2480 \MT@vinfo{Tracking font '\MT@font'\on@line}%
2481 <pdf-|
2482 \MT@requires@pdftex8\@firstofone{%
2483 \MT@ifdefined@nTF{\MT@font-fake6}{%
2484 \expandafter\ifx\csname\MT@font-fake6\endcsname\empty
2485 \MT@warning@n1{%
2486 Font '\MT@font' does not specify its\MessageBreak
2487 \@backslashchar fontdimen 6 (width of an `em')! Therefore,\MessageBreak
2488 tracking will not work with this font}%
2489 \MT@gl@et@nc{\MT@font-fake6}\relax
2490 \fi
2491 }%
2492 }%
2493 </pdf-|
2494 \MT@if@list@exists
2495 \MT@get@tr@opt
2496 \relax
2497 </pdf-|lua-|
2498 \MT@ifdefined@cTF\MT@letterspace@\relax{\let\MT@letterspace@\MT@letterspace}%
2499 \ifnum\MT@letterspace@=z@

```

Zero tracking requires special treatment.

```

2500 \MT@set@tr@zero
2501 \else
2502 <pdf-|lua-| \MT@vinfo{... Tracking by \number\MT@letterspace@}%

```

Letterspacing only works in PDF mode.

```

2503 \MT@warn@tracking@DVI

```

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

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

```

2504 \xdef\MT@lsfont{\csname\expandafter\string\font@name
2505 \number\MT@letterspace@ ls\endcsname}%
2506 \expandafter\ifx\MT@lsfont\relax
2507 <debug>\MT@dinfo@n1{1}{... new letterspacing instance}%

```

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

```

2508 \MT@get@ls@basefont

```

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

```

2509 <lua-|letterspace>
2510 \MT@if@luaotf@font{%
2511 <lua-&debug>\MT@dinfo@n1{1}{... luaotf font: \MessageBreak
2512 <lua-&debug> \expandafter\fontname\font@name}%
2513 \global\expandafter\font\MT@lsfont=\MT@ls@fontspec@font
2514 }%
2515 </lua-|letterspace>
2516 <lua-&debug>\MT@dinfo@n1{1}{... legacy font}%
2517 \global\expandafter\letterspacefont\MT@lsfont\font@name\MT@letterspace@

```

```
2518 <lua-|letterspace> }%
```

Scale interword spacing (not configurable in letterspace).

```
2519 <*pdf-|lua->
2520 \MT@ifdefined@c@TF\MT@tr@ispace
2521 {\let\@tempa\MT@tr@ispace}%
2522 {\edef\@tempa{\MT@letterspace@*,,}}%
2523 \MT@ifdefined@c@TF\MT@tr@ospace
2524 {\edef\@tempa{\@tempa,\MT@tr@ospace}}%
2525 {\edef\@tempa{\@tempa,,}}%
2526 \expandafter\MT@tr@set@space\@tempa,%
2527 </pdf-|lua->
2528 <*letterspace>
2529 % spacing = {<letterspace amount>*,,}
2530 \fontdimen2\MT@lsfont=\dimexpr\numexpr 1000+\MT@letterspace@relax sp
2531 * \fontdimen2\MT@lsfont/1000\relax
2532 </letterspace>
```

Adjust outer kerning (microtype only).

```
2533 <*pdf-|lua->
2534 \MT@ifdefined@c@TF\MT@tr@okern{\let\@tempa\MT@tr@okern}{\def\@tempa{*,,}}%
2535 \expandafter\MT@tr@set@okern\@tempa,%
```

Disable ligatures (not configurable in letterspace).

```
2536 \MT@ifdefined@c@TF\MT@tr@ligatures\MT@tr@noligatures
2537 </pdf-|lua->
2538 <*letterspace>
2539 % no ligatures = {f}
2540 \tagcode\MT@lsfont`f=m@ne
2541 </letterspace>
```

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

```
2542 <lua-|letterspace> \MT@if@luaotf@font\relax{%
2543 <debug>\MT@edinfo@n1{2}{... compensating for tracking (\number\MT@letterspace@)}%
2544 \MT@do@font{\lcode\MT@lsfont\@tempcnta=\numexpr\MT@letterspace@/2\relax
2545 \rprcode\MT@lsfont\@tempcnta=\numexpr\MT@letterspace@/2\relax}%
2546 \let\MT@the@pr@code\MT@the@pr@code@tr
2547 <lua-|letterspace> }%
2548 \fi
```

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

```
2549 \aftergroup\MT@set@lsfont
2550 <pdf-|lua-> \let\MT@font\MT@lsfont
2551 <lua-> \MT@if@luaotf@font\MT@font\relax
```

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

```
\MT@curr@ls 2552 \xdef\MT@set@curr@ls{\def\noexpand\MT@curr@ls{\MT@letterspace@}}%
2553 \aftergroup\MT@set@curr@ls
```

Adjust surrounding spacing and kerning.

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

```
2554 <*pdf-|lua->
2555 \MT@outer@space=\csname MT@outer@space\expandafter\string\font@name\endcsname\relax
2556 \xdef\MT@set@curr@os{\MT@outer@space=\the\MT@outer@space\relax}%
2557 \MT@tr@outer@l
2558 </pdf-|lua->
```

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

```
2559 \ifx\MT@ls@adjust\empty
2560 <letterspace> % \textls : outer kerning = {*,*} ; \textls* : outer kerning = {0,0}
2561 \MT@outer@kern=-\dimexpr\MT@letterspace@ sp * \fontdimen6\font@name/2000\relax
```

2562 \MT@ls@outer@k

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

```

2563 <pdf-|lua-|
2564 \else
2565 \MT@outer@kern=\expandafter\expandafter\expandafter\@firstoftwo
2566 \csname MT@outer@kern\expandafter\string\font@name\endcsname\relax
2567 \ifdim\MT@outer@kern=\z@ \else \MT@ls@outer@k \fi
2568 \MT@outer@kern=\expandafter\expandafter\expandafter\@secondoftwo
2569 \csname MT@outer@kern\expandafter\string\font@name\endcsname\relax
2570 </pdf-|lua-|
2571 <letterspace>
2572 \xdef\MT@set@curr@ok{\MT@outer@kern=\the\MT@outer@kern\relax}%
2573 \MT@afteraftergroup{%
2574 \MT@set@curr@ok
2575 \noexpand\MT@ls@outer@k
2576 }%
2577 </letterspace>
2578 \fi
2579 <pdf-|lua-|

```

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

```

2580 \xdef\MT@set@curr@ok{\MT@outer@kern=\the\MT@outer@kern\relax}%

```

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

```

2581 \MT@afteraftergroup{%
2582 \MT@set@curr@os
2583 \MT@set@curr@ok
2584 \noexpand\MT@tr@outer@r
2585 }%
2586 </pdf-|lua-|
2587 \fi
2588 <pdf-|  }%
2589 }

```

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

```

2590 \def\MT@afteraftergroup#1{%
2591 <letterspace> \MT@maybe@gobble@with@tikz{%
2592 \MT@ifdefined@n@TF{MT@aftergroup@number\currentgrouplevel}\relax{%
2593 \MT@exp@cs\xdef{MT@aftergroup@number\currentgrouplevel}%
2594 {MT@exp@cs\MT@glet{MT@aftergroup@number\currentgrouplevel}\noexpand\@undefined#1}%
2595 \expandafter\aftergroup\expandafter\aftergroup\MT@exp@cs\aftergroup
2596 {MT@aftergroup@number\currentgrouplevel}%
2597 }%
2598 <letterspace> }%
2599 }
2600 </pdf-|lua-|letterspace>

```

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

```

2601 <lua-|letterspace>
2602 \def\MT@ls@fontspec@font{%
2603 \MT@lua{microtype.add_ls[[\MT@letterspace@]]}%
2604 }
2605 </lua-|letterspace>
2606 <luafile>
2607 local function add_ls(k)
2608 local f = tex.fontname(font.current())
2609 local spec,size = match(f,'^(.+)( at .+)$')
2610 if not spec then spec = f end

```

```

2611 local a,b,c = match(spec,'^([[:]]+):?([[:]]*):?(.*)$')
2612 local ls = "kernfactor=" .. k/1000 .. ';'
2613 microtype.sprint(a..':')
2614 if (a == "name" or a == "file") then
2615     microtype.sprint(b..'..'..ls..c)
2616 else
2617     microtype.sprint(ls..b)
2618 end
2619 if size then
2620     microtype.sprint(size)
2621 end
2622 end
2623 microtype.add_ls = add_ls
2624
2625 </luafile>

```

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

```

2626 <*pdf-|lua->
2627 \def\MT@get@tr@opt{%
2628     \MT@set@listname
2629     \let\MT@tr@factor@\@m

```

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

```

2630 \MT@ifdefined@n@T{MT@tr@c@\MT@tr@c@name @unit}{%
2631     \MT@let@cn\MT@tr@unit@\MT@tr@c@\MT@tr@c@name @unit}%
2632     \ifdim\MT@tr@unit@=1em
2633         \let\MT@tr@unit@\@undefined
2634     \else
2635         \MT@get@unit\MT@tr@unit@
2636     \fi
2637 }%
2638 \MT@ifdefined@n@T{MT@tr@c@\MT@tr@c@name}{%
2639     \MT@let@cn\MT@letterspace{MT@tr@c@\MT@tr@c@name}%
2640     \MT@ifdefined@c@T\MT@tr@unit@{%
2641         \let\@tempb\MT@letterspace
2642         \MT@scale@to@em
2643         \edef\MT@letterspace{\number\@tempcntb}%
2644     }%
2645 }%

```

`\MT@tr@ispace`      Adjust interword spacing.

```

\MT@tr@ospace 2646 \MT@get@tr@opt@{spacing} {ispace}%
2647 \MT@get@tr@opt@{outerspacing}{ospace}%

```

`\MT@tr@okern`      Adjust outer kerning.

```

2648 \MT@get@tr@opt@{outerkerning}{okern}%

```

`\MT@tr@ligatures`      Which ligatures should we disable (empty means all, undefined none)?

```

2649 \MT@get@tr@opt@{noligatures} {ligatures}%
2650 }

```

`\MT@get@tr@opt@`

```

2651 \def\MT@get@tr@opt@#1#2{%
2652     \MT@ifdefined@n@T{MT@tr@c@\MT@tr@c@name @#1}%
2653     {\MT@let@nn{MT@tr@#2}{MT@tr@c@\MT@tr@c@name @#1}}%
2654 }
2655 </pdf-|lua->

```

`\MT@set@lsfont`      Redefine `\font@name`, which will be called a second later (in `\selectfont`).

```

2656 <*pdf-|lua-|letterspace>
2657 <plain>\MT@requires@latex2{
2658 \def\MT@set@lsfont{\MT@exp@two@c\let\font@name\MT@lsfont}

```

`\lstyle`      Disable the tests whether the font should be letterspaced, then trigger the setup.

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

```

2659 \DeclareRobustCommand\lsstyle{%
2660   \not@math@alphabet\lsstyle\textls
2661   \let\glb@currsz\empty
2662   \pdf-|lua- \MTmaybe@gobble@with@tikz{\aftergroup\glb@settings}%
2663   \pdf-|lua- \def\MT@feat{tr}%
2664   \let\MT@tracking\MT@set@tr@codes
2665   \selectfont
2666 }

```

Now the definitions for the letterspace package with plain  $\TeX$ .

```

2667 \*plain
2668 {}{
2669 \def\MT@set@lsfont{\MT@lsfont}
2670 \def\lsstyle{%
2671   \begingroup
2672   \escapechar\m@ne
2673   \xdef\font@name{\csname\expandafter\string\the\font\endcsname}%
2674   \MT@set@tr@codes
2675   \endgroup
2676 }
2677 \let\textls\undefined
2678 \let\lslig\undefined
2679 }
2680 \*plain

```

`\lslig` For Fraktur fonts, some ligatures shouldn't be broken up. This command will temporarily select the base font (making sure to really select the current font) and insert the correct kerning.

```

2681 \DeclareRobustCommand\lslig[1]{%
2682   {\MT@ifdefined@c@TF\MT@curr@ls{%
2683     \escapechar\m@ne
2684     \plain \MT@requires@latex2{%
2685       \xdef\font@name{\csname\curr@fontshape/\f@size\endcsname}%
2686       \plain } \relax%
2687     \MT@get@ls@basefont
2688     \MT@outer@kern=\dimexpr\MT@curr@ls sp * \fontdimen6\font@name/2000\relax
2689     \kern\MT@outer@kern
2690     \font@name #1%
2691     \kern\MT@outer@kern
2692   }{#1}}%
2693 }

```

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

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

```

2694 \def\MT@get@ls@basefont{%
2695   \xdef\MT@ls@basefont{\csname\expandafter\string\font@name @base\endcsname}%
2696   \expandafter\ifx\MT@ls@basefont\relax
2697     \MT@exp@two@c\MT@gl@et\MT@ls@basefont\font@name
2698   \else
2699   \*debug \MT@info@n1{1}{... fixing base font}%
2700   \MT@set@ls@basefont

```



```

2701 \fi
2702 }

\MT@set@lsbasefont    If tracking is switched off in the middle of the document, or if \textls is called
\MT@set@tr@zero        with a zero letterspacing amount, we have to retrieve the base font and select it.
2703 \def\MT@set@lsbasefont{\MT@exp@two@c\let\font@name\MT@ls@basefont}
2704 \def\MT@set@tr@zero{%
2705   <debug>\MT@info@n1{1}{... zero tracking}%
2706   \xdef\MT@ls@basefont{\csname\expandafter\string\font@name @base\endcsname}%
2707   \expandafter\ifx\MT@ls@basefont\relax \else
2708   <debug>\MT@info@n1{1}{... fixing base font}%
2709   \aftergroup\MT@set@lsbasefont
2710   \fi
2711 }
2712 </pdf-|lua-|letterspace>

\MT@tr@noligatures    pdfTeX 1.40.0–1.40.3 disabled all ligatures in letterspaced fonts.
2713 <*pdf-|lua->
2714 <pdf->\MT@requires@pdftex{
2715   \def\MT@tr@noligatures{%
2716     \ifx\MT@tr@ligatures\empty
2717       \MT@noligatures@\MT@lsfont\@undefined
2718     \else
2719       \MT@noligatures@\MT@lsfont\MT@tr@ligatures
2720     \fi
2721   }
2722   <*pdf->
2723 }{
2724   \def\MT@tr@noligatures{%
2725     \MT@warning@n1{%
2726       Disabling selected ligatures is only possible since\MessageBreak
2727       pdftex 1.40.4. Disabling all ligatures instead}%
2728     \MT@glet\MT@tr@noligatures\relax
2729   }
2730 }
2731 </pdf->

\MT@outer@space       A new skip for outer spacing.
2732 \newskip\MT@outer@space

\MT@tr@set@space       Adjust interword spacing (\fontdimen 2,3,4) for inner and outer space. For inner
                        spacing, the font dimensions will be adjusted, the settings for outer spacing will be
                        remembered in a macro.
2733 \def\MT@tr@set@space#1,#2,#3,#4,#5,#6,{%
2734   <debug>\MT@info@n12{... orig. space: \the\fontdimen2\MT@lsfont,
2735   <debug> \the\fontdimen3\MT@lsfont, \the\fontdimen4\MT@lsfont
2736   <debug> \MessageBreak... (#1,#2,#3) (#4,#5,#6)}%
2737   \let\MT@temp\empty
2738   \MT@tr@set@space@{#1}{#4}{2}\empty
2739   \MT@tr@set@space@{#2}{#5}{3}\@plus
2740   \MT@tr@set@space@{#3}{#6}{4}\@minus
2741   \MT@glet@c{MT@outer@space\expandafter\string\font@name}\MT@temp
2742   <debug>\MT@info@n12{... inner space: \the\fontdimen2\MT@lsfont,
2743   <debug> \the\fontdimen3\MT@lsfont, \the\fontdimen4\MT@lsfont}%
2744   <debug>\MT@info@n12{... outer space: \MT@temp}%
2745 }

\MT@tr@set@space@     If settings for outer spacing (#2) don't exist, they will be inherited from the inner
                        spacing settings (#1).
2746 \def\MT@tr@set@space@#1#2#3#4{%
2747   \MT@ifempty{#2}{%
2748     \MT@ifempty{#1}\relax{%
2749       \MT@tr@set@space@@{#1}{#3}{1000}%
2750       \fontdimen#3\MT@lsfont=\@tempdima

```

```

2751 }%
2752 \edef\MT@temp{\MT@temp#4\the\fontdimen#3\MT@lsfont}%
2753 }{%
2754 \MT@tr@set@space@@{#2}{#3}{2000}%
2755 \edef\MT@temp{\MT@temp#4\the\@tempdima}%
2756 \MT@ifempty{#1}\relax{%
2757 \MT@tr@set@space@@{#1}{#3}{1000}%
2758 \fontdimen#3\MT@lsfont=\@tempdima
2759 }%
2760 }%
2761 }

```

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

```

2762 \def\MT@tr@set@space@@#1#2#3{%
2763 \MT@test@ast#1*\@nil{%
2764 \MT@ifdefined@cTF\MT@tr@unit@
2765 {\edef\@tempb{#1}\MT@scale@to@em}
2766 {\@tempcntb=#1\relax}%
2767 \@tempdima=\dimexpr\@tempcntb sp*\MT@dimen@six/1000\relax

```

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

```

2768 \ifnum#2=\tw@
2769 \advance\@tempdima -\dimexpr\MT@letterspace@ sp*\MT@dimen@six/#3\relax
2770 \fi
2771 }{%
2772 \MT@ifempty\@tempa{\let\@tempa\MT@letterspace@}\relax
2773 \@tempdima=\dimexpr \numexpr1000+\@tempa sp *\fontdimen#2\MT@lsfont/1000\relax
2774 }%
2775 (debug)\MT@info{n13}{... : font dimen #2 (#1): \the\@tempdima}%
2776 }

```

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

```

2777 \def\MT@tr@outer@l{%
2778 \ifhmode
2779 \ifdim\lastskip>5sp
2780 \edef\x{\the\lastskip minus 0pt}%
2781 \setbox\z@\hbox{\MT@outer@space=\x}%
2782 \ifdim\wd\z@>\z@
2783 (debug)\MT@info{2}{[[[ adjusting pre space: \the\MT@outer@space}%
2784 \unskip \hskip\MT@outer@space\relax

```

Disable left outer kerning.

```

2785 \let\MT@ls@outer@k\relax
2786 \else

```

The ragged2e package sets `\spaceskip` without glue.

```

2787 \ifdim\lastskip=%
2788 \ifnum\spacefactor<2000
2789 \spaceskip
2790 \else
2791 \ifdim\xspaceskip=\z@
2792 \dimexpr\spaceskip+\fontdimen7\font@name\relax
2793 \else
2794 \xspaceskip
2795 \fi
2796 \fi
2797 (debug)\MT@info{2}{[[[ adjusting pre space (skip): \the\MT@outer@space}%
2798 \unskip \hskip\MT@outer@space\relax
2799 \let\MT@ls@outer@k\relax
2800 \fi
2801 \fi

```

```

2802 \fi
2803 \fi
2804 }

```

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

```

2805 \def\MT@tr@outer@r{%
2806 \futurelet\MT@tr@outer@next\MT@tr@outer@r@
2807 }

```

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

```

2808 \def\MT@if@outer@next#1{%
2809 \ifx\MT@tr@outer@next#1\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
2810 }

```

`\MT@tr@outer@r@`

```

2811 \def\MT@tr@outer@r@{%
2812 \def\MT@temp*{%

```

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

```

2813 \ifmmode \else

```

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

```

2814 \ifnum\currentgrouptype=10 \else
2815 \def\MT@temp*##1{\ifhmode\hskip\MT@outer@space
2816 <debug>\MT@info2{}} adjusting post space (1): \the\MT@outer@space}%
2817 \fi}%
2818 \expandafter\ifcat\expandafter\noexpand\csname MT@tr@outer@next\endcsname\egroup
2819 \ifhmode\unkern\fi\egroup
2820 \MT@set@curr@ok \MT@set@curr@os
2821 \def\MT@temp*{\afterassignment\MT@tr@outer@r\let\MT@temp=}%
2822 \else

```

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

```

2823 \MT@if@outer@next\maybe@ic{%
2824 \MT@set@curr@ok \MT@set@curr@os
2825 \def\MT@temp*{\afterassignment\MT@tr@outer@icr\let\MT@temp=}%
2826 }{%

```

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

```

2827 \MT@if@outer@next\check@icr{%
2828 \def\MT@temp*{\aftergroup\MT@tr@outer@r\check@icr\let\MT@temp=}%
2829 }{%
2830 \MT@if@outer@next\@sptoken{%
2831 \def\MT@temp* {\ifhmode\hskip\MT@outer@space
2832 <debug>\MT@info2{}} adjusting post space (2): \the\MT@outer@space}%
2833 \fi}%
2834 }{%
2835 \MT@if@outer@next~{%
2836 \def\MT@temp*~{\nobreak\hskip\MT@outer@space
2837 <debug>\MT@info2{}} adjusting post space (3): \the\MT@outer@space}%
2838 }%
2839 }{%

```

xspace requires special treatment.

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

`\MT@tr@outer@icr`      Helper macros for the italic correction mess.

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

For older pdfTeX versions and LuaTeX, throw an error.

And for  $X \nexists \text{TF} X$ , too.

<code>\textls</code>	This command may be used like the other text commands. The starred version
<code>\MT@ls@adjust@</code>	removes kerning on the sides. The optional argument changes the letterspacing factor.

```
2885 <*package|letterspace>
```

```

2886 \DeclareRobustCommand\textls{%
2887   \ifstar{\let\MT@ls@adjust@MT@ls@adjust@empty\MT@textls}%
2888           {\let\MT@ls@adjust@MT@ls@adjust@relax\MT@textls}%
2889 }

```

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

```

2890 \newcommand\MT@textls[2][{}]{%
2891   \ifmode
2892     \nfss@text{\MT@ls@set@ls{#1}\lsstyle#2}%
2893   \else
2894     \hmode@bgroup
2895     \MT@ls@set@ls{#1}%
2896     \lsstyle #2%
2897     \expandafter
2898     \egroup
2899   \fi
2900 }

```

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

```

\MT@ls@adjust@empty
\MT@ls@adjust@relax
\MT@ls@set@ls
2901 \def\MT@ls@adjust@empty{\let\MT@ls@adjust@empty}
2902 \def\MT@ls@adjust@relax{\let\MT@ls@adjust@relax}
2903 \def\MT@ls@set@ls#1{%
2904   \MT@ifempty{#1}%
2905   {\let\MT@letterspace@ \@undefined}%
2906   {\KV@sp@def\MT@letterspace@{#1}%
2907     \edef\MT@letterspace@{\number\MT@letterspace@}%
2908     \MT@ls@too@large\MT@letterspace@}%
2909   \MT@ls@adjust@
2910 }

```

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

```

2911 \def\MT@ls@too@large#1{%
2912   \ifnum#1>\MT@tr@max
2913     \MT@warning{Maximum for option `letterspace' is \number\MT@tr@max}%
2914     \edef#1{\number\MT@tr@max}%
2915   \else
2916     \ifnum#1<\MT@tr@min
2917       \MT@warning{Minimum for option `letterspace' is \number\MT@tr@min}%
2918       \edef#1{\number\MT@tr@min}%
2919     \fi
2920   \fi
2921 }

```

`\MT@outer@kern` This dimen is used for the starred version of `\textls`, for `\lslig` and for adjusted outer kerning.

```

\MT@tr@set@okern
2922 \newdimen\MT@outer@kern
2923 </package>|letterspace>
2924 <*pdf-|lua->
2925 \def\MT@tr@set@okern#1,#2,{%
2926   \let\MT@temp@empty
2927   \MT@ifempty{#1}{\MT@tr@set@okern@{*}}{\MT@tr@set@okern@{#1}}%
2928   \MT@ifempty{#2}{\MT@tr@set@okern@{*}}{\MT@tr@set@okern@{#2}}%
2929   \MT@gl@et@nc{\MT@outer@kern\expandafter\string\font@name}\MT@temp
2930 <debug>\MT@din@fo@n12{... outer kerning: (#1,#2)
2931 <debug>      = \@nameuse{\MT@outer@kern\expandafter\string\font@name}}%
2932 }

\MT@tr@set@okern@
2933 \def\MT@tr@set@okern@#1{%
2934   \MT@test@ast#1*\@nil{%
2935     \MT@ifdefined@c@TF\MT@tr@unit@

```

```

2936      {\edef\@tempb{#1}\MT@scale@to@em}
2937      {\@tempcntb=#1\relax}%
2938      \@tempdima=\dimexpr \@tempcntb sp * \MT@dimen@six/1000\relax
2939    }{%
2940      \MT@ifempty\@tempa{\let\@tempa\@m}\relax
2941      \@tempdima=\dimexpr \numexpr\@tempa*\MT@letterspace@/1000\relax sp
2942                * \fontdimen6\MT@lsfont/2000\relax
2943    }%
2944    \advance\@tempdima -\dimexpr \MT@letterspace@ sp
2945                * \fontdimen6\MT@lsfont/2000\relax
2946    \edef\MT@temp{\MT@temp{\the\@tempdima}}%
2947  }
2948  </pdf-|lua-|

```

`\MT@ls@outer@k` Adjust outer kerning. We additionally add a marker (`\kern3sp\kern-3sp`) for cases of nested letterspacing without anything actually printed.

```

2949  <*pdf-|lua-|letterspace>
2950  \def\MT@ls@outer@k{%
2951    \ifhmode
2952      \ifdim\lastkern=-3sp \unkern
2953      \ifdim\lastkern=3sp \kern-3sp
2954        \expandafter\expandafter\expandafter\@gobble
2955      \else \unkern
2956        \expandafter\expandafter\expandafter\@firstofone
2957      \fi
2958    \else
2959      \expandafter\@firstofone
2960    \fi
2961    {\kern\MT@outer@kern\kern3sp\kern-3sp\relax}%
2962  \fi
2963  }
2964  </pdf-|lua-|letterspace>

```

### 1.2.6 Disabling ligatures

`\MT@noligatures` The possibility to disable ligatures is a new features of pdfTeX 1.30, and also works with LuaTeX.

```

2965  <*pdf-|lua-|
2966  <pdf-|lua-|>\MT@requires@pdftex5{
2967  \def\MT@noligatures{%
2968    \MT@dotrue
2969    \let\@tempa\MT@nl@setname
2970    \MT@map@clist@n{font,encoding,family,series,shape,size}%
2971    \MT@ifdefined@nTF{MT@checklist@##1}%
2972      {\csname MT@checklist@##1\endcsname}%
2973      {\MT@checklist@{##1}}%
2974    {nl}%
2975  }%
2976  \ifMT@do
2977    \MT@noligatures@MT@font\MT@nl@ligatures
2978  \fi
2979  }

```

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

```

2980  <lua-|>\MT@requires@luatex4{\let\pdfnoligatures\ignoreligaturesinfont}\relax
2981  \def\MT@noligatures@#1#2{%
2982    \MT@ifdefined@c@TF#2%

```

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

```

2983    \MT@ifdefined@c@TF\tagcode%

```

No 'inputenc' key.

```

2984    \let\MT@warn@maybe@inputenc\@empty

```

```

2985 \def\MT@curr@list@name{\@backslashchar DisableLigatures}%
2986 \MT@map@c@list@c#2{%
2987   \KV@sp@def\@tempa{##1}\MT@get@slot
2988   \ifnum\MT@char>\m@ne
2989     \tagcode#1\MT@char=\m@ne

```

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

```

2990 <lua-> \MT@if@luaotf@font
2991 <lua-> { \MT@lua{microtype.noligatures([[#1]], [[\MT@char]])} } \relax
2992 \fi
2993 }%
2994 \MT@vinfo{... Disabling ligatures for characters: #2}%
2995 }{%
2996 \pdfnoligatures#1%
2997 \MT@warning{Cannot disable selected ligatures (pdfTeX doesn't\MessageBreak
2998 know \@backslashchar tagcode). Disabling all ligatures of\MessageBreak
2999 the font instead}%
3000 }%
3001 }{%
3002 \pdfnoligatures#1%
3003 <lua-> \MT@if@luaotf@font
3004 <lua-> { \MT@lua{microtype.noligatures([[#1]], "_all_")} } \relax
3005 \MT@vinfo{... Disabling all ligatures}%
3006 }%
3007 }
3008 <pdf-> \relax
3009 </pdf-|lua->

```

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

```

3010 <*luafile>
3011 microtype.ligs = microtype.ligs or { }
3012
3013 local function noligatures(fontcs,liga)
3014   local fontcs = match(fontcs,"([^\s]+)")
3015   microtype.ligs[fontcs] = microtype.ligs[fontcs] or { }
3016   table.insert(microtype.ligs[fontcs],liga)
3017 end
3018 microtype.noligatures = noligatures
3019
3020 local function keepligature(c)
3021   local nodedirect = node.direct
3022   local getfield = nodedirect.getfield
3023   local getfont = nodedirect.getfont
3024   local f,ch
3025   if type(c) == "userdata" then -- in older luaotfload versions, c was a node
3026     f = c.font
3027     ch = c.components.char
3028   else -- since 2.6, c is a (direct node) number
3029     f = getfont(c)
3030     ch = getfield(getfield(c,"components"),"char")
3031   end
3032   -- if ch then -- should always be true
3033   local ligs = microtype.ligs[match(tex.fontidentifier(f),"\\([^\s]+)")]
3034   if ligs then
3035     for _,lig in pairs(ligs) do
3036       if lig == "_all_" or tonumber(lig) == ch then
3037         return false
3038       end
3039     end
3040   end

```

```

3041 return true
3042 -- end
3043 end
3044
3045 if luaotfload and luaotfload.letterspace then
3046   if luaotfload.letterspace.keepligature then
3047     microtype.info("overwriting function `keepligature'")
3048   end
3049   luaotfload.letterspace.keepligature = keepligature
3050 end
3051
3052 /luafile

```

### 1.2.7 Loading the configuration

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

```

3053 <*package|show
3054 <package>\def\MT@load@list#1%
3055 <show>\def\MTS@load@list#1%
3056   {\edef\@tempa{#1}%
3057    \MT@let@cn\@tempb{MT@\MT@feat @c@\@tempa @load}%
3058    \MT@ifstreq\@tempa\@tempb{%
3059      \MT@error{\@nameuse{MT@abbr@\MT@feat} list `@\tempa' cannot load itself}{}%
3060    }{%
3061      \ifx\@tempb\relax
3062        <show> : \par\medskip\leavevmode
3063      \else
3064        \MT@ifdefined@n@TF{MT@\MT@feat @c@\@tempb}{%
3065          <show> \MTS@printtext{, loading \texttt{\@tempb}}%
3066          \MT@vinfo{... : First loading \@nameuse{MT@abbr@\MT@feat} list `@\tempb'}%
3067          \begingroup
3068            \MT@load@list\@tempb
3069          \endgroup
3070          \edef\MT@curr@list@name{%
3071            <package> \nameuse{MT@abbr@\MT@feat} list \noexpand\MessageBreak
3072              `@\tempb'}%
3073            \MT@let@cn\@tempc{MT@\MT@feat @c@\@tempb}%
3074            \expandafter\MT@set@codes\@tempc,\relax,%
3075            <show> \vrule width 4cm height .5pt \\\
3076            <show> \MTS@printtext{End of list \texttt{\MT@curr@list@name}}%
3077            <show> \par\medskip\leavevmode
3078          }{%
3079            \MT@error{\@nameuse{MT@abbr@\MT@feat} list `@\tempb' undefined.\MessageBreak
3080              Cannot load it from list `@\tempa'}{}%
3081          }%
3082        \fi
3083      }%
3084    }
3085    </package|show>

```

`\MT@find@file` Micro-typographic settings may be written into a file `mt-<font family>.cfg`.

`\MT@file@list` We must also record whether we've already loaded the file.

```

3086 <*package>
3087 \let\MT@file@list\empty
3088 \def\MT@find@file#1%

```

Check for existence of the file only once.

```

3089 \MT@in@clist{#1}\MT@file@list
3090 \ifMT@inlist@ \else

```

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

```

3091 \MT@begin@catcodes

```



```

3092 \let\MT@begin@catcodes\relax
3093 \let\MT@end@catcodes\relax
3094 \InputIfFileExists{mt-#1.cfg}{%
3095   \edef\MT@curr@file{mt-#1.cfg}%
3096   \MT@vinfo{... Loading configuration file \MT@curr@file}%
3097   \MT@xadd\MT@file@list{#1,}%
3098 }{%
3099   \MT@get@basefamily#1\@empty\@empty\@empty\@nil
3100   \MT@exp@one@n\MT@in@clist\@tempa\MT@file@list
3101   \ifMT@inlist@
3102     \MT@xadd\MT@file@list{#1,}%
3103   \else
3104     \InputIfFileExists{mt-\@tempa.cfg}{%
3105       \edef\MT@curr@file{mt-\@tempa.cfg}%
3106       \MT@vinfo{... Loading configuration file \MT@curr@file}%
3107       \MT@xadd\MT@file@list{\@tempa,#1,}%
3108     }{%
3109       \MT@vinfo{... No configuration file mt-#1.cfg}%
3110       \MT@xadd\MT@file@list{#1,}%
3111     }%
3112   \fi
3113 }%
3114 \endgroup
3115 \fi
3116 }

```

`\MT@cfg@catcodes` We have to make sure that all characters have the correct category code. Especially, new lines and spaces should be ignored, since files might be loaded in the middle of the document. This is basically `\nfss@catcodes` (from the  $\text{\LaTeX}$  kernel). I've added: & (in tabulars), !, ?, , , : (french), , , \$, -, ~, and = (Turkish babel).

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

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

```

3117 \def\MT@cfg@catcodes{%
3118   \makeatletter
3119   \catcode\^7%
3120   \catcode\ 9%
3121   \catcode\^^I9%
3122   \catcode\^^M9%
3123   \catcode\\\z@
3124   \catcode\{\@ne
3125   \catcode\}\tw@
3126   \catcode\#6%
3127   \catcode\%14%
3128   \MT@map@tlist@n
3129   {\!\"$&'\"(\)\*+,\-\.\/\:\;\<=\>?\[\\\\_\\|\-}%
3130   \@makeother
3131 }

```

`\MT@begin@catcodes` This will be used before reading the files as well as in all configuration commands, so that catcodes are also harmless when these commands are used outside the configuration files.

```

3132 \def\MT@begin@catcodes{%
3133   \begingroup
3134   \MT@cfg@catcodes
3135 }

```

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

```

3136 \let\MT@end@catcodes\endgroup

```

`\MT@get@basefamily` The family name might have a suffix e.g., for expert set (x), old style numbers (j) swash capitals (w) etc. We mustn't simply remove the last letter, as this would make

Table 1:

Order for matching font attributes

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

for instance cms out of cmss and cmsy (OK, cmex will still become cme ...).

We only work on the font name if it is longer than three characters.

```

3137 \def\MT@get@basefamily#1#2#3#4\@nil{%
3138   \ifx\@empty#4%
3139     \def\@tempa{#1#2#3}%
3140   \else
3141     \let\@tempa\@empty
3142     \edef\@tempb{#1#2#3#4}%
3143     \expandafter\MT@get@basefamily@\@tempb\@nil
3144   \fi
3145 }
```

\MT@get@basefamily@ This will only remove one suffix (the longest match), so that *combinations* of suffixes would have to be added manually (e.g., \DeclareMicrotypeVariants\*{aw}). But otherwise, something like ‘pplx’ would be truncated to ‘p’.

```

3146 \def\MT@get@basefamily@#1#2\@nil{%
3147   \edef\@tempa{\@tempa#1}%
3148   \ifx\#2\@expandafter\@gobble\else\expandafter\@firstofone\fi
3149   {\MT@in@tlist{#2}\MT@variants
3150    \ifMT@inlist\else\MT@get@basefamily@#2\@nil\fi}%
3151 }
```

\MT@listname Try all combinations of font family, series, shape and size to get a list for the current font.

```

\MT@get@listname
\MT@get@listname@ 3152 \def\MT@get@listname#1{%
3153   (debug)\MT@edinfo\@nil{1}{trying to find \@nameuse{MT@abbr@#1} list for font '\MT@font'}%
3154   \let\MT@listname\@undefined
3155   \def\@tempb{#1}%
3156   \MT@map@tlist@c\MT@try@order\MT@get@listname@
3157 }
3158 \def\MT@get@listname@#1{%
3159   \expandafter\MT@next@listname#1%
3160   \ifx\MT@listname\@undefined \else
3161     \expandafter\MT@tlist@break
3162   \fi
3163 }
```

\MT@try@order Beginning with version 1.7, we always check for the font size. Since the matching order has become more logical now, it can be described in words, so that we don’t need table 1 in the documentation part any longer and can cast it off here.

```

3164 \def\MT@try@order{%
3165   {1111}{1110}{1101}{1100}{1011}{1010}{1001}{1000}%
3166   {0111}{0110}{0101}{0100}{0011}{0010}{0001}{0000}%
3167 }
```

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

```

3168 \def\MT@next@listname#1#2#3#4{%
3169   \ifnum#1=\z@\MT@nofamilytrue\fi
3170   \edef\@tempa{\MT@encoding
3171 / \ifnum#1=\@ne \MT@family \fi
3172 / \ifnum#2=\@ne \MT@series \fi
```

```

3173 /\ifnum#3=\@ne \MT@shape \fi
3174 /\ifnum#4=\@ne *\fi
3175 \MT@context}%
3176 <debug>\MT@info@n1{1}{trying \@tempa}%
3177 \MT@ifdefined@n@TF{MT@\@tempb @\@tempa}{%
3178 \MT@next@listname@#4%
3179 }{%

```

Also try with an alias family.

```

3180 \ifnum#1=\@ne
3181 \ifx\MT@familyalias\@empty \else
3182 \edef\@tempa{\MT@encoding
3183 \MT@familyalias
3184 /\ifnum#2=\@ne \MT@series\fi
3185 /\ifnum#3=\@ne \MT@shape\fi
3186 /\ifnum#4=\@ne *\fi
3187 \MT@context}%
3188 <debug>\MT@info@n1{1}{(alias) \@tempa}%
3189 \MT@ifdefined@n@TF{MT@\@tempb @\@tempa}{%
3190 \MT@next@listname@#4%
3191 }%
3192 \fi
3193 \fi
3194 }%
3195 }

```

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

```

3196 \def\MT@next@listname@#1{%
3197 \ifnum#1=\@ne
3198 \MT@exp@cs\MT@in@list{MT@\@tempb @\@tempa @size}%
3199 \ifMT@inlist@
3200 \let\MT@listname\MT@size@name
3201 \fi
3202 \else
3203 \MT@let@cn\MT@listname{MT@\@tempb @\@tempa}%
3204 \fi
3205 }

```

\MT@if@list@exists

```

\MT@context 3206 \def\MT@if@list@exists{%
3207 \MT@let@cn\MT@context{MT@\MT@feat @context}%
3208 \MT@ifstreq{0}\MT@context{\let\MT@context\@empty}\relax
3209 \MT@get@listname{\MT@feat @c}%
3210 \MT@ifdefined@c@TF\MT@listname{%
3211 \MT@edef{n{MT@\MT@feat @c@name}}{\MT@listname}%
3212 \ifMT@nonselected
3213 \MT@vinfo{... Applying non-selected expansion (list `~\MT@listname')}%
3214 \else
3215 \MT@vinfo{... Loading \@nameuse{MT@abbr@\MT@feat} list `~\MT@listname'}%
3216 \fi
3217 \@firstoftwo
3218 }{%

```

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

```

3219 \MT@let@cn{MT@\MT@feat @c@name}\@empty

```

Don't warn if selected=false.

```

3220 \ifMT@nonselected
3221 \MT@vinfo{... Applying non-selected expansion (no list)}%
3222 \else

```

Tracking doesn't require a list, either.

```

3223 \MT@ifstreq\MT@feat{tr}\relax%
3224 \MT@warning{I cannot find a \@nameuse{MT@abbr@\MT@feat} list

```

```

3225         for font\MessageBreak`\MT@font'%
3226         \ifx\MT@context\@empty\else\space(context: \MT@context')\fi.
3227         Switching off\MessageBreak\@nameuse{MT@abbr@MT@feat} for this font}%
3228     }%
3229     \fi
3230     \@secondoftwo
3231 }%
3232 }

```

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

```

\MT@context 3233 \def\MT@get@inh@list{%
3234     \let\MT@context\@empty
3235     \MT@get@listname{\MT@feat @inh}%
3236     \MT@ifdefined@c@TF\MT@listname{%
3237         \MT@edef@n{MT@\MT@feat @inh@name}{\MT@listname}%
3238         <debug>\MT@info@n{1}{... Using \@nameuse{MT@abbr@MT@feat} inheritance list
3239         <debug>         \MT@listname'}%
3240         \MT@let@cn\@tempc{MT@\MT@feat @inh@MT@listname}%

```

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

```

3241     \ifx\@tempc\@empty \else
3242     <debug>\MT@info@n{1}{parsing inheritance list ...}%

```

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

```

3243     \begingroup
3244     \edef\MT@curr@list@name{inheritance list\noexpand\MessageBreak`\MT@listname'}%
3245     \MT@set@inputenc{inh}%
3246     \expandafter\MT@inh@do\@tempc,\relax,%
3247     \MT@gl@et@nc{MT@\MT@feat @inh@MT@listname}\@empty
3248     \endgroup
3249     \fi
3250 }%
3251     \MT@let@nc{MT@\MT@feat @inh@name}\@undefined
3252 }%
3253 }

```

## 1.2.8 Translating characters into slots

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

\MT@get@slot There are lots of possibilities how a character may be specified in the configuration files, which makes translating them into slot numbers quite expensive. Also, we want to have this as robust as possible, so that the user does not have to solve a sphinx's riddle if anything goes wrong.

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

```

\MT@char@ 3254 \def\MT@get@slot{%
3255     \escapechar`\
3256     \let\MT@char@m@ne
3257     \MT@noresttrue

```

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

```

3258     \MT@toks=\expandafter{\@tempa}%

```

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

```

3259     \MT@exp@two@c\MT@is@active\string\@tempa\@nil

```

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

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

```

3260     \expandafter\MT@is@letter\@tempa\relax\relax
3261     \ifnum\MT@char@ < \z@

```

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

If  $\langle encoding \rangle \langle command \rangle$  (that's *one* command) is defined, we try to extract the slot number.

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

```
3262 \MT@ifdefined@n@TF{\MT@encoding\MT@detokenize@c\@tempa}%
3263 \MT@is@symbol
```

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

```
3264 {\expandafter\MT@is@composite\@tempa\relax\relax}%
3265 \ifnum\MT@char@ < \z@
```

- It could also be a  $\backslash chardefed$  command (e.g., the percent character). This seems the least likely case, so it's last.

```
3266 \expandafter\MT@exp@two@c\expandafter\MT@is@char\expandafter
3267 \meaning\expandafter\@tempa\MT@charstring\relax\relax\relax
3268 \fi
3269 \fi

3270 \let\MT@char\MT@char@
3271 \MT@get@slot@
3272 \escapechar\m@ne
3273 }
3274 /package
```

$\backslash MT@get@slot@$

```
3275 <pdf-|lua-|xe->
3276 \def\MT@get@slot@{%
```

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

```
3277 <xe-> \ifnum\XeTeXfonttype\MT@font=\z@
3278 \ifnum\MT@char > \m@ne
```

In Lua<sub>T</sub>E<sub>X</sub>, it may also be a glyph name, prefixed with  $\backslash'$ .

```
3279 <*lua->
3280 \ifnum\MT@char=47\relax
3281 \ifMT@norest \else
3282 \@tempcnta=\MT@lua{
3283   local glyph = microtype.name_to_slot([[ \expandafter\@gobble\@tempa ]],true)
3284   if glyph then tex.write(glyph)
3285   else tex.write(-1)
3286   end
3287 } \relax
3288 \ifnum\@tempcnta<\z@
3289 \MT@warn@unknown
3290 \let\MT@char\m@ne
3291 \else
3292 \edef\MT@char{\the\@tempcnta}%
3293 <debug> \MT@edinfo@n1{3}{> ` \the\MT@toks' is a glyph name (\the\@tempcnta)}%
3294 \fi
3295 \fi
3296 \else
3297 /lua->
```

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

```
3298 \ifMT@norest \else
```

```

3299     \MT@warn@rest
3300 <pdf-|lua-> \let\MT@char\m@ne
3301 <xe-> \let\MT@char\@empty
3302 \fi
3303 <lua-> \fi
3304 \else
3305 \MT@warn@unknown
3306 <xe-> \let\MT@char\@empty
3307 \fi
3308 <*xe->
3309 \else

```

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

```

3310 \ifnum\MT@char=47\relax
3311 \ifMT@noreset \edef\MT@char{U47}%
3312 \else
3313 \@tempcnta=\XeTeXglyphindex"\expandafter\@gobble\@tempa"\relax
3314 \ifnum\@tempcnta=\z@
3315 \MT@warn@unknown
3316 \let\MT@char\@empty
3317 \else
3318 \edef\MT@char{\@tempa\space}%
3319 \edef\MT@char@{-\the\@tempcnta}%
3320 <debug>\MT@info@n1{3}{> `the\MT@toks' is a glyph name (\the\@tempcnta)}%
3321 \fi
3322 \fi
3323 \else
3324 \ifnum\MT@char > \m@ne
3325 \ifMT@noreset

```

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

```

3326 \@tempcnta=\XeTeXcharglyph\MT@char\relax
3327 \ifnum\@tempcnta=\z@
3328 \MT@info@missing@char
3329 \let\MT@char\@empty
3330 \else
3331 <debug>\MT@info@n1{3}{> (glyph number: \the\@tempcnta,
3332 <debug> glyph name: \XeTeXglyphname\MT@font\@tempcnta)}%
3333 \edef\MT@char{U\MT@char}%
3334 \fi
3335 \else
3336 \MT@warn@rest
3337 \let\MT@char\@empty
3338 \fi
3339 \else
3340 \MT@warn@unknown
3341 \let\MT@char\@empty
3342 \fi
3343 \fi
3344 \fi
3345 </xe->
3346 }
3347 </pdf-|lua-|xe->

```

This is the lua function to translate glyph name into slot number. Beginning with v2.2, luaotfload provides this function in its API, which we use if available, but (for now, at least) keep the old code for backward compatibility. With HarfBuzz, the return value is not guaranteed to be inside the Unicode range, so we have to guard

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

against this case as well (same as in `do_font`). Also, older versions of `luaotfload` (until v3.18) returned the numbers as floats.

```

3348 <luafile>
3349 if luaotfload and luaotfload.aux and luaotfload.aux.slot_of_name then
3350   local slot_of_name = luaotfload.aux.slot_of_name
3351   microtype.name_to_slot = function(name, unsafe)
3352     local n = slot_of_name(font.current(), name, unsafe)
3353     if not n then return -1 end
3354     if n > 1114111 then return -1 end
3355     return math.tointeger(n)
3356   end
3357 else
3358   -- we dig into internal structure (should be avoided)
3359   local function name_to_slot(name, unsafe)
3360     if fonts then
3361       local unicodes
3362       if fonts.ids then -- legacy luaotfload
3363         local tfmdata = fonts.ids[font.current()]
3364         if not tfmdata then return end
3365         unicodes = tfmdata.shared.otfdata.luaotex.unicodes
3366       else -- new location
3367         local tfmdata = fonts.hashes.identifiers[font.current()]
3368         if not tfmdata then return end
3369         unicodes = tfmdata.resources.unicodes
3370       end
3371       local unicode = unicodes[name]
3372       if unicode then -- does the 'or' branch actually exist?
3373         return type(unicode) == "number" and unicode or unicode[1]
3374       end
3375     end
3376   end
3377   microtype.name_to_slot = name_to_slot
3378 end
3379
3380 </luafile>

```

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

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

```

\MT@max@slot 3381 <pdf-|lua-|xe->
3382 \def\MT@max@char
3383 <pdf-> {127 }
3384 <lua-|xe-> {1114111 }
3385 \def\MT@max@slot
3386 <pdf-> {255 }
3387 <lua-|xe-> {1114111 }
3388 </pdf-|lua-|xe->

```

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

```

3389 <package>
3390 \newif\ifMT@noreset
3391 \def\MT@is@letter#1#2\relax{%
3392   \ifcat a\noexpand#1\relax
3393     \edef\MT@char@{\number`#1}%
3394     \ifx\#2\%
3395 <debug>\MT@info{n1}{3}{> `the\MT@toks' is a letter (\MT@char@)}%
3396     \else
3397       \MT@noresetfalse
3398     \fi
3399   \else
3400     \ifcat !\noexpand#1\relax
3401       \edef\MT@char@{\number`#1}%
3402 <debug>\MT@info{n1}{3}{> `the\MT@toks' is a character (\MT@char@)}%
3403       \ifx\#2\%
3404         \ifnum\MT@char@ > \MT@max@char \MT@warn@ascii \fi

```

```

3405     \else
3406         \MT@norestfalse
3407         \expandafter\MT@is@number#1#2\relax\relax
3408     \fi
3409 \fi
3410 \fi
3411 }

```

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

```

3412 \def\MT@is@number#1#2#3\relax{%
3413     \ifx\relax#3\relax \else
3414         \ifx\relax#2\relax \else
3415             \MT@noresttrue
3416             \if#1"\relax
3417                 \def\x{\uppercase{\edef\MT@char@{\number#1#2#3}}}\x
3418 (debug)\MT@info@n1{3}{> ... a hexadecimal number: \MT@char@}%
3419             \else
3420                 \if#1'\relax
3421                     \def\MT@char@{\number#1#2#3}%
3422 (debug)\MT@info@n1{3}{> ... an octal number: \MT@char@}%
3423             \else
3424                 \MT@ifint{#1#2#3}{%
3425                     \def\MT@char@{\number#1#2#3}%
3426 (debug)\MT@info@n1{3}{> ... a decimal number: \MT@char@}%
3427                 } \MT@norestfalse
3428             \fi
3429         \fi
3430         \ifnum\MT@char@ > \MT@max@slot
3431             \MT@warn@number@too@large{\noexpand#1\noexpand#2\noexpand#3}%
3432             \let\MT@char@\m@ne
3433         \fi
3434     \fi
3435 \fi
3436 }

```

`\MT@is@active` Expand an active character. (This was completely broken in v1.7, and only worked by chance before.) We `\set@display@protect` to translate, e.g., Å into `\A`, that is to whatever it is defined in the `inputenc` encoding file.

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

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

```

3437 \def\MT@is@active#1#2\@nil{%
3438     \ifnum\catcode`#1 = \active
3439         \begingroup
3440             \set@display@protect
3441             \let\IeC\@firstofone
3442             \let\@inpenc@undefined@\MT@undefined@char

```

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

```

3443     \let\UTF@two@octets@noexpand\@empty
3444     \let\UTF@three@octets@noexpand\@empty
3445     \let\UTF@four@octets@noexpand\@empty

```

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

```

3446     \def\UTFviii@defined##1{\ifx ##1\relax

```



```
3447 \MT@undefined@char{utf8}\else\expandafter ##1\fi}%
```

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

```
3448 \MT@ifdefined@c@T\PrerenderUnicode
3449 {\PrerenderUnicode{\@tempa}\let\unicode@charfilter\@firstofone}%
```

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

```
3450 \edef\x{\endgroup
3451 \def\noexpand\@tempa{\expandafter\expandafter\expandafter\@empty\@tempa}%
```

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

```
3452 \MT@toks={\the\MT@toks\space(=
3453 \expandafter\expandafter\expandafter\@empty\@tempa)}%
3454 }%
3455 \x
3456 \fi
3457 }
```

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

```
3458 \def\MT@undefined@char#1{undefined in input encoding ``#1''}
```

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

```
3459 \def\MT@is@symbol{%
3460 \expandafter\def\expandafter\MT@char\expandafter
3461 {\csname\MT@encoding\MT@detokenize@c\@tempa\endcsname}%
```

Since recently, some glyphs are defined optionally in  $\text{\LaTeX}$  by checking if the glyph actually exists in the font (e.g., `\textasteriskcentered`).

```
3462 \expandafter\expandafter\expandafter
3463 \MT@is@opt@char\MT@char\iffontchar\char\else\fi\relax
3464 \expandafter\MT@exp@two@c\expandafter\MT@is@char\expandafter
3465 \meaning\expandafter\MT@char\MT@charstring\relax\relax\relax
3466 \ifnum\MT@char@ < \z@
```

In TU encoding, some commands (currently, `\textquotesingle`, `\textasciigrave` and `\textquotedbl`) are defined by means of the auxiliary macro `\remove@tlig`, which we take care of here.

```
3467 \expandafter\expandafter\expandafter\MT@is@tlig\MT@char\relax\relax
3468 \ifnum\MT@char@ < \z@
```

Finally, if it hasn't been defined by `\DeclareTextSymbol`, it could be a letter (e.g., `\i`, when using `frenchpro`).

```
3469 \expandafter\expandafter\expandafter\MT@is@letter\MT@char\relax\relax
3470 \fi
3471 \fi
3472 }
```

`\MT@is@opt@char` This seems adventurous, but we're only redefining the text command within the scope of our setup.

```
3473 \def\MT@is@opt@char#1\iffontchar#2\char#3\else#4\fi\relax{%
3474 \MT@ifempty{#1}{%
3475 \iffontchar#2%
3476 \expandafter\chardef
3477 \csname\MT@encoding\MT@detokenize@c\@tempa\endcsname=#3\relax
3478 \fi
3479 }\relax
3480 }
```

`\MT@is@char` A helper macro that inspects the `\meaning` of its argument.  
`\MT@charstring`

```

3481 \begingroup
3482 \catcode~\=/\z@
3483 /MT@map@tlist@n{\CHARLEX}/@makeother
3484 /lowercase{%
3485 /def/x{/endgroup
3486 /def/MT@charstring{\CHAR"%
3487 /def/MT@is@char##1\CHAR"##2##3##4/relax{%
3488 /ifx/relax##4/relax
3489 /ifMT@xunicode
3490 /expandafter/MT@is@charx/MT@strip@prefix##1>/relax\CHAR "%
3491 /relax/relax/relax/relax/relax
3492 /fi
3493 /else
3494 /ifx/relax##1/relax
3495 /if##3\relax
3496 /edef/MT@char@{/number"##2}%
3497 /MT@ifstreq/MT@charstring{##3##4}/relax/MT@noestfalse
3498 /else
3499 /edef/MT@char@{/number"##2##3}%
3500 /MT@ifstreq/MT@charstring{##4}/relax
3501 {/MT@is@xchar##2##3|##4\CHAR"/relax}%
3502 /fi
3503 <debug> /MT@dinfo@n1{3}{>~/the/MT@toks' is a \char (/MT@char@)}%
3504 /fi
3505 /fi
3506 }%

```

\MT@is@xchar With fontspec's TU encoding, glyph numbers may be up to four digits.

```

3507 /def/MT@is@xchar##1|##2\CHAR"##3##4/relax{%
3508 /MT@ifstreq/MT@charstring{##3##4}%
3509 {/edef/MT@char@{/number"##1##2}}/MT@noestfalse
3510 }%

```

\MT@charxstring For xunicode, which doesn't \countdef, but rather \defs the chars.

```

\MT@strip@prefix 3511 /def/MT@charxstring{\CHAR "%
\MT@is@charx 3512 /def/MT@strip@prefix##1>##2/relax{##2}%
3513 /def/MT@is@charx##1\CHAR "##2##3##4##5##6/relax{%
3514 /ifx/relax##1/relax
3515 /ifx/relax##6/relax/else
3516 /edef/MT@char@{/number"##2##3##4##5}%
3517 /MT@ifstreq{\RELAX >\CHAR "}{##6}/relax/MT@noestfalse
3518 <debug> /MT@dinfo@n1{3}{>~/the/MT@toks' is a xunicode \char (/MT@char@)}%
3519 /fi
3520 /fi
3521 }%
3522 }%
3523 }
3524 /x

```

\MT@is@tlig This might have to change again with the next L<sup>A</sup>T<sub>E</sub>X release, ... or so I feared, but it still seems to be fine.

```

3525 \def\MT@is@tlig#1#2\relax{%
3526 \ifx\remove@tlig#1%
3527 <debug> \MT@dinfo@n1{3}{>~/the/MT@toks' (removing remove@tlig)}%
3528 \MT@remove@tlig
3529 \fi
3530 }

```

\MT@remove@tlig We remove the \remove@tlig command and only pass on the number.

```

3531 \def\MT@remove@tlig{%
3532 \expandafter\MT@exp@two@c\expandafter\MT@is@number
3533 \expandafter\@secondoftwo\MT@char\relax\relax
3534 }

```

`\MT@is@composite` Here, we are dealing with accented characters, specified as two tokens.

```
3535 \def\MT@is@composite#1#2\relax{%
3536   \ifx\#2\\else
```

Again, we construct a control sequence, this time of the form: `\\(encoding)(accent)-(character)`, e.g., `\\T1\"-a`, which we then expand once to see if it is a letter (if it has been defined by `\DeclareTextComposite`). This should be robust, finally, especially, since we also `\detokenize` the input instead of only `\stringifying` it. Thus, we will die gracefully even on wrong Unicode input without `utf8`.

```
3537   \expandafter\def\expandafter\MT@char\expandafter{\csname\expandafter
3538     \string\csname\MT@encoding\endcsname
3539     \MT@detokenize@n{#1}-\MT@detokenize@n{#2}\endcsname}%
```

In 2017,  $\text{\LaTeX}$  introduced a new way of declaring accented Unicode commands (`\DeclareUnicodeComposite`), which we take care of here (`\UnicodeEncodingName` has been introduced at the same time):

```
3540   \ifx\UnicodeEncodingName\undefined\else
3541     \expandafter\expandafter\expandafter
3542       \MT@is@uni@comp\MT@char\iffontchar\else\fi\relax
3543   \fi
3544   \expandafter\expandafter\expandafter\MT@is@letter\MT@char\relax\relax
```

Again, `xunicode`.

```
3545   \ifnum\MT@char@ < \z@
3546     \ifMT@xunicode
3547       \edef\MT@char{\MT@exp@two@c\MT@strip@prefix\meaning\MT@char>\relax}%
3548       \expandafter\MT@exp@two@c\expandafter\MT@is@charx\expandafter
3549         \MT@char\MT@charxstring\relax\relax\relax\relax\relax
3550     \fi
3551   \fi
3552 \fi
3553 }
```

`\MT@is@uni@comp` Helper for `\DeclareUnicodeComposite`.

```
3554 \def\MT@is@uni@comp#1\iffontchar#2\else#3\fi\relax{%
3555   \ifx\#1\\edef\MT@char{\iffontchar#2\fi}\fi
3556 }
```

[What about math? Well, for a moment the following looked like a solution, with `\mt@is@mathchar` defined accordingly, analogous to `\MT@is@char` above, to pick up the last two tokens (the `\meaning` of a `\mathchardef`'ed command expands to its hexadecimal notation):

```
\def\MT@is@mathchar#1{%
  \if\relax\noexpand#1% it's a macro
    \let\x#1%
  \else % it's a character
    \mathchardef\x=\mathcode~#1\relax
  \fi
  \expandafter\MT@exp@two@c\expandafter\mt@is@mathchar\expandafter
    \meaning\expandafter\x\mt@mathcharstring\relax\relax\relax
}
```

However, the problem is that `\mathcodes` and `\mathchardefs` have global scope. Therefore, if they are changed by a package that loads different math fonts, there is no guarantee whatsoever that things will still be correct (e.g., the minus in `cmsy` when the `euler` package is loaded). So, no way to go, unfortunately.]

Some warning messages, for performance reasons separated here.

`\MT@curr@list@name` The type and name of the current list, defined at various places.

```
\MT@set@list@name 3557 \def\MT@set@list@name{%
```

```

3558 \edef\MT@curr@list@name{\@nameuse{MT@abbr@MT@feat} list\noexpand\MessageBreak
3559 ~\@nameuse{MT@MT@feat @c@name}}}%
3560 }

\MT@warn@ascii For ‘other’ characters > 127, we issue a warning (inputenc probably hasn’t been
loaded), since correspondence with the slot numbers would be purely coincidental.
3561 \def\MT@warn@ascii{%
3562 \MT@warning@nl{Character ~\the\MT@toks' (= \MT@char@)
3563 is outside of ASCII range.\MessageBreak
3564 You must load the ~inputenc' package before using\MessageBreak
3565 8-bit characters in \MT@curr@list@name}%
3566 }

\MT@warn@number@too@large Number too large.
3567 \def\MT@warn@number@too@large#1{%
3568 \MT@warning@nl{%
3569 Number #1 in encoding ~\MT@encoding' too large!\MessageBreak
3570 Ignoring it in \MT@curr@list@name}%
3571 }

\MT@warn@rest Not all of the string has been parsed.
3572 \def\MT@warn@rest{%
3573 \MT@warning@nl{%
3574 Unknown slot number of character\MessageBreak~\the\MT@toks'%
3575 \MT@warn@maybe@inputenc\MessageBreak
3576 in font encoding ~\MT@encoding'.\MessageBreak
3577 Make sure it's a single character\MessageBreak
3578 (or a number) in \MT@curr@list@name}%
3579 }

\MT@warn@unknown No idea what went wrong.
3580 \def\MT@warn@unknown{%
3581 \MT@warning@nl{%
3582 Unknown slot number of character\MessageBreak~\the\MT@toks'%
3583 \MT@warn@maybe@inputenc\MessageBreak
3584 in font encoding ~\MT@encoding' in \MT@curr@list@name}%
3585 }

\MT@warn@maybe@inputenc In case an input encoding had been requested.
3586 \def\MT@warn@maybe@inputenc{%
3587 \MT@ifdefined@n@T
3588 {MT@MT@feat @\MT@cat @\csname MT@MT@feat @\MT@cat @name\endcsname @inputenc}%
3589 { (input encoding ~\@nameuse
3590 {MT@MT@feat @\MT@cat @\csname MT@MT@feat @\MT@cat @name\endcsname @inputenc}')}%
3591 }

```

### 1.2.9 Hook into L<sup>A</sup>T<sub>E</sub>X’s font selection

We append `\MT@setupfont` to `\pickup@font`, which is called by L<sup>A</sup>T<sub>E</sub>X every time a font is selected. We then check whether we’ve already seen this font, and if not, set it up for micro-typography. This ensures that we will catch all fonts, and that we will not set up fonts more than once. The whole package really hangs on this command.

In contrast to the `pdfcprot` package, it is not necessary to declare in advance which fonts should benefit from micro-typographic treatment. Also, only those fonts that are actually being used will be set up.

For my reference:

- `\pickup@font` is called by `\selectfont`, `\wrong@fontshape`, or `\getanddefine@fonts` (for math).

- `\pickup@font` calls `\define@newfont`.
- `\define@newfont` may call (inside a group!)
  - `\wrong@fontshape`, which in turn will call `\pickup@font`, and thus `\define@newfont` again, or
  - `\extract@font`.
- `\get@external@font` is called by `\extract@font`, by itself, and by the substitution macros.

Up to version 1.3 of this package, we were using `\define@newfont` as the hook, which is only called for *new* fonts, and therefore seemed the natural choice. However, this meant that we had to take special care to catch all fonts: we additionally had to set up the default font, the error font (if it wasn't the default font), we had to check for some packages that might have been loaded before `microtype` and were loading fonts, e.g., `jurabib`, `ledmac`, `pi font` (loaded by `hyperref`), `tifa`, and probably many more. Furthermore, we had to include a hack for the `IEEEtran` class which loads all fonts in the class file itself (to fine tune inter-word spacing), and the `memoir` class, too. To cut this short: it seemed to get out of hand, and I decided that it would be better to use `\pickup@font` and decide for ourselves whether we've already seen that font. I hope the overhead isn't too large.

`\MT@font@list` We use a comma separated list.

```
\MT@font 3592 \let\MT@font@list\@empty
3593 \let\MT@font\@empty
```

All this is done at the beginning of the document. It doesn't work for plain, of course, which doesn't have `\pickup@font`.

```
3594 </package>
3595 <*package|letterspace>
3596 <plain>\MT@requires@latex2{
3597 \MT@addto@setup{%
```

`\MT@orig@pickupfont`

The `luatexja` package redefines `\char`, which will upset our parsing of text symbols and commands; instead of fixing this, we won't bother, at least for the moment, but simply issue a warning and disable all further warnings. The fix is left to the user by not specifying any text commands but only (Unicode) letters. The `xeCJK` package, or rather its `xunicode-addon`, also modifies the way text symbols are defined (like `luatexja` but in a different way). Again, we only issue a warning.

```
3598 <package> \MT@with@package@T{luatexja}{\MT@warn@unknown@once{luatexja}}%
3599 <package> \MT@with@package@T{xeCJK} {\MT@warn@unknown@once{xeCJK}}%
```

`microtype` also works with CJK in the sense that nothing will break when both packages are used at the same time. However, since CJK has its own way of encoding, it is currently not possible to create character-specific settings. That is, the only feature available with CJK fonts is (non-selected) expansion. (Tracking doesn't really work for other reasons.) Like us, CJK redefines `\pickup@font`.

```
3600 \ifpackage@loaded{CJK}{%
```

The `xeCJK` package in turn pretends that CJK was loaded, but does not change the definition of `\pickup@font`. With `xeCJK`, protrusion should be possible also for C/J/K characters; I haven't tried it, though.

```
3601 \ifpackage@loaded{xeCJK}{\@firstofone}{%
3602 \ifpackage@later{CJK}{2006/10/17}% 4.7.0
3603 {\def\MT@orig@pickupfont{\CJK@ifundefined\CJK@plane}}%
3604 {\def\MT@orig@pickupfont{\@ifundefined{CJK@plane}}}%
```

```

3605 \g@addto@macro\MT@orig@pickupfont
3606 {{\expandafter\ifx\font@name\relax\define@newfont\fi}}%

```

CJKut8 redefines \pickup@font once more (recent versions, in PDF mode, as determined by ifpdf, which CJKut8 loads).

```

3607 \ifpackageloaded{CJKut8}%
3608 {\@ifpackagelater{CJKut8}{2008/05/22}% 4.8.0
3609 {\ifpdf\expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi}%
3610 {\@firstoftwo}}%
3611 {\@firstoftwo}%
3612 {\g@addto@macro\MT@orig@pickupfont{%
3613 {\expandafter\ifx\csname\curr@fontshape/\f@size/\CJK@plane\endcsname\relax
3614 \define@newfont\else\xdef\font@name{%
3615 \csname \curr@fontshape/\f@size/\CJK@plane\endcsname\fi}}}%
3616 {\g@addto@macro\MT@orig@pickupfont{%
3617 {\expandafter\ifx\csname \curr@fontshape/\f@size/\CJK@plane\endcsname\relax
3618 \define@newfont\def\CJK@temp{v}%
3619 \ifx\CJK@temp\CJK@plane
3620 \expandafter\ifx\csname CJK@cmap@\f@family\CJK@plane\endcsname\relax
3621 \else\csname CJK@cmap@\f@family\CJK@plane\endcsname\fi
3622 \else \CJK@addcmap\CJK@plane \fi
3623 \else\xdef\font@name{%
3624 \csname \curr@fontshape/\f@size/\CJK@plane\endcsname\fi}}}%
3625 \@gobble
3626 }%
3627 }{\@firstofone}%

```

This is the normal L<sup>A</sup>T<sub>E</sub>X definition.

```

3628 {\def\MT@orig@pickupfont{\expandafter\ifx\font@name\relax\define@newfont\fi}}%

```

Check whether \pickup@font is defined as expected. The warning issued by \CheckCommand\* would be a bit too generic.

```

3629 \ifx\pickup@font\MT@orig@pickupfont \else
3630 \MT@warning@nl{%
3631 Command \string\pickup@font\space is not defined as expected.%
3632 \MessageBreak Patching it anyway. Some things may break%
3633 <package>
3634 .\MessageBreak Double-check whether micro-typography is indeed%
3635 \MessageBreak applied to the document.%
3636 \MessageBreak (Hint: Turn on `verbose' mode)%
3637 </package>
3638 }%
3639 \fi

```

\pickup@font Then we append our stuff. Everything is done inside a group.

```

3640 \g@addto@macro\pickup@font{\begingroup}%

```

If the trace package is loaded, we turn off tracing of microtype's setup, which is extremely noisy.

```

3641 \MT@with@package@T{trace}{\g@addto@macro\pickup@font{\conditionally@traceoff}}%
3642 \g@addto@macro\pickup@font{%
3643 \escapechar\m@ne
3644 <package>
3645 <debug> \global\MT@inannottrue
3646 <debug> \MT@glet\MT@pdf@annot\@empty
3647 <debug> \MT@addto@annot{(line \number\inputlineno)}%

```

If \MT@font is empty, no substitution has taken place, hence \font@name is correct. Otherwise, if they are different, \font@name does not describe the font actually used. This test will catch first order substitutions, like bx to b, but it will still fail if the substituting font is itself substituted.

```

3648 \MT@let@cn\MT@font{MT@subst@\expandafter\string\font@name}%
3649 \ifx\MT@font\relax

```

```

3650     \let\MT@font\font@name
3651     \else
3652     \ifx\MT@font\font@name \else
3653 <debug> \MT@addto@annot{= substituted with \MT@font}%
3654     \MT@register@subst@font
3655     \fi
3656     \fi
3657     \MT@setupfont
3658 </package>
3659 <letterspace> \MT@tracking
3660     \endgroup
3661 }%
3662 <*package>

```

\MT@pickupfont Remember the patched command, because we may have to disable ourselves in certain situations.

```

\MT@MT@pickupfont
\MT@ltx@pickupfont 3663 \let\MT@pickupfont\pickup@font
3664 \def\MT@MT@pickupfont {\let\pickup@font\MT@pickupfont}%
3665 \def\MT@ltx@pickupfont{\let\pickup@font\MT@orig@pickupfont}%

```

\do@subst@correction Additionally, we hook into \do@subst@correction, which is called if a substitution has taken place, to record the name of the ersatz font. Unfortunately, this will only work for one-level substitutions. We have to remember the substitute for the rest of the document, not just for the first time it is called, since we need it every time a font is letterspaced.

```

3666 \g@addto@macro\do@subst@correction
3667 {\edef\MT@font{\csname\curr@fontshape/\f@size\endcsname}%
3668 \MT@gletnc\MT@subst@expandafter\string\font@name}\MT@font}%

```

\add@accent Inside \add@accent, we have to disable microtype's setup, since the grouping in \MT@orig@add@accent the patched \pickup@font would break the accent if different fonts are used for the base character and the accent. Fortunately, L<sup>A</sup>T<sub>E</sub>X takes care that the fonts used for the \accent are already set up, so that we cannot be overlooking them.

```

3669 \let\MT@orig@add@accent\add@accent
3670 \def\add@accent#1#2{%
3671 \MT@ltx@pickupfont
3672 \MT@orig@add@accent{#1}{#2}%
3673 \MT@MT@pickupfont
3674 }%
3675 </package>
3676 }
3677 <plain>\relax
3678 <*package>

```

Consequently (if all goes well), we are the last ones to change these commands, therefore there is no need to check whether our definition has survived.

\MT@check@font Check whether we've already seen the current font.

```

3679 \def\MT@check@font{\MT@exp@one@n\MT@in@clist\MT@font\MT@font@list}

```

\MT@register@font Register the current font.

```

3680 \def\MT@register@font{\xdef\MT@font@list{\MT@font@list\MT@font,}}

```

\MT@register@subst@font Register the substituted font (only if it isn't registered already). Additionally, we have to remove the substitute font from the list of fonts, so that we set it up again.

```

3681 \def\MT@register@subst@font{%
3682 \MT@exp@one@n\MT@in@clist\font@name\MT@font@list
3683 \ifMT@inlist\else
3684 \xdef\MT@font@list{\MT@font@list\font@name,}%
3685 \expandafter\MT@rem@from@clist\MT@font\MT@font@list
3686 \fi
3687 }

```

### 1.2.10 Context-sensitive setup

Here are the variants for context-sensitive setup.

`\MT@active@features` The activated features are stored in this command.

```
3688 \let\MT@active@features\@empty
```

`\MT@check@font@cx` Every feature has its own list of fonts that have already been dealt with. If the font needn't be set up for a feature, we temporarily disable the corresponding setup command. This should be more efficient than book-keeping the fonts in lists associated with the combination of contexts, as we've done it before.

```
3689 \def\MT@check@font@cx{%
3690   \MT@if@true
3691   \MT@map@clist@c\MT@active@features{%
3692     \expandafter\MT@exp@one@n\expandafter\MT@in@clist\expandafter\MT@font
3693     \csname MT@##1\csname MT@##1@context\endcsname font@list\endcsname
3694     \ifMT@inlist@
3695       \MT@let@nc{MT@\@nameuse{MT@abbr@##1}}\relax
3696     \else
3697       \MT@if@false
3698     \fi
3699   }%
3700   \ifMT@if@ \MT@inlist@true \else \MT@inlist@false \fi
3701 }
```

`\MT@register@subst@font@cx` Add the substituted font to each feature list and possibly remove substitute font.

```
3702 \def\MT@register@subst@font@cx{%
3703   \MT@map@clist@c\MT@active@features{%
3704     \expandafter\MT@exp@one@n\expandafter\MT@in@clist\expandafter\font@name
3705     \csname MT@##1\csname MT@##1@context\endcsname font@list\endcsname
3706     \ifMT@inlist@ \else
3707       \MT@exp@cs\MT@xadd
3708       {MT@##1\csname MT@##1@context\endcsname font@list}%
3709       {\font@name,}%
3710     \expandafter\MT@exp@one@n\expandafter\MT@rem@from@clist\expandafter\MT@font
3711     \csname MT@##1\csname MT@##1@context\endcsname font@list\endcsname
3712     \fi
3713   }%
3714 }
```

`\MT@register@font@cx` For each feature, add the current font to the list, unless we didn't set it up.

```
3715 \def\MT@register@font@cx{%
3716   \MT@map@clist@c\MT@active@features{%
3717     \MT@exp@cs\ifx{MT@\@nameuse{MT@abbr@##1}}\relax\else
3718       \MT@exp@cs\MT@xadd
3719       {MT@##1\csname MT@##1@context\endcsname font@list}%
3720       {\MT@font,}%
3721     \def\@tempa{##1}%
3722     \MT@exp@cs\MT@map@tlist@c{MT@##1@doc@contexts}\MT@maybe@rem@from@list
3723     \fi
3724   }%
3725 }
```

`\MT@maybe@rem@from@list` Recurse through all context font lists of the document and remove the font, unless it's the current context.

```
3726 \def\MT@maybe@rem@from@list#1{%
3727   \MT@ifstreq{\@tempa/#1}{\@tempa/\csname MT@\@tempa @context\endcsname}\relax{%
3728     \expandafter\MT@exp@one@n\expandafter\MT@rem@from@clist\expandafter
3729     \MT@font \csname MT@\@tempa @#1font@list\endcsname
3730   }%
3731 }
```

`\microtypecontext` The user may change the context, so that different setups are possible. This is especially useful for multi-lingual documents.

`\MT@microtypecontext`



Inside the preamble, this command shouldn't actually do anything but remember itself for later.

```

3732 \def\microtypecontext{\MT@begin@catcodes\MT@microtypecontext}
3733 \def\MT@microtypecontext#1{\MT@end@catcodes\MT@addto@setup{\microtypecontext{#1}}}
3734 \MT@addto@setup{%
3735   \DeclareRobustCommand\microtypecontext{%
3736     \MT@begin@catcodes
3737     \MT@microtypecontext
3738   }%
3739   \def\MT@microtypecontext#1{%
3740     \MT@end@catcodes
3741     \MT@setup@contexts
3742     \let\MT@reset@context\relax

```

We need to ensure that math fonts are set up anew.

```

3743   \MT@gllet\glb@currsizel\empty
3744   \setkeys{MTC}{#1}%
3745   \selectfont
3746   \MT@reset@context
3747 }%
3748 }

```

`\textmicrotypecontext` This is just a wrapper around `\microtypecontext`.

```

\MT@textmicrotypecontext 3749 \DeclareRobustCommand\textmicrotypecontext{\MT@begin@catcodes\MT@textmicrotypecontext}
\MT@text@microtypecontext 3750 \def\MT@textmicrotypecontext#1{\MT@end@catcodes\MT@text@microtypecontext{#1}}
3751 \def\MT@text@microtypecontext#1#2{\microtypecontext{#1}#2}

```

`\MT@reset@context` We have to reset the font at the end of the group, provided there actually was a change.

```

3752 \def\MT@reset@context@{%
3753   \MT@vinfo{<<< Resetting contexts\on@line
3754   <debug> \MessageBreak= \MT@pr@context/\MT@ex@context
3755   <debug>           /\MT@tr@context/\MT@kn@context/\MT@sp@context
3756   }%
3757   \selectfont
3758 }

```

`\MT@setup@contexts` The first time `\microtypecontext` is called, we initialise the context lists and redefine the commands used in `\pickup@font`.

```

3759 \def\MT@setup@contexts{%
3760   \MT@map@clist@c\MT@active@features
3761   {\MT@gllet@nc{MT@##1@font@list}\MT@font@list}%
3762   \MT@gllet\MT@check@font\MT@check@font@cx
3763   \MT@gllet\MT@register@font\MT@register@font@cx
3764   \MT@gllet\MT@register@subst@font\MT@register@subst@font@cx
3765   \MT@gllet\MT@setup@contexts\relax
3766 }

```

Define context keys.

```

3767 \MT@map@clist@c\MT@features@long{%
3768   \define@key{MTC}{#1}[]{}%
3769   \edef\@tempb{\@nameuse{MT@rbba#1}}%
3770   \MT@exp@one@n\MT@in@clist\@tempb\MT@active@features
3771   \ifMT@inlist@

```

Using an empty context is only asking for trouble, therefore we choose the ‘@’ instead (hoping for the L<sup>A</sup>T<sub>E</sub>X users’ natural awe of this character).

```

3772   \MT@ifempty{#1}{\def\MT@val{0}}{\def\MT@val{#1}}%
3773   \MT@exp@cs\ifx{MT@ \@tempb @context}\MT@val
3774   <debug> \MT@dinfo{1}{>>> no change of #1 context: `~\MT@val'}%
3775   \else
3776     \MT@vinfo{>>> Changing #1 context to `~\MT@val'\MessageBreak\on@line
3777   <debug> \space(previous: `~\@nameuse{MT@ \@tempb @context}')}%
3778   }%

```

```
3779 \def\MT@reset@context{\aftergroup\MT@reset@context}%
```

The next time we see the font, we have to reset *all* factors.

```
3780 \MT@gl@et@nn{MT@reset@\@tempb @codes}{MT@reset@\@tempb @codes}%
```

We must also keep track of all contexts in the document.

```
3781 \expandafter\MT@exp@one@n\expandafter\MT@in@tlist\expandafter
3782 \MT@val \csname MT@\@tempb @doc@contexts\endcsname
3783 \ifMT@inlist@ \else
3784 \MT@exp@cs\MT@xadd{MT@\@tempb @doc@contexts}{\MT@val}}%
3785 <debug> \MT@info{1}{||| added #1 context: \@nameuse{MT@\@tempb @doc@contexts}}%
3786 \fi
3787 \MT@edef@n{MT@\@tempb @context}{\MT@val}%
3788 \fi
3789 \fi
3790 }%
3791 }
```

We also allow the activate shortcut.

```
3792 \define@key{MTC}{activate}[]{}%
3793 \setkeys{MTC}{protrusion={#1}}%
3794 \setkeys{MTC}{expansion={#1}}%
3795 }
```

\MT@pr@context Initialise the contexts.

```
\MT@ex@context 3796 \MT@exp@one@n\MT@map@clist@n{\MT@features,n1}}%
```

```
\MT@tr@context 3797 \MT@def@n{MT@#1@context}{@}%
```

```
\MT@sp@context 3798 \MT@def@n{MT@#1@doc@contexts}{\{0}}%
```

```
\MT@kn@context 3799 }
```

```
\MT@kn@context 3800 \let\MT@extra@context\empty
```

```
\MT@pr@doc@contexts
```

```
\MT@ex@doc@contexts
```

```
\MT@tr@doc@contexts
```

```
\MT@sp@doc@contexts
```

```
\MT@kn@doc@contexts
```

```
\DeclareMicrotypeSet
```

```
\MT@extra@context
```

```
\DeclareMicrotypeSet*
```

## 1.3 Configuration

### 1.3.1 Font sets

Calling this macro will create a comma list for every font attribute of the form: `\MT<feature>list@<attribute>@<set name>`. If the optional argument is empty, lists for all available features will be created.

The third argument must be a list of key=value pairs. If a font attribute is not specified, we define the corresponding list to `\relax`, so that it does not constitute a constraint.

```
3801 \def\DeclareMicrotypeSet{%
3802 \MT@begin@catcodes
3803 \ifstar
3804 \MT@DeclareSetAndUseIt
3805 \MT@DeclareSet
3806 }
```

\MT@DeclareSet

```
3807 \newcommand\MT@DeclareSet[3][]{%
3808 \MT@ifempty{#1}{%
3809 \MT@map@clist@c\MT@features{\begingroup\MT@declare@sets{##1}{#2}{#3}\endgroup}%
3810 }{%
3811 \MT@map@clist@n{#1}{\begingroup
3812 \MT@ifempty{##1}\relax{%
3813 \MT@is@feature{##1}{set declaration `#2'}{%
3814 \MT@exp@one@n\MT@declare@sets
3815 {\csname MT@rbba@##1\endcsname}{#2}{#3}%
3816 }%
3817 }%
3818 \endgroup}%
3819 }%
```

```

3820 \MT@end@catcodes
3821 }

\MT@DeclareSetAndUseIt
3822 \newcommand\MT@DeclareSetAndUseIt[3] [] {%
3823 \MT@DeclareSet[#1]{#2}{#3}%
3824 \UseMicrotypeSet[#1]{#2}%
3825 }

\MT@curr@set@name We need to remember the name of the set currently being declared.
3826 \let\MT@curr@set@name\@empty

\MT@declare@sets Define the current set name and parse the keys.
3827 \def\MT@declare@sets#1#2#3{%
3828 \def\MT@curr@set@name{#2}%
3829 \MT@ifdefined@n@T{MT@#1@set@@\MT@curr@set@name}{%
3830 \MT@warning{Redefining \@nameuse{MT@abbr@#1} set ` \MT@curr@set@name'%}
3831 \MT@map@clist@n{font,encoding,family,series,shape,size}{%
3832 \MT@gl@et@nc{MT@#1@list@##1@MT@curr@set@name}\@undefined
3833 }%
3834 }%
3835 \MT@gl@et@nc{MT@#1@set@@\MT@curr@set@name}\@empty
3836 debug \MT@edinfo{1}{declaring \@nameuse{MT@abbr@#1} set ` \MT@curr@set@name'%}
3837 \setkeys{MT@#1@set}{#3}%
3838 }

\MT@define@set@key@ <#1> = font axis, <#2> = feature.
3839 \def\MT@define@set@key@#1#2{%
3840 \define@key{MT@#2@set}{#1} [] {%
3841 \MT@gl@et@nc{MT@#2@list@#1@MT@curr@set@name}\@empty
3842 \MT@map@clist@n{##1}{%
3843 \KV@sp@def\MT@val{###1}%
3844 \MT@get@highlevel{#1}%

We do not add the expanded value to the list ...
3845 \MT@exp@two@n@g@addto@macro
3846 { \csname MT@#2@list@#1@MT@curr@set@name\expandafter\endcsname}%
3847 { \MT@val,}%
3848 }%

... but keep in mind that the list has to be expanded at the end of the preamble.
3849 \expandafter\g@addto@macro\expandafter\MT@font@sets
3850 \csname MT@#2@list@#1@MT@curr@set@name\endcsname
3851 debug \MT@edinfo@n1{1}{-- #1: \@nameuse{MT@#2@list@#1@MT@curr@set@name}}%
3852 }%
3853 }

\MT@get@highlevel Saying, for instance, ‘family=rm*’ or ‘shape=bf*’ will expand to \rmdefault resp.
\bfdefault.
3854 \def\MT@get@highlevel#1{%
3855 \expandafter\MT@test@ast\MT@val*\@nil\relax{%

And ‘family = *’ will become \familydefault.
3856 \MT@ifempty\@tempa{\def\@tempa{#1}}\relax

Test whether the command is actually defined.
3857 \MT@ifdefined@n@TF{\@tempa default}%
3858 {\edef\MT@val{\expandafter\noexpand\csname \@tempa default\endcsname}}%
3859 {\MT@warning{\@backslashchar\@tempa default' is not a defined command.\MessageBreak
3860 Ignoring `#1 = {\@tempa*}' in font set\MessageBreak` \MT@curr@set@name'%}
3861 \let\MT@val\@empty}%

In contrast to earlier versions, these values will not be expanded immediately, but
at the end of the preamble.

```

```
3862 }%
3863 }
```

\MT@test@ast     It the last character is an asterisk, execute the second argument, otherwise the first one.

```
3864 \def\MT@test@ast#1*#2\@nil{%
3865   \def\@tempa{#1}%
3866   \MT@ifempty{#2}%
3867 }
```

\MT@font@sets     Fully expand the font specification and fix catcodes for all font sets. Also remove  
 \MT@fix@font@set   fontspec's counters.

```
3868 \let\MT@font@sets\empty
3869 \def\MT@fix@font@set#1{%
3870   \MT@ifdefined@c@T{#1}{%
3871     \xdef#1{#1}%
3872     \ifMT@fontspec
3873       \xdef#1{\expandafter\MT@scrubfeatures#1()\relax}%
3874     \fi
3875     \global\@onelevel@sanitize#1%
3876   }%
3877 }
```

\MT@define@set@key@size     size requires special treatment.

```
3878 \def\MT@define@set@key@size#1{%
3879   \define@key{MT@#1@set}{size}[]{%
3880     \MT@map@cliston{##1}{%
3881       \def\MT@val{####1}%
3882       \expandafter\MT@get@range\MT@val--\@nil
3883       \ifx\MT@val\relax \else
3884         \MT@exp@cs\MT@xadd
3885         {MT@#1list@size@MT@curr@set@name}%
3886         {{{\MT@lower}{\MT@upper}\relax}}%
3887       \fi
3888     }%
3889     <debug>\MT@infoonl{1}{-- size: \@nameuse{MT@#1list@size@MT@curr@set@name}}%
3890   }%
3891 }
```

Font sizes may also be specified as ranges. This has been requested by Andreas Böhmann, who has also offered valuable help in implementing this. Now, it is for instance possible to set up different lists for fonts with optical sizes. (The MinionPro project does this for the OpenType version of Adobe's Minion. (Available from CTAN at [pkg/minionpro](#)))

\MT@get@range     Ranges will be stored as triplets of {<lower bound>}{<upper bound>}{<list name>}.

\MT@upper     For simple sizes, the upper boundary is -1.

```
\MT@lower 3892 \def\MT@get@range#1-#2-#3\@nil{%
3893   \MT@ifempty{#1}{%
3894     \MT@ifempty{#2}{%
3895       \let\MT@val\relax
3896     }%
3897     \def\MT@lower{0}%
3898     \def\MT@val{#2}%
3899     \MT@get@size
3900     \edef\MT@upper{\MT@val}%
3901   }%
3902 }%
3903 \def\MT@val{#1}%
3904 \MT@get@size
3905 \ifx\MT@val\relax \else
3906   \edef\MT@lower{\MT@val}%
3907   \MT@ifempty{#2}{%
```

```

3908      \MT@ifempty{#3}%
3909      {\def\MT@upper{-1}}%
2048 pt is TeX's maximum font size.
3910      {\def\MT@upper{2048}}%
3911    }{%
3912      \def\MT@val{#2}%
3913      \MT@get@size
3914      \ifx\MT@val\relax \else
3915        \MT@ifdim\MT@lower>\MT@val{%
3916          \MT@error{%
3917            Invalid size range (\MT@lower\space > \MT@val) in font set
3918            ~\MT@curr@set@name'.\MessageBreak Swapping sizes}}%
3919          \edef\MT@upper{\MT@lower}%
3920          \edef\MT@lower{\MT@val}%
3921        }{%
3922          \edef\MT@upper{\MT@val}%
3923        }%
3924        \MT@ifdim\MT@lower=\MT@upper
3925        {\def\MT@upper{-1}}%
3926        \relax
3927      \fi
3928    }%
3929  \fi
3930 }%
3931 }

```

`\MT@get@size` Translate a size selection command and normalise it.

```

3932 \def\MT@get@size{%
  A single star would mean \sizedefault, which doesn't exist, so we define it to be
  \normalsize.
3933   \if*\MT@val\relax
3934     \def\@tempa{\normalsize}%
3935   \else
3936     \MT@let@cn\@tempa{\MT@val}%
3937   \fi
3938   \ifx\@tempa\relax\else
3939     \MT@get@size@
3940   \fi

```

Test whether we finally got a number or dimension so that we can strip the ‘pt’  
(`\@defaultunits` and `\strip@pt` are kernel macros).

```

3941 \MT@ifdimen\MT@val{%
3942   \@defaultunits\@tempdima\MT@val pt\relax\@nnil
3943   \edef\MT@val{\strip@pt\@tempdima}%
3944 }{%
3945   \MT@warning{Could not parse font size ~\MT@val'\MessageBreak
3946     in font set ~\MT@curr@set@name'}%
3947   \let\MT@val\relax
3948 }%
3949 }

```

`\MT@get@size@` The `relsize` solution of parsing `\@setfontsize` does not work with the AMS  
`\MT@get@size@@` classes, among others. I hope my hijacking doesn't do any harm. We redefine  
`\set@fontsize` instead of `\@setfontsize` because some classes might define the  
size selection commands by simply using `\fontsize` (e.g., the `a0poster` class).

```

3950 \def\MT@get@size@@{%
3951   \begingroup
3952   \def\set@fontsize##1##2##3##4\@nil{\endgroup\def\MT@val{##2}}%
3953   \@tempa\@nil
3954 }

```

The `svjour3` class defines the size commands using conditionals; using e-TeX

primitives, we close any leftovers here.

```

3955 ^^X\@ifclassloaded{svjour3}{%
3956 ^^X  \def\MT@get@size@{%
3957 ^^X    \@tempcnta=\currentiflevel
3958 ^^X    \MT@get@size@@
3959 ^^X    \MT@loop
3960 ^^X      \ifnum\numexpr\currentiflevel-1>\@tempcnta
3961 ^^X        \csname fi\endcsname
3962 ^^X      \MT@repeat
3963 ^^X    }%
3964 ^^X}{%
3965 ^^X  \let\MT@get@size@\MT@get@size@@
3966 ^^X}

```

\MT@define@set@key@font

```

3967 \def\MT@define@set@key@font#1{%
3968   \define@key{MT@#1@set}{font}[]{%
3969     \MT@glet@nc{MT@#1list@font@\MT@curr@set@name}\@empty
3970     \MT@map@clist@n{##1}{%
3971       \def\MT@val{####1}%
3972       \MT@ifstreq\MT@val*{\def\MT@val{*/*/*/*/}}\relax
3973       \expandafter\MT@get@font\MT@val////\@nil
3974       \MT@exp@two@n@g@addto@macro
3975         {\csname MT@#1list@font@\MT@curr@set@name\expandafter\endcsname}%
3976         {\MT@val,}%
3977     }%
3978     \expandafter\g@addto@macro\expandafter\MT@font@sets
3979     \csname MT@#1list@font@\MT@curr@set@name\endcsname
3980   }%
3981 }
3982 }

```

\MT@get@font      Translate any asterisks.

```

3983 \def\MT@get@font#1/#2/#3/#4/#5/#6\@nil{%
3984   \MT@get@font@{#1}{#2}{#3}{#4}{#5}{0}%
3985   \ifx\MT@val\relax\def\MT@val{0}\fi
3986   \expandafter\g@addto@macro\expandafter\@tempb\expandafter{\MT@val}%
3987   \let\MT@val\@tempb
3988 }

```

\MT@get@font@      Helper macro, also used by \MT@get@font@and@size.

```

3989 \def\MT@get@font@#1#2#3#4#5#6{%
3990   \let\@tempb\@empty
3991   \def\MT@temp{#1/#2/#3/#4/#5}%
3992   \MT@get@axis{encoding}{#1}%
3993   \MT@get@axis{family} {#2}%
3994   \MT@get@axis{series} {#3}%
3995   \MT@get@axis{shape} {#4}%
3996   \ifnum#6>\z@\edef\@tempb{\@tempb*}\fi
3997   \MT@ifempty{#5}{%
3998     \MT@warn@axis@empty{size}{\string\normalsize}%
3999     \def\MT@val{*}%
4000   }{%
4001     \def\MT@val{#5}%
4002   }%
4003   \MT@get@size
4004 }

```

\MT@get@axis

```

4005 \def\MT@get@axis#1#2{%
4006   \def\MT@val{#2}%
4007   \MT@get@highlevel{#1}%
4008   \MT@ifempty\MT@val{%
4009     \MT@warn@axis@empty{#1}{\csname #1default\endcsname}%

```

```

4010 \expandafter\def\expandafter\MT@val\expandafter{\csname #1default\endcsname}%
4011 }\relax
4012 \expandafter\g@addto@macro\expandafter\@tempb\expandafter{\MT@val/}%
4013 }

```

\MT@warn@axis@empty

```

4014 \def\MT@warn@axis@empty#1#2{%
4015 \MT@warning{#1 axis is empty in font specification\MessageBreak
4016 ~\MT@temp'. Using ~#2' instead}%
4017 }

```

We can finally assemble all pieces to define \DeclareMicrotypeSet's keys. They are also used for \DisableLigatures.

```

4018 \MT@exp@one@n\MT@map@clist@n{\MT@features,nl}{%
4019 \MT@define@set@key@{encoding}{#1}%
4020 \MT@define@set@key@{family}{#1}%
4021 \MT@define@set@key@{series}{#1}%
4022 \MT@define@set@key@{shape}{#1}%
4023 \MT@define@set@key@size{#1}%
4024 \MT@define@set@key@font{#1}%
4025 }

```

\UseMicrotypeSet To use a particular set we simply redefine MT@<feature>@setname. If the optional argument is empty, set names for all features will be redefined.

```

4026 \def\UseMicrotypeSet{%
4027 \MT@begin@catcodes
4028 \MT@UseMicrotypeSet
4029 }

```

\MT@UseMicrotypeSet

```

4030 \newcommand*\MT@UseMicrotypeSet[2][]{%
4031 \MT@ifempty{#1}{%
4032 \MT@map@clist@c\MT@features{\begingroup\MT@use@set{##1}{#2}\endgroup}%
4033 }{%
4034 \MT@map@clist@n{#1}{\begingroup
4035 \MT@ifempty{##1}\relax{%
4036 \MT@is@feature{##1}{activation of set ~#2'}{%
4037 \MT@exp@one@n\MT@use@set
4038 {\csname MT@rbba@##1\endcsname}{#2}%
4039 }%
4040 }%
4041 \endgroup}%
4042 }%
4043 \MT@end@catcodes
4044 }

```

\MT@pr@setname Only use sets that have been declared.

```

\MT@ex@setname 4045 \def\MT@use@set#1#2{%
\MT@tr@setname 4046 \MT@ifdefined@n@TF{MT@#1@set@@#2}{%
4047 \MT@xdef@n{MT@#1@setname}{#2}%
\MT@sp@setname 4048 }{%
\MT@kn@setname 4049 \MT@ifdefined@n@TF{MT@#1@setname}\relax{%
\MT@use@set 4050 \MT@xdef@n{MT@#1@setname}{\@nameuse{MT@default@#1@set}}%
4051 }%
4052 \MT@error{%
4053 The \@nameuse{MT@abbr@#1} set ~#2' is undeclared.\MessageBreak
4054 Using set ~\@nameuse{MT@#1@setname}' instead}{}%
4055 }%
4056 }

```

\DeclareMicrotypeSetDefault This command can be used in the main configuration file to declare the default font set, in case no set is specified in the package options.

```

4057 \def\DeclareMicrotypeSetDefault{%
4058 \MT@begin@catcodes

```

```

4059 \MT@DeclareMicrotypeSetDefault
4060 }

```

```
\MT@DeclareMicrotypeSetDefault
```

```

4061 \newcommand*\MT@DeclareMicrotypeSetDefault[2][ ]{%
4062 \MT@ifempty{#1}{%
4063 \MT@map@clist@{\MT@features{\begingroup\MT@set@default@set{##1}{#2}\endgroup}%
4064 }{%
4065 \MT@map@clist@{#1}{\begingroup
4066 \MT@ifempty{##1}\relax{%
4067 \MT@is@feature{##1}{declaration of default set `#2'}{%
4068 \MT@exp@one@{\MT@set@default@set
4069 {\csname MT@rbba@##1\endcsname}{#2}%
4070 }%
4071 }%
4072 \endgroup}%
4073 }%
4074 \MT@end@catcodes
4075 }

```

```
\MT@default@pr@set
```

```
\MT@default@ex@set 4076 \def\MT@set@default@set#1#2{%
```

```
\MT@default@tr@set 4077 \MT@ifdefined@n@TF{MT@#1@set@#2}{%
```

```
\MT@default@sp@set 4078 (debug)\MT@info{1}{declaring default \@nameuse{MT@abbr@#1} set `#2'}%
```

```
\MT@default@kn@set 4079 \MT@xdef@{\MT@default@#1@set}{#2}%
```

```
\MT@set@default@set 4080 }{%
```

```
\MT@error{%
```

```
The \@nameuse{MT@abbr@#1} set `#2' is not declared.\MessageBreak
```

```
Cannot make it the default set. Using set\MessageBreak `all' instead}{}%
```

```
\MT@xdef@{\MT@default@#1@set}{all}%
```

```
4085 }%
```

```
4086 }
```

### 1.3.2 Variants and aliases

`\DeclareMicrotypeVariants` Specify suffixes for variants (see `fontname/variants.map`). The starred version appends to the list.

```
\MT@variants
```

```

4087 \let\MT@variants@empty
4088 \def\DeclareMicrotypeVariants{%
4089 \MT@begin@catcodes
4090 \ifstar
4091 \MT@DeclareVariants
4092 {\let\MT@variants@empty\MT@DeclareVariants}%
4093 }

```

```
\MT@DeclareVariants
```

```

4094 \def\MT@DeclareVariants#1{%
4095 \MT@map@clist@{#1}{%
4096 \def\@tempa{##1}%
4097 \@onelevel@sanitize\@tempa
4098 \xdef\MT@variants{\MT@variants{\@tempa}}%
4099 }%
4100 \MT@end@catcodes
4101 }

```

`\DeclareMicrotypeAlias`

This can be used to set an alias name for a font, so that the file and the settings for the aliased font will be loaded.

```

4102 \def\DeclareMicrotypeAlias{%
4103 \MT@begin@catcodes
4104 \MT@DeclareMicrotypeAlias
4105 }

```

```
\MT@DeclareMicrotypeAlias
```



```

4106 \newcommand*\MT@DeclareMicrotypeAlias[2]{%
4107   \def\@tempb{#2}%
4108   \@onelevel@sanitize\@tempb
4109   \MT@ifdefined\@T{MT@#1@alias}{%
4110     \MT@warning{Alias font family '\@tempb' will override
4111       alias '\@nameuse{MT@#1@alias}'\MessageBreak
4112     for font family `#1'}%
4113   \MT@xdef\@T{MT@#1@alias}{\@tempb}%

```

If we encounter this command while a font is being set up, we also set the alias for the current font so that if `\DeclareMicrotypeAlias` has been issued inside a configuration file, the configuration file for the alias font will be loaded, too.

```

4114   \MT@ifdefined\@cT\MT@family{%
4115     <debug>\MT@info{1}{Activating alias font '\@tempb' for '\MT@family'}%
4116     \MT@glet\MT@familyalias\@tempb
4117   }%
4118   \MT@end@catcodes
4119 }

```

`\LoadMicrotypeFile` May be used to load a configuration file manually.

```

4120 \def\LoadMicrotypeFile#1{%
4121   \edef\@tempa{\zap@space#1 \@empty}%
4122   \@onelevel@sanitize\@tempa
4123   \MT@exp@one\@T{in@clist}\@tempa\MT@file@list
4124   \ifMT@inlist@
4125     \MT@vinfo{... Configuration file mt-\@tempa.cfg already loaded}%
4126   \else
4127     \MT@xadd\MT@file@list{\@tempa,}%
4128     \MT@begin@catcodes
4129     \InputIfFileExists{mt-\@tempa.cfg}{%
4130       \edef\MT@curr@file{mt-\@tempa.cfg}%
4131       \MT@vinfo{... Loading configuration file \MT@curr@file}%
4132     }{%
4133       \MT@warning{Configuration file mt-\@tempa.cfg\MessageBreak
4134         does not exist}%
4135     }%
4136     \MT@end@catcodes
4137   \fi
4138 }
4139 </package>
4140 </package|letterspace>

```

### 1.3.3 Disabling ligatures

`\DisableLigatures` This is really simple now: we can re-use the set definitions of `\DeclareMicrotypeSet`; there can only be one set, which we'll call 'no ligatures'.

`\MT@nl@setname` The optional argument may be used to disable selected ligatures only.

```

\MT@nl@ligatures 4141 <*pdf-|lua->
4142 <pdf->\MT@requires@pdftex5{
4143 \def\DisableLigatures{%
4144   \MT@begin@catcodes
4145   \MT@DisableLigatures
4146 }
4147 \newcommand*\MT@DisableLigatures[2][{}]{%
4148   \MT@ifempty{#1}\relax{\gdef\MT@nl@ligatures{#1}}%
4149   \xdef\MT@active@features{\MT@active@features,nl}%
4150   \global\MT@no@ligaturestrue
4151   \MT@declare@sets{nl}{no ligatures}{#2}%
4152   \gdef\MT@nl@setname{no ligatures}%
4153   \MT@end@catcodes
4154 }
4155 <pdf->}{
4156 </pdf-|lua->

```

If pdfTeX is too old, we throw an error.

```

4157 <pdf-|xe-
4158 \renewcommand*{DisableLigatures}[2][]{%
4159   \MT@error{Disabling ligatures of a font is only possible\MessageBreak
4160     with pdftex version 1.30 or newer.\MessageBreak
4161     Ignoring \@backslashchar DisableLigatures}{%
4162 <pdf-} Upgrade
4163 <xe-} Use
4164   pdftex.}%
4165 }
4166 <pdf-}
4167 </pdf-|xe-

```

### 1.3.4 Interaction with babel

`\DeclareMicrotypeBabelHook` Declare the context that should be loaded when a babel language is selected. The command will not check whether a previous declaration will be overwritten.

```

4168 <package
4169 \def\DeclareMicrotypeBabelHook#1#2{%
4170   \MT@map@clist@n{#1}{%
4171     \KV@esp@def\@tempa{##1}%
4172     \MT@gdef@n{MT@babel@}\@tempa}{#2}%
4173   }%
4174 }

```

### 1.3.5 Fine tuning

The commands `\SetExpansion` and `\SetProtrusion` provide an interface for setting the character protrusion resp. expansion factors for a set of fonts.

`\SetProtrusion` This macro accepts three arguments: [options,] set of font attributes and list of character protrusion factors.

A new macro called `\MT@pr@c@<name>` will be defined to be `<#3>` (i.e., the list of characters, not expanded).

```

4175 \def\SetProtrusion{%
4176   \MT@begin@catcodes
4177   \MT@SetProtrusion
4178 }

```

`\MT@SetProtrusion` We want the catcodes to be correct even if this is called in the preamble.

```

\MT@pr@c@name 4179 \newcommand*\MT@SetProtrusion[3][]{%

```

`\MT@extra@context` 4180 \let\MT@extra@context\empty

`\MT@permutelist` Parse the optional first argument. We first have to know the name before we can deal with the extra options.

```

4181   \MT@set@named@keys{MT@pr@c}{#1}%
4182 <debug>\MT@info{1}{creating protrusion list `~\MT@pr@c@name'}%
4183   \def\MT@permutelist{pr@c}%
4184   \setkeys{MT@cfig}{#2}%

```

We have parsed the second argument, and can now define macros for all permutations of the font attributes to point to `\MT@pr@c@<name>`, ...

```

4185   \MT@permute

```

... which we can now define to be `<#3>`. Here, as elsewhere, we have to make the definitions global, since they will occur inside a group.

```

4186   \MT@gdef@n{MT@pr@c@}\MT@pr@c@name}{#3}%
4187   \MT@end@catcodes
4188 }
4189 </package>

```

`\SetExpansion` `\SetExpansion` only differs in that it allows some extra options (stretch, shrink, step, auto).

```

4190 (*pdf-|lua-)
4191 \def\SetExpansion{%
4192   \MT@begin@catcodes
4193   \MT@SetExpansion
4194 }

```

`\MT@SetExpansion`

```

\MT@ex@c@name 4195 \newcommand*\MT@SetExpansion[3] [] {%
4196   \let\MT@extra@context\@empty
\MT@extra@context 4197   \MT@set@named@keys{MT@ex@c}{#1}%
\MT@permutelist 4198   \MT@ifdefined@n@T{MT@ex@c@MT@ex@c@name @factor}{%
4199     \ifnum\c@name MT@ex@c@MT@ex@c@name @factor\endcsname > \@m
4200     \MT@warning@n1{Expansion factor \number\@nameuse{MT@ex@c@MT@ex@c@name @factor}
4201       too large in list\MessageBreak `~\MT@ex@c@name'. Setting it to the
4202       maximum of 1000}%
4203     \MT@gl@et@nc{MT@ex@c@MT@ex@c@name @factor}\@m
4204     \fi
4205   }%
4206   <debug>\MT@info{1}{creating expansion list `~\MT@ex@c@name'}%
4207   \def\MT@permutelist{ex@c}%
4208   \setkeys{MT@cfg}{#2}%
4209   \MT@permute
4210   \MT@gdef@n{MT@ex@c@MT@ex@c@name}{#3}%
4211   \MT@end@catcodes
4212 }

```

`\SetTracking`

```

4213 \def\SetTracking{%
4214   \MT@begin@catcodes
4215   \MT@SetTracking
4216 }

```

`\MT@SetTracking` Third argument may be empty.

```

4217 \newcommand*\MT@SetTracking[3] [] {%
4218   \let\MT@extra@context\@empty
4219   \MT@set@named@keys{MT@tr@c}{#1}%
4220   <debug>\MT@info{1}{creating tracking list `~\MT@tr@c@name'}%
4221   \def\MT@permutelist{tr@c}%
4222   \setkeys{MT@cfg}{#2}%
4223   \MT@permute
4224   \KV@sp@def\@tempa{#3}%
4225   \MT@ifempty\@tempa\relax{%
4226     \MT@ifint\@tempa
4227     {\MT@xdef@n{MT@tr@c@MT@tr@c@name}{\@tempa}}%
4228     {\MT@warning{Value `~\@tempa' is not a number in\MessageBreak
4229       tracking set `~\MT@curr@set@name'}}}%
4230   \MT@end@catcodes
4231 }
4232 </pdf-|lua->

```

`\SetExtraSpacing`

```

4233 <pdf-|lua-|
4234 \def\SetExtraSpacing{%
4235   \MT@begin@catcodes
4236   \MT@SetExtraSpacing
4237 }

```

`\MT@SetExtraSpacing`

```

\MT@sp@c@name 4238 \newcommand*\MT@SetExtraSpacing[3] [] {%
4239   \let\MT@extra@context\@empty
\MT@extra@context 4240   \MT@set@named@keys{MT@sp@c}{#1}%
\MT@permutelist 4241   <debug>\MT@info{1}{creating spacing list `~\MT@sp@c@name'}%

```

```

4242 \def\MT@permutelist{sp@c}%
4243 \setkeys{MT@cfg}{#2}%
4244 \MT@permute
4245 \MT@gdef@n{MT@sp@c@MT@sp@c@name}{#3}%
4246 \MT@end@catcodes
4247 }

```

\SetExtraKerning

```

4248 \def\SetExtraKerning{%
4249 \MT@begin@catcodes
4250 \MT@SetExtraKerning
4251 }

```

\MT@SetExtraKerning

```

\MT@kn@c@name 4252 \newcommand*\MT@SetExtraKerning[3] [] {%
\MT@extra@context 4253 \let\MT@extra@context\@empty
4254 \MT@set@named@keys{MT@kn@c}{#1}%
\MT@permutelist 4255 (debug)\MT@dinfo{1}{creating kerning list '\MT@kn@c@name'}%
4256 \def\MT@permutelist{kn@c}%
4257 \setkeys{MT@cfg}{#2}%
4258 \MT@permute
4259 \MT@gdef@n{MT@kn@c@MT@kn@c@name}{#3}%
4260 \MT@end@catcodes
4261 }
4262 (/pdf-)

```

\MT@set@named@keys We first set the name (if specified), then remove it from the list, and set the remaining keys.

\MT@options

```

4263 (*package)
4264 \def\MT@set@named@keys#1#2{%
4265 \def\x##1name=##2,##3\@nil{%
4266 \setkeys{#1}{name=##2}%
4267 \gdef\MT@options{##1##3}%
4268 \MT@rem@from@clist{name=}\MT@options
4269 }%
4270 \x#2,name=,\@nil
4271 \@expandtwoargs\setkeys{#1}\MT@options
4272 }

```

\MT@define@code@key

Define the keys for the configuration lists (which are setting the codes, in pdfTeX speak).

```

4273 \def\MT@define@code@key#1#2{%
4274 \define@key{MT@#2}{#1} [] {%
4275 \@tempcnta=\@ne
4276 \MT@map@clist@n{##1}{%
4277 \KV@sp@def\MT@val{###1}%

```

Here, too, we allow for something like ‘bf\*’. It will be expanded immediately.

```

4278 \MT@get@highlevel{#1}%
4279 \MT@edef@n{MT@temp#1\the\@tempcnta}{\MT@val}%
4280 \advance\@tempcnta \@ne
4281 }%
4282 }%
4283 }

```

\MT@define@code@key@family

Remove fontspec’s internal feature counter.

```

4284 \def\MT@define@code@key@family#1{%
4285 \define@key{MT@#1}{family} [] {%
4286 \@tempcnta=\@ne
4287 \MT@map@clist@n{##1}{%
4288 \KV@sp@def\MT@val{###1}%
4289 \MT@get@highlevel{family}%
4290 \ifMT@fontspec
4291 \edef\x{\edef\noexpand\MT@val{\noexpand\MT@scrubfeature\MT@val()}\relax}}\x

```

```

4292     \fi
4293     \MT@edef\MT@tempfamily\the\@tempcnta{\MT@val}%
4294     \advance\@tempcnta \@ne
4295   }%
4296 }%
4297 }

```

`\MT@define@code@key@size`      `\MT@tempsize` must be in a `\csname`, so that it is at least `\relax`, not undefined.

```

4298 \def\MT@define@code@key@size#1{%
4299   \define@key{MT@#1}{size}[]{%
4300     \MT@map@clist@n{##1}%
4301     \KV@esp@def\MT@val{###1}%
4302     \expandafter\MT@get@range\MT@val--\@nil
4303     \ifx\MT@val\relax \else
4304       \MT@exp@cs\MT@xadd{\MT@tempsize}%
4305       {{{\MT@lower}{\MT@upper}{\MT@curr@set@name}}}%
4306     \fi
4307   }%
4308 }%
4309 }

```

`\MT@define@code@key@font`

```

4310 \def\MT@define@code@key@font#1{%
4311   \define@key{MT@#1}{font}[]{%
4312     \MT@map@clist@n{##1}%
4313     \KV@esp@def\MT@val{###1}%
4314     \MT@ifstreq\MT@val*{\def\MT@val{*/*/*/*/}}\relax
4315     \expandafter\MT@get@font@and@size\MT@val////\@nil
4316     \ifMT@fontspec
4317       \edef\@tempb{\expandafter\MT@scrubfeatures\@tempb()\relax}%
4318     \fi
4319     \MT@xdef\MT@MT@permutelist @\@tempb\MT@extra@context{%
4320       {\csname MT@MT@permutelist @name\endcsname}%
4321       (debug) \MT@info@n1{1}{initialising: use list for font \@tempb=\MT@val}
4322       (debug) \ifx\MT@extra@context\@empty\else\MessageBreak
4323       (debug) (context: \MT@extra@context)\fi}%
4324     \MT@exp@cs\MT@xaddb
4325     {\MT@MT@permutelist @\@tempb\MT@extra@context @sizes}%
4326     {{{\MT@val}{\m@ne}{\MT@curr@set@name}}}%
4327   }%
4328 }%
4329 }

```

`\MT@get@font@and@size`      Translate any asterisks and split off the size.

```

4330 \def\MT@get@font@and@size#1/#2/#3/#4/#5/#6\@nil{%
4331   \MT@get@font@{#1}{#2}{#3}{#4}{#5}{1}%
4332 }
4333 \MT@define@code@key{encoding}{cfg}
4334 \MT@define@code@key{family}{cfg}
4335 \MT@define@code@key{series}{cfg}
4336 \MT@define@code@key{shape}{cfg}
4337 \MT@define@code@key{size}{cfg}
4338 \MT@define@code@key{font}{cfg}

```

`\MT@define@opt@key`

```

4339 \def\MT@define@opt@key#1#2{%
4340   \define@key{MT@#1c}{#2}[]{\MT@ifempty{##1}\relax%
4341     \MT@xdef\MT@#1c@{\MT@curr@set@name @#2}{##1}}%
4342 }

```

`\MT@listname@count`      The options in the optional first argument.

```

4343 \newcount\MT@listname@count
4344 \MT@map@clist@c\MT@features{%

```

Use file name and line number as the list name if the user didn't bother to invent one – also check whether the name already exists (in case more than one unnamed list is loaded in the same line, for example `\AtBeginDocument`).

```

4345 \define@key{MT@#1@c}{name}[]{}%
4346 \MT@ifempty{##1}{}%
4347 \MT@ifdefined@n@TF{MT@#1@c@MT@curr@file/\the\inputlineno}{%
4348 \global\advance\MT@listname@count\@ne
4349 \MT@edef@n{MT@#1@c@name}{\MT@curr@file/\the\inputlineno
4350 (\number\MT@listname@count)}%
4351 }{}%
4352 \MT@edef@n{MT@#1@c@name}{\MT@curr@file/\the\inputlineno}%
4353 }{}%
4354 }{}%
4355 \MT@edef@n{MT@#1@c@name}{##1}%
4356 \MT@ifdefined@n@T{MT@#1@c@csname MT@#1@c@name\endcsname}{%
4357 \MT@warning{Redefining \@nameuse{MT@abbr@#1} list ~\@nameuse{MT@#1@c@name}'}%
4358 }{}%
4359 }{}%
4360 \MT@let@cn\MT@curr@set@name{MT@#1@c@name}%
4361 }{}%
4362 \MT@define@opt@key{#1}{load}%
4363 \MT@define@opt@key{#1}{factor}%
4364 \MT@define@opt@key{#1}{preset}%
4365 \MT@define@opt@key{#1}{inputenc}%

```

Only one context is allowed. This might change in the future.

```

4366 \define@key{MT@#1@c}{context}[]{\MT@ifempty{##1}\relax{\def\MT@extra@context{##1}}}%
4367 }
4368 </package>

```

Automatically enable font copying if we find a protrusion or expansion context. After the preamble, check whether font copying is enabled. For older pdfTeX versions, disallow. It also works with LuaTeX 0.30 or newer.

```

4369 <*pdf-|lua-|
4370 pdf-)\MT@requires@pdftex{
4371 \define@key{MT@ex@c}{context}[]{}%
4372 \MT@ifempty{#1}\relax{}%
4373 \MT@gl@t\MT@copy@font\MT@copy@font@
4374 \def\MT@extra@context{#1}%
4375 }{}%
4376 }
4377 \MT@addto@setup{
4378 \define@key{MT@ex@c}{context}[]{}%
4379 \ifx\MT@copy@font\MT@copy@font@
4380 \MT@ifempty{#1}\relax{\def\MT@extra@context{#1}}%
4381 \else
4382 \MT@error{\MT@MT\space isn't set up for expansion contexts.\MessageBreak
4383 Ignoring `context' key\on@line}%
4384 {Either move the settings inside the preamble,\MessageBreak
4385 or load the package with the `copyfonts' option.}%
4386 \fi
4387 }{}%
4388 }

```

Protrusion contexts *might* also work without copying the font, so we don't issue an error but only a warning. The problem is that pdfTeX only allows one set of protrusion factors for a given font within one paragraph (those that are in effect at the end of the paragraph will be in effect for the whole paragraph). When different fonts are loaded – like in the example with the footnote markers – we don't need to copy the fonts.

```

4389 \define@key{MT@pr@c}{context}[]{}%
4390 \MT@ifempty{#1}\relax{}%

```

```

4391 \MT@gllet\MT@copy@font\MT@copy@font@
4392 \def\MT@extra@context{#1}%
4393 }%
4394 }
4395 \MT@addto@setup{%
4396 \define@key{MT@pr@c}{context}[]{%
4397 \MT@ifempty{#1}\relax{\def\MT@extra@context{#1}}%
4398 \ifx\MT@copy@font\MT@copy@font@else
4399 \MT@warning@n{If protrusion contexts don't work as expected,
4400 \MessageBreak load the package with the `copyfonts' option}%
4401 \fi
4402 }%
4403 }
4404 </pdf-|lua->
4405 <*pdf->
4406 }{
4407 \define@key{MT@ex@c}{context}[]{%
4408 \MT@error{Expansion contexts only work with pdftex 1.40.4\MessageBreak
4409 or later. Ignoring `context' key\on@line}%
4410 {Upgrade pdftex.}%
4411 }
4412 </pdf->
4413 <*pdf-|xe->
4414 \define@key{MT@pr@c}{context}[]{%
4415 \MT@error{Protrusion contexts only work with pdftex
4416 <pdf-> 1.40.4\MessageBreak or later.
4417 <xe-> \MessageBreak or luatex.
4418 Ignoring `context' key\on@line}%
4419 <pdf-> {Upgrade pdftex.}%
4420 <xe-> {Use pdftex or luatex.}%
4421 }
4422 </pdf-|xe->
4423 <pdf->}
```

\MT@warn@nodim

```

4424 <*package>
4425 \def\MT@warn@nodim#1{%
4426 \MT@warning{`@tempa' is not a dimension.\MessageBreak
4427 Ignoring it and setting values relative to\MessageBreak #1}%
4428 }
```

Protrusion codes may be relative to character width, or to any dimension.

```

4429 \define@key{MT@pr@c}{unit}[character]{%
4430 \MT@gllet@nc{MT@pr@c@\MT@curr@set@name @unit}\@empty
4431 \def\@tempa{#1}%
4432 \MT@ifstreq\@tempa{character}\relax{%
```

Test whether it's a dimension, but do not translate it into its final form here, since it may be font-specific.

```

4433 \MT@ifdimen\@tempa
4434 { \MT@gllet@nc{MT@pr@c@\MT@curr@set@name @unit}\@tempa}%
4435 { \MT@warn@nodim{character widths}}%
4436 }%
4437 }
4438 </package>
```

Tracking may only be relative to a dimension.

```

4439 <*pdf-|lua->
4440 \define@key{MT@tr@c}{unit}[1em]{%
4441 \MT@gllet@nc{MT@tr@c@\MT@curr@set@name @unit}\@empty
4442 \def\@tempa{#1}%
4443 \MT@ifdimen\@tempa
4444 { \MT@gllet@nc{MT@tr@c@\MT@curr@set@name @unit}\@tempa}%
4445 { \MT@warn@nodim{1em}%
4446 \MT@gdefn{MT@tr@c@\MT@curr@set@name @unit}{1em}}%
```

```

4447 }
4448 </pdf-|lua-|

```

Spacing and kerning codes may additionally be relative to space dimensions.

```

4449 <*pdf-|
4450 \MT@map@clist@n{sp,kn}{%
4451   \define@key{MT@#1@c}{unit}[space]{%
4452     \MT@glet@nc{MT@#1@c@MT@curr@set@name @unit}\@empty
4453     \def\@tempa{##1}%
4454     \MT@ifstreq\@tempa{character}\relax{%
4455       \MT@glet@nc{MT@#1@c@MT@curr@set@name @unit}\m@ne
4456       \MT@ifstreq\@tempa{space}\relax{%
4457         \MT@ifdimen\@tempa
4458         {\MT@glet@nc{MT@#1@c@MT@curr@set@name @unit}\@tempa}%
4459         {\MT@warn@nodim{width of space}}}%
4460       }%
4461     }%
4462   }%
4463 }
4464 </pdf-|

```

The first argument to `\SetExpansion` accepts some more options.

```

4465 <*pdf-|lua-|
4466 \MT@map@clist@n{stretch,shrink,step}{%
4467   \define@key{MT@ex@c}{#1}[]{%
4468     \MT@ifempty{##1}\relax{%
4469       \MT@ifint{##1}%

```

A space terminates the number.

```

4470     \MT@gdef@n{MT@ex@c@MT@curr@set@name @#1}{##1}%
4471   }{%
4472     \MT@warning{%
4473       Value `##1' for option `#1' is not a number.\MessageBreak
4474       Ignoring it}%
4475   }%
4476 }%
4477 }%
4478 }
4479 \define@key{MT@ex@c}{auto}[true]{%
4480   \def\@tempa{##1}%
4481   \csname if\@tempa\endcsname

```

Don't use `autoexpand` for pdfTeX version older than 1.20.

```

4482 <pdf-|
4483 <lua-|
4484   {\MT@gdef@n{MT@ex@c@MT@curr@set@name @auto}{autoexpand}}%
4485 <pdf-|
4486   \else
4487 <pdf-|
4488 <*lua-|
4489   \MT@requires@luatex3{%
4490     \MT@warning{Non-automatic font expansion doesn't work with\MessageBreak
4491       luatex}}%
4492 </lua-|
4493   {\MT@glet@nc{MT@ex@c@MT@curr@set@name @auto}\@empty}%
4494 <pdf-|
4495   \fi
4496 }

```

Tracking: Interword spacing and outer kerning. The variant with space just in case `\SetTracking` is called inside an argument (e.g., to `\IfFileExists`).

```

4497 \MT@define@opt@key{tr}{spacing}
4498 \MT@define@opt@key{tr}{outerspacing}
4499 \MT@define@opt@key{tr}{outerkerning}

```



Which ligatures should be disabled?

```

4500 \define@key{MT@tr@c}{noligatures}[]%
4501   {\MT@xdefn{MT@tr@c@MT@curr@set@name @noligatures}{#1}}
4502 \define@key{MT@tr@c}{outer spacing}[]{\setkeys{MT@tr@c}{outerspacing={#1}}}
4503 \define@key{MT@tr@c}{outer kerning}[]{\setkeys{MT@tr@c}{outerkerning={#1}}}
4504 \define@key{MT@tr@c}{noligatures}[]{\setkeys{MT@tr@c}{noligatures={#1}}}
4505 </pdf-|lua-|

```

### 1.3.6 Character inheritance

`\DeclareCharacterInheritance` This macro may be used in the configuration files to declare characters that should inherit protrusion resp. expansion values from other characters. Thus, there is no need to define all accented characters (e.g., `\'a`, `\'a`, `\^a`, `\~a`, `\"a`, `\r{a}`, `\k{a}`, `\u{a}`), which will make the configuration files look much nicer and easier to maintain. If a single character of an inheritance list should have a different value, one can simply override it.

`\MT@inh@feat` The optional argument may be used to restrict the list to some features,  
`\MT@extra@inputenc` and to specify an input encoding.

```

4506 <*package>
4507 \renewcommand*\DeclareCharacterInheritance[1][]{%
4508   \let\MT@extra@context\@empty
4509   \let\MT@extra@inputenc\@undefined
4510   \let\MT@inh@feat\@empty
4511   \setkeys{MT@inh@}{#1}%
4512   \MT@begin@catcodes
4513   \MT@set@inh@list
4514 }

```

`\MT@set@inh@list` No need to create an inheritance list for tracking.

```

4515 \def\MT@set@inh@list#1#2{%
4516   \MT@ifempty\MT@inh@feat{%
4517     \MT@map@clist@c\MT@features{\begingroup
4518       \MT@ifstreq{#1}{tr}\relax{\MT@declare@char@inh{#1}{#2}}%
4519     \endgroup}%
4520   }{%
4521     \MT@map@clist@c\MT@inh@feat{\begingroup
4522       \KV@@sp@def\@tempa{#1}%
4523       \MT@ifempty\@tempa\relax{%
4524         \edef\@tempa{\csname MT@rbba@\@tempa\endcsname}%
4525         \MT@ifstreq\@tempa{tr}\relax{%
4526           \MT@exp@one@n\MT@declare@char@inh{\@tempa}{#1}{#2}}%
4527       \endgroup}%
4528   }%
4529   \MT@end@catcodes
4530 }

```

The keys for the optional argument.

```

4531 \MT@map@clist@c\MT@features@long{%
4532   \define@key{MT@inh@}{#1}[]{\edef\MT@inh@feat{\MT@inh@feat#1,}}%
4533 \define@key{MT@inh@}{inputenc}{\def\MT@extra@inputenc{#1}}

```

`\MT@declare@char@inh` The lists cannot be given a name by the user.

```

4534 \def\MT@declare@char@inh#1#2#3{%
4535   \MT@edefn{MT@#1@inh@name}%
4536     {\MT@curr@file/\the\inputlineno (\@nameuse{MT@abbr@#1})}%
4537   \MT@let@cn\MT@curr@set@name{MT@#1@inh@name}%
4538   \MT@ifdefined@c@T\MT@extra@inputenc{%
4539     \MT@xdefn{MT@#1@inh@\MT@curr@set@name @inputenc}{\MT@extra@inputenc}}%
4540 <debug>\MT@edinfo{1}{creating inheritance list \@nameuse{MT@#1@inh@name}}%
4541   \MT@gdefn{MT@#1@inh@\csname MT@#1@inh@name\endcsname}{#3}%
4542   \def\MT@permutelist{#1@inh}%

```

```

4543 \setkeys{MT@inh}{#2}%
4544 \MT@permute
4545 }

```

Parse the second argument. `\DeclareCharacterInheritance` may also be set up for various combinations. We can reuse the key setup from the configuration lists (`\Set...`).

```

4546 \MT@define@code@key{encoding}{inh}
4547 \MT@define@code@key{family} {inh}
4548 \MT@define@code@key{series} {inh}
4549 \MT@define@code@key{shape} {inh}
4550 \MT@define@code@key{size} {inh}
4551 \MT@define@code@key{font} {inh}

```

`\MT@inh@do` Now parse the third argument, the inheritance lists. We define the commands `\MT@inh@<name>@<slot>`, containing the inheriting characters. They will also be translated to slot numbers here, to save some time. The following will be executed only once, namely the first time this inheritance list is encountered (in `\MT@set@<feature>@codes`).

```

4552 \def\MT@inh@do#1,{%
4553 \ifx\relax#1\@empty \else
4554 \MT@inh@split #1==\relax
4555 \expandafter\MT@inh@do
4556 \fi
4557 }

```

`\MT@inh@split` Only gather the inheriting characters here. Their codes will actually be set in `\MT@set@<feature>@codes`.

```

4558 </package>
4559 <*pdf-|lua-|xe-|>
4560 \def\MT@inh@split#1=#2=#3\relax{%
4561 \def\@tempa{#1}%
4562 \ifx\@tempa\@empty \else
4563 \expandafter\MT@has@inh@prefix\@tempa()\relax\@ni
4564 \MT@get@slot
4565 <pdf-|lua-|> \ifnum\MT@char > \m@ne
4566 <xe-|> \ifx\MT@char\@empty\else
4567 \let\MT@val\MT@char
4568 \MT@map@clist@n{#2}{%
4569 \def\@tempa{##1}%
4570 \ifx\@tempa\@empty \else
4571 \MT@get@slot
4572 <pdf-|lua-|> \ifnum\MT@char > \m@ne
4573 <xe-|> \ifx\MT@char\@empty\else
4574 \ifx\MT@inh@prefix\@empty
4575 \MT@exp@cs\MT@xadd{MT@inh@MT@listname @\MT@val @}{\MT@char}%
4576 \else
4577 \MT@exp@cs\MT@xadd{MT@inh@MT@listname @prefixes}%
4578 {{{\MT@val}{\MT@char}\MT@inh@prefix@}}}%
4579 \fi
4580 \fi
4581 \fi
4582 }%
4583 <debug>\MT@edinfo@n1{2}{children of #1 (\MT@val):
4584 <debug> \@nameuse{MT@inh@MT@listname @\ifx\MT@inh@prefix\@empty\MT@val @\else prefixes\fi}}%
4585 \fi
4586 \fi
4587 }
4588 </pdf-|lua-|xe-|>

```

`\MT@inh@prefix` If the inheriting character is preceded by (`<prefix>`), where `<prefix>` is one of l, r

`\MT@has@inh@prefix` or lr, this has a special meaning for protrusion. For the other features, we ignore

these settings.

```

4589 <package>
4590 \def\MT@has@inh@prefix#1(#2)#3#4\@nil{%
4591   \let\MT@temp\relax
4592   \ifx\relax#3%
4593     \def\@tempa{#1#2}%
4594     \let\MT@inh@prefix\@empty
4595   \else
4596     \MT@ifstreq{\MT@feat}{pr}{%
4597       \MT@ifstreq{#2}{l}{\def\MT@inh@prefix@{{1000}{0}}\@firstoftwo}%
4598       \MT@ifstreq{#2}{r}{\def\MT@inh@prefix@{{0}{1000}}\@firstoftwo}%
4599       \MT@ifstreq{#2}{lr}{\def\MT@inh@prefix@{{500}{500}}\@firstoftwo}%
4600       \MT@warning@n{`#2' is not a valid prefix in inheritance list%
4601         \MessageBreak\MT@listname. Ignoring it}%
4602       \@secondoftwo}}%
4603     {\def\@tempa{#3}%
4604       \def\MT@inh@prefix{#2}%
4605       \@gobble}%
4606     {\@firstofone}%
4607     {\@firstofone}%
4608     {\let\MT@char\m@ne
4609       \let\MT@temp\@gobble
4610     }%
4611   \fi
4612   \MT@temp
4613 }

```

### 1.3.7 Permutation

`\MT@permute`      Calling `\MT@permute` will define commands for all permutations of the specified font  
`\MT@permute@`    attributes of the form `\MT@<list type>@/<encoding>/<family>/<series>/<shape>/<| *>` to  
`\MT@permute@@`    be the expansion of `\MT@<list type>@name`, i.e., the name of the currently defined list.  
`\MT@permute@@@`    Size ranges are held in a separate macro called `\MT@<list type>@/<font axes>@sizes`,  
`\MT@permute@@@`    which in turn contains the respective `<list name>s` attached to the ranges. So that,

```

\SetProtrusion
{ encoding = U,
  family   = {euroitc,euroitcs} }
{ E = {100,50} }
\SetProtrusion
{ encoding = U,
  family   = {euroitc,euroitcs},
  shape    = it* }
{ E = {100,} }

```

would yield the following assignments:

```

4614 \MT@gdef@n{\MT@pr@c@U/euroitc///}{euroitc}
4615 \MT@gdef@n{\MT@pr@c@U/euroitcs///}{euroitc}
4616 \MT@gdef@n{\MT@pr@c@U/euroitc//it/}{euroitci}
4617 \MT@gdef@n{\MT@pr@c@U/euroitcs//it/}{euroitci}
4618 \MT@gdef@n{\MT@pr@c@euroitc}{E={100,50}}
4619 \MT@gdef@n{\MT@pr@c@euroitci}{E={100,}}
4620 \def\MT@permute{%
4621   \let\MT@cnt@encoding\@ne
4622   \MT@permute@

```

Undefine commands for the next round.

```

4623 \MT@map@tlist@n{{encoding}{family}{series}{shape}}\MT@permute@reset
4624 \MT@glet\MT@tempsize\@undefined
4625 }
4626 \def\MT@permute@{%
4627   \let\MT@cnt@family\@ne
4628   \MT@permute@@

```

```

4629 \MT@increment\MT@cnt@encoding
4630 \MT@ifdefined@n@T{MT@tempencoding\MT@cnt@encoding}%
4631 \MT@permute@
4632 }
4633 \def\MT@permute@@{%
4634 \let\MT@cnt@series\@ne
4635 \MT@permute@@@
4636 \MT@increment\MT@cnt@family
4637 \MT@ifdefined@n@T{MT@tempfamily\MT@cnt@family}%
4638 \MT@permute@@
4639 }
4640 \def\MT@permute@@@{%
4641 \let\MT@cnt@shape\@ne
4642 \MT@permute@@@@
4643 \MT@increment\MT@cnt@series
4644 \MT@ifdefined@n@T{MT@tempseries\MT@cnt@series}%
4645 \MT@permute@@@@
4646 }
4647 \def\MT@permute@@@@{%
4648 \MT@permute@@@@@
4649 \MT@increment\MT@cnt@shape
4650 \MT@ifdefined@n@T{MT@tempshape\MT@cnt@shape}%
4651 \MT@permute@@@@@
4652 }

```

\MT@permute@@@@ In order to save some memory, we can ignore unused encodings (inside the document).

```

4653 \def\MT@permute@@@@@{%
4654 \MT@permute@define{encoding}%
4655 \ifMT@document
4656 \ifx\MT@tempencoding\@empty \else
4657 \MT@ifdefined@n@TF{T@\MT@tempencoding}\relax
4658 {\expandafter\expandafter\expandafter\@gobble}%
4659 \fi
4660 \fi
4661 \MT@permute@@@@@
4662 }

```

\MT@permute@@@@@

```

4663 \def\MT@permute@@@@@{%
4664 \MT@permute@define{family}%
4665 \MT@permute@define{series}%
4666 \MT@permute@define{shape}%
4667 \edef\@tempa{\MT@tempencoding
4668 \MT@tempfamily
4669 \MT@tempseries
4670 \MT@tempshape
4671 \MT@ifdefined@c@T\MT@tempsize *}

```

Some sanity checks: an encoding must be specified (unless nothing else is).

```

4672 \MT@ifstreq\@tempa{////}\relax{%
4673 \ifx\MT@tempencoding\@empty
4674 \MT@warning{%
4675 You have to specify an encoding for\MessageBreak
4676 \@nameuse{MT@abbr@MT@permutelist} list
4677 ` \@nameuse{MT@MT@permutelist @name}'.\MessageBreak
4678 Ignoring it}%
4679 \else
4680 \MT@ifdefined@c@TF\MT@tempsize{%

```

Add the list of ranges to the beginning of the current combination, after checking for conflicts.

```

4681 \MT@ifdefined@n@T{MT@MT@permutelist @\@tempa\MT@extra@context @sizes}{%
4682 \MT@map@tlist@c\MT@tempsize\MT@check@rlist
4683 }%

```

```

4684      \MT@exp@cs\MT@xaddb
4685      {MT@MT@permutelist @\@tempa\MT@extra@context @sizes}%
4686      \MT@tempsize
4687 (debug) \MT@edinfo@n1{1}{initialising: use list for font \@tempa,\MessageBreak
4688 (debug)      sizes: \csname MT@MT@permutelist @\@tempa\MT@extra@context
4689 (debug)      @sizes\endcsname}%
4690      }{%

```

Only one list can apply to a given combination. But we don't warn if the overridden list is to be loaded by the current one.

```

4691      \MT@ifdefined@n@T{MT@MT@permutelist @\@tempa\MT@extra@context}{%
4692      \MT@ifstreq{\csname MT@MT@permutelist @\@tempa\MT@extra@context\endcsname}%
4693      {\csname MT@MT@permutelist @\csname MT@MT@permutelist @name\endcsname @load\endcsname}%
4694      \relax}%
4695      \MT@warning{\@nameuse{MT@abbr@MT@permutelist} list
4696      ~\@nameuse{MT@MT@permutelist @name}' will\MessageBreak override
4697      list ~\@nameuse{MT@MT@permutelist @\@tempa\MT@extra@context}'
4698      for \MessageBreak font ~\@tempa'}%
4699      }%
4700      }%
4701 (debug) \MT@edinfo@n1{1}{initialising: use list for font \@tempa
4702 (debug)      \ifx\MT@extra@context\@empty\else\MessageBreak
4703 (debug)      (context: \MT@extra@context)\fi}%
4704      }%
4705      \MT@xdef@n{MT@MT@permutelist @\@tempa\MT@extra@context}%
4706      {\csname MT@MT@permutelist @name\endcsname}%
4707      \fi
4708      }%
4709 }

```

\MT@permute@define      Define the commands.

```

4710 \def\MT@permute@define#1{%
4711   \@tempcnta=\csname MT@cnt@#1\endcsname\relax
4712   \MT@ifdefined@n@TF{MT@temp#1\the\@tempcnta}%
4713   {\MT@edef@n{MT@temp#1}{\csname MT@temp#1\the\@tempcnta\endcsname}}%
4714   {\MT@let@nc{MT@temp#1}\@empty}%
4715 }

```

\MT@permute@reset      Reset the commands.

```

4716 \def\MT@permute@reset#1{%
4717   \@tempcnta=\@ne
4718   \MT@loop
4719   \MT@let@nc{MT@temp#1\the\@tempcnta}\@undefined
4720   \advance\@tempcnta\@ne
4721   \MT@ifdefined@n@TF{MT@temp#1\the\@tempcnta}%
4722   \iftrue
4723   \iffalse
4724   \MT@repeat
4725 }

```

\MT@check@rlist      For every new range item in \MT@tempsize, check whether it overlaps with ranges in the existing list.

```

4726 \def\MT@check@rlist#1{\expandafter\MT@check@rlist@ #1}

```

\MT@check@rlist@      Define the current new range and ...

```

4727 \def\MT@check@rlist@#1#2#3{%
4728   \def\@tempb{#1}%
4729   \def\@tempc{#2}%
4730   \MT@if@false
4731   \MT@exp@cs\MT@map@tlist@c
4732   {MT@MT@permutelist @\@tempa\MT@extra@context @sizes}%
4733   \MT@check@range
4734 }

```

`\MT@check@range` ... recurse through the list of existing ranges.

```
4735 \def\MT@check@range#1{\expandafter\MT@check@range@ #1}
```

`\MT@check@range@` `\@tempb` and `\@tempc` are lower resp. upper bound of the new range, `<#1>` and `<#2>` those of the existing range. `<#3>` is the list name.

```
4736 \def\MT@check@range@#1#2#3{%
```

```
4737   \MT@ifdim{#2}=\m@ne{%
```

```
4738   \MT@ifdim\@tempc=\m@ne{%
```

- Both items are simple sizes.

```
4739   \MT@ifdim\@tempb={#1}\MT@iftrue\relax
```

```
4740 }{%
```

- Item in list is a simple size, new item is a range.

```
4741   \MT@ifdim\@tempb>{#1}\relax{%
```

```
4742   \MT@ifdim\@tempc>{#1}{%
```

```
4743   \MT@iftrue
```

```
4744   \edef\@tempb{#1 (with range: \@tempb\space to \@tempc)}%
```

```
4745   }\relax
```

```
4746 }%
```

```
4747 }%
```

```
4748 }{%
```

```
4749 \MT@ifdim\@tempc=\m@ne{%
```

- Item in list is a range, new item is a simple size.

```
4750   \MT@ifdim\@tempb<{#2}{%
```

```
4751   \MT@ifdim\@tempb<{#1}\relax\MT@iftrue
```

```
4752   }\relax
```

```
4753 }{%
```

- Both items are ranges.

```
4754   \MT@ifdim\@tempb<{#2}{%
```

```
4755   \MT@ifdim\@tempc>{#1}{%
```

```
4756   \MT@iftrue
```

```
4757   \edef\@tempb{#1 to #2 (with range: \@tempb\space to \@tempc)}%
```

```
4758   }\relax
```

```
4759   }\relax
```

```
4760 }%
```

```
4761 }%
```

```
4762 \ifMT@if@
```

```
4763   \MT@ifstreq{#3}%
```

```
4764   {\csname MT@MT@permutelist @\csname MT@MT@permutelist @name\endcsname @load\endcsname}%
```

```
4765   \relax{%
```

```
4766   \MT@warning{\@nameuse{MT@abbr@MT@permutelist} list
```

```
4767   ~\@nameuse{MT@MT@permutelist @name}' will override\MessageBreak
```

```
4768   list ~#3' for font \@tempa,\MessageBreak size \@tempb}%
```

```
4769 }%
```

If we've already found a conflict with this item, we can skip the rest of the list.

```
4770   \expandafter\MT@tlist@break
```

```
4771   \fi
```

```
4772 }
```

## 1.4 Package options

### 1.4.1 Declaring the options

`\ifMT@opt@expansion` Keep track of whether the user explicitly set these options.

```
\ifMT@opt@auto 4773 \newif\ifMT@opt@expansion
```

```
\ifMT@opt@DVI
```

```

4774 \newif\ifMT@opt@auto
4775 \newif\ifMT@opt@DVI

\MT@optwarn@admissible    Some warnings.

4776 \def\MT@optwarn@admissible#1#2{%
4777   \MT@warning@n1{`#1' is not an admissible value for option\MessageBreak
4778     `#2'. Assuming `false'}%
4779 }

\MT@optwarn@nan

4780 </package>
4781 <*package|letterspace>
4782 <plain>\MT@requires@latex1{
4783   \def\MT@optwarn@nan#1#2{%
4784     \MT@warning@n1{Value `#1' for option `#2' is not a\MessageBreak number.
4785       Using default value of \number\@nameuse{MT@#2@default}}%
4786   }
4787   <plain>\relax
4788   </package|letterspace>
4789   <*package>

\MT@opt@def@set

4790 \def\MT@opt@def@set#1{%
4791   \MT@ifdefined@n@TF{MT@ \@tempb @set@@\MT@val}{%
4792     \MT@xdef@n{MT@ \@tempb @setname}{\MT@val}%
4793   }{%
4794     \MT@xdef@n{MT@ \@tempb @setname}{\@nameuse{MT@default@ \@tempb @set}}%
4795     \MT@warning@n1{The #1 set `~\MT@val' is undeclared.\MessageBreak
4796       Using set `~\@nameuse{MT@ \@tempb @setname}' instead}%
4797   }%
4798 }
```

expansion and protrusion may be true, false, compatibility, nocompatibility and/or a *<set name>*.

```

4799 \MT@map@clist@n{protrusion,expansion}{%
4800   \define@key{MT}{#1}[true]{%
4801     \csname MT@opt@#1true\endcsname
4802     \MT@map@clist@n{##1}{%
4803       \KV@esp@def\MT@val{###1}%
4804       \MT@ifempty\MT@val\relax{%
4805         \csname MT@#1true\endcsname
4806         \edef\@tempb{\csname MT@rbba@#1\endcsname}%
4807         \MT@ifstreq\MT@val{true}\relax
4808       }%
4809       \MT@ifstreq\MT@val{false}{%
4810         \csname MT@#1false\endcsname
4811       }{%
4812         \MT@ifstreq\MT@val{compatibility}{%
4813           \MT@let@nc{MT@ \@tempb @level}\@ne
4814         }{%
4815           \MT@ifstreq\MT@val{nocompatibility}{%
4816             \MT@let@nc{MT@ \@tempb @level}\tw@
4817           }{%

```

If everything failed, it should be a set name.

```

4818     \MT@opt@def@set{#1}%
4819   }%
4820 }%
4821 }%
4822 }%
4823 }%
4824 }%
4825 }%
4826 }
```

activate is a shortcut for protrusion and expansion.

```
4827 \define@key{MT}{activate}[true]{%
4828   \setkeys{MT}{protrusion={#1}}%
4829   \setkeys{MT}{expansion={#1}}%
4830 }
```

spacing, kerning and tracking do not have a compatibility level.

```
4831 \MT@map@clist@n{spacing,kerning,tracking}{%
4832   \define@key{MT}{#1}[true]{%
4833     \MT@map@clist@n{##1}{%
4834       \KV@sp@def\MT@val{###1}%
4835       \MT@ifempty\MT@val\relax{%
4836         \csname MT@#1true\endcsname
4837         \MT@ifstreq\MT@val{true}\relax
4838         {%
4839           \MT@ifstreq\MT@val{false}{%
4840             \csname MT@#1false\endcsname
4841             }%
4842           \edef\@tempb{\csname MT@rbba@#1\endcsname}%
4843           \MT@opt@def@set{#1}%
4844           }%
4845         }%
4846       }%
4847     }%
4848   }%
4849 }
```

`\MT@def@bool@opt` The true/false options: draft (may be inherited from the class options), auto, selected, babel, DVInoutput, defersetup, copyfonts.

```
4850 \def\MT@def@bool@opt#1#2{%
4851   \define@key{MT}{#1}[true]{%
4852     \def\@tempa{##1}%
4853     \MT@ifstreq\@tempa{true}\relax{%
4854       \MT@ifstreq\@tempa{false}\relax{%
4855         \MT@optwarn@admissible{##1}{#1}%
4856         \def\@tempa{false}%
4857       }%
4858     }%
4859     #2%
4860   }%
4861 }
```

Boolean options that only set the switch.

```
4862 \MT@map@clist@n{draft,selected,babel}{%
4863   \MT@def@bool@opt{#1}{\csname MT@#1\@tempa\endcsname}}
4864 \MT@def@bool@opt{auto}{\csname MT@auto\@tempa\endcsname \MT@opt@autotru}
```

The DVInoutput option will change `\pdfoutput` immediately to minimise the risk of confusing other packages.

```
4865 </package>
4866 <*pdf-|lua-|xe-|
4867 <lua-|MT@requires@luatex4{\let\pdfoutput\outputmode}\relax
4868 \MT@def@bool@opt{DVInoutput}{%
4869   \csname if\@tempa\endcsname
4870 <*pdf-|lua-|
4871   \ifnum\pdfoutput>\z@ \MT@opt@DVIttrue \fi
4872   \pdfoutput\z@
4873   \else
4874     \ifnum\pdfoutput<\@ne \MT@opt@DVIttrue \fi
4875     \pdfoutput\@ne
4876 </pdf-|lua-|
4877 <xe-|MT@warning@n{Ignoring `DVInoutput' option}%
4878   \fi
4879 }
```



```
4880 </pdf-|lua-|xe->
```

Setting the `defersetup` option to false will restore the old behaviour, where the setup took place at the time when the package was loaded. This is *undocumented*, since I would like to learn about the cases where this is necessary.

The only problem with the new deferred setup I can think of is when a box is being constructed inside the preamble and this box contains a font that is not loaded before the box is being used.

```
4881 (*package)
4882 \MT@def@bool@opt{defersetup}{%
4883   \csname if\@tempa\endcsname \else
4884     \AtEndOfPackage{%
4885       \MT@setup@
4886       \let\MT@setup@\empty
4887       \let\MT@addto@setup\@firstofone
4888     }%
4889   \fi
4890 }
4891 </package>
```

`copyfonts` will copy all fonts before setting them up. This allows protrusion and expansion with different parameters. This options is also *undocumented* in the hope that we can always find out automatically whether it's required. It also works with LuaTeX 0.30 or newer.

```
4892 (*pdf-|lua-)
4893 <pdf->\MT@requires@pdftex7{
4894   \MT@def@bool@opt{copyfonts}{%
4895     \csname if\@tempa\endcsname
4896       \MT@gllet\MT@copy@font\MT@copy@font@
4897     \else
4898       \MT@gllet\MT@copy@font\relax
4899     \fi
4900   }
4901 <pdf->}{
4902 </pdf-|lua-
4903 *pdf-|xe-
4904   \MT@def@bool@opt{copyfonts}{%
4905     \csname if\@tempa\endcsname
4906       \MT@error
4907 <pdf->      {The pdftex version you are using is too old\MessageBreak
4908 <pdf->      to use the `copyfonts' option}{Upgrade pdftex.}%
4909 <xe->      {The `copyfonts' option does not work with xetex}
4910 <xe->      {Use pdftex or luatex instead.}%
4911     \fi
4912   }
4913 <pdf->}
4914 </pdf-|xe->
```

`final` is the opposite to `draft`. It's only kept for backwards compatibility.

```
4915 (*package)
4916 \MT@def@bool@opt{final}{}
```

The `disable` option replaces the `draft` option, which could be inherited from the class options. The third value `ifdraft` mimicks this behaviour.

```
4917 \define@key{MT}{disable}[true]{%
4918   \def\@tempa{#1}%
4919   \MT@ifstreq\@tempa{true}\MT@disabletrue{%
4920     \MT@ifstreq\@tempa{ifdraft}{\ifMT@draft\MT@disabletrue\fi}{%
4921       \MT@ifstreq\@tempa{false}\relax{%
4922         \MT@optwarn@admissible{#1}{disable}%
4923       }%
4924     }%
4925   }
```

```

4925 }%
4926 }

```

For verbose output, we redefine \MT@vinfo.

```

4927 \define@key{MT}{verbose}[true]{%
4928   \let\MT@vinfo\MT@info@n1
4929   \def\@tempa{#1}%
4930   \MT@ifstreq\@tempa{true}\relax{%

```

Take problems seriously.

```

4931   \MT@ifstreq\@tempa{errors}{%
4932     \let\MT@warning \MT@warn@err
4933     \let\MT@warning@n1\MT@warn@err
4934   }{%
4935     \let\MT@vinfo\@gobble

```

Cast warnings to the winds.

```

4936   \MT@ifstreq\@tempa{silent}{%
4937     \let\MT@warning \MT@info
4938     \let\MT@warning@n1\MT@info@n1
4939   }{%
4940     \MT@ifstreq\@tempa{false}\relax{\MT@optwarn@admissible{#1}{verbose}}%
4941   }%
4942 }%
4943 }%
4944 }
4945 </package>

```

Options with numerical keys: factor, stretch, shrink, step, letterspace.

```

4946 <*package|letterspace>
4947 <plain>\MT@requires@latex1{
4948   \MT@map@clist@n{%
4949     <package> stretch,shrink,step,%
4950     letterspace}{%
4951     \define@key{MT}{#1}[\csname MT@#1@default\endcsname]{%
4952     \def\@tempa{##1 }%

```

No nonsense in \MT@factor et al.? A space terminates the number.

```

4953   \MT@ifint\@tempa
4954   {\MT@edef@n{MT@#1}{\@tempa}}%
4955   {\MT@optwarn@nan{##1}{#1}}%
4956 }%
4957 }
4958 <plain>}\relax
4959 </package|letterspace>

```

factor will define the protrusion factor only.

```

4960 <*package>
4961 \define@key{MT}{factor}[\MT@factor@default]{%
4962   \def\@tempa{#1 }%
4963   \MT@ifint\@tempa
4964   {\edef\MT@pr@factor{\@tempa}}
4965   {\MT@optwarn@nan{#1}{factor}}%
4966 }

```

Unit for protrusion codes.

```

4967 \define@key{MT}{unit}[character]{%
4968   \def\@tempa{#1}%
4969   \MT@ifstreq\@tempa{character}\relax{%
4970     \MT@ifdimen\@tempa
4971     {\let\MT@pr@unit\@tempa}%
4972     {\MT@warning@n1{"\@tempa" is not a dimension.\MessageBreak
4973       Ignoring it and setting values relative to\MessageBreak
4974       character widths}}%
4975   }%

```

```

4976 }

\MT@patches@list    The patch and nopatch options. Remember chosen option for later (\relax means
\MT@nopatches@list  'all', \@empty means 'none').

4977 \let\MT@patches@list\relax
4978 \let\MT@nopatches@list\@empty

4979 \define@key{MT}{patch}[all]{%
4980   \def\@tempa{#1}%
4981   \MT@ifstreq\@tempa{all}
4982     \relax
4983     {\MT@ifstreq\@tempa{none}
4984       {\let\MT@patches@list\@empty}
4985       {\def\MT@patches@list{#1}}}%
4986 }
4987 \define@key{MT}{nopatch}[all]{%
4988   \def\@tempa{#1}%
4989   \MT@ifstreq\@tempa{all}
4990     {\let\MT@nopatches@list\relax}
4991     {\MT@ifstreq\@tempa{none}
4992       \relax
4993       {\def\MT@nopatches@list{#1}}}%
4994 }

```

We can only apply the patches AtBeginDocument.

```

4995 \MT@addto@setup{%
4996   \ifx\MT@patches@list\relax
4997     \let\MT@patches@list\MT@patches@def
4998   \fi
4999   \ifx\MT@nopatches@list\@empty\else
5000     \ifx\MT@nopatches@list\relax
5001       \let\MT@nopatches@list\MT@patches@def
5002     \fi
5003     \MT@map@clist@c\MT@nopatches@list{%
5004       \MT@rem@from@clist{#1}\MT@patches@list}%
5005   \fi
5006   \ifx\MT@patches@list\@empty\else
5007 ^^X   \MT@map@clist@c\MT@patches@list{\MT@apply@patch{#1}}%
5008 ^^Q   \MT@warning@nl{Patches require the etex extensions. Ignoring them}%
5009   \fi
5010 }

```

#### 1.4.2 Loading the definition file

Load the engine-specific code (as strewn across this file).

```

5011 \input{microtype-\MT@engine tex.def}

```

#### 1.4.3 Reading the configuration file

The package should just work if called without any options. Therefore, expansion will be switched off by default if output is DVI, since it isn't likely that expanded fonts are available. (This grows more important as modern T<sub>E</sub>X systems have switched to the pdfT<sub>E</sub>X engine even for DVI output, so that the user might not even be aware of the fact that she's running pdfT<sub>E</sub>X.)

```

5012 \MT@protrusiontrue
5013 /package
5014 <*pdf-|lua-
5015 \ifnum\pdfoutput<\@ne \else

```

Also, we only enable expansion by default if pdfT<sub>E</sub>X can expand the fonts automatically.

```

5016 <pdf- > \MT@requires@pdftex4{
5017     \MT@expansiontrue
5018 <pdf- > \MT@autottrue
5019 <pdf- > }\relax
5020 \fi
5021 <lua- > \MT@autottrue
5022 </pdf-|lua- >

```

The main configuration file will be loaded before processing the package options.

\MT@config@file However, the config option must of course be evaluated beforehand. We also have  
 \MT@get@config to define a no-op for the regular option processing later.

```

5023 <*package >
5024 \define@key{MT}{config}[]{\relax}
5025 \def\MT@get@config#1config=#2,#3\@nil{%
5026     \MT@ifempty{#2}%
5027     {\def\MT@config@file{\MT@MT.cfg}}%
5028     {\def\MT@config@file{#2.cfg}}%
5029 }
5030 \expandafter\expandafter\expandafter\MT@get@config
5031 \csname opt@\currname.\@currxt\endcsname,config=\@nil

```

Load the file.

```

5032 \IfFileExists{\MT@config@file}{%
5033     \MT@info@nl{Loading configuration file \MT@config@file}%
5034     \MT@begin@catcodes
5035     \let\MT@begin@catcodes\relax
5036     \let\MT@end@catcodes\relax
5037     \let\MT@curr@file\MT@config@file
5038     \input{\MT@config@file}%
5039     \endgroup
5040 }{\MT@warning@nl{%
5041     Could not find configuration file `~\MT@config@file'!\MessageBreak
5042     This will almost certainly cause undesired results.\MessageBreak
5043     Please fix your installation}%
5044 }

```

\MT@check@active@set We have to make sure that font sets are active. If the user didn't activate any, we use those sets declared by \DeclareMicrotypeSetDefault (this is done at the end of the preamble).

```

5045 \def\MT@check@active@set#1{%
5046     \MT@ifdefined@n@TF{MT@#1@setname}{%
5047         \MT@info@nl{Using \@nameuse{MT@abbr@#1} set ~\@nameuse{MT@#1@setname}'}%
5048     }{%
5049         \MT@ifdefined@n@TF{MT@default@#1@set}{%
5050             \MT@gl@et@nn{MT@#1@setname}{MT@default@#1@set}%
5051             \MT@info@nl{Using default \@nameuse{MT@abbr@#1} set ~\@nameuse{MT@#1@setname}'}%
5052         }{%

```

If no default font set has been declared in the main configuration file, we use the (empty, non-existent) set '@', and issue a warning.

```

5053             \MT@gdef@n{MT@#1@setname}{@}%
5054             \MT@warning@nl{No \@nameuse{MT@abbr@#1} set chosen, no default set declared.
5055                 \MessageBreak Using empty set}%
5056         }%
5057     }%
5058 }

```

#### 1.4.4 Hook for other packages

\Microtype@Hook This hook may be used by font package authors, e.g., to declare alias fonts. If it is defined, it will be executed here, i.e., after the main configuration file has been loaded, and before the package options are evaluated.

This hook was needed in versions prior to 1.9a to overcome the situation that (1) the microtype package should be loaded after all font defaults have been set up (hence, using `\ifpackageloaded` in the font package was not viable), and (2) checking `\AtBeginDocument` could be too late, since fonts might already have been loaded, and consequently set up, in the preamble. With the new deferred setup, one could live without this command, however, it remains here since it's simpler than testing whether the package was loaded both in the preamble as well as at the beginning of the document (which is what one would have to do).

Package authors should check whether the command is already defined so that existing definitions by other packages aren't overwritten. Example:

```
\def\MinionPro@MT@Hook{\DeclareMicrotypeAlias{MinionPro-LF}{MinionPro}}
\ifpackageloaded{microtype}
  \MinionPro@MT@Hook
  {\ifundefined{Microtype@Hook}
    {\let\Microtype@Hook\MinionPro@MT@Hook}
    {\g@addto@macro\Microtype@Hook{\MinionPro@MT@Hook}}}
```

`\MicroType@Hook` with a capital T (which only existed in version 1.7) is now officially deprecated.

```
5059 \MT@ifdefined@c@T\MicroType@Hook{\MT@error{%
5060   Command \@backslashchar MicroType@Hook is deprecated.\MessageBreak
5061   Use \@backslashchar Microtype@Hook instead}
5062   {You might want to inform the font package authors.}\MicroType@Hook}
5063 \MT@ifdefined@c@T\Microtype@Hook\Microtype@Hook
```

#### 1.4.5 Changing options later

`\microtypesetup` Inside the preamble, `\microtypesetup` accepts the same options as the package (unless `defersetsup=false`). In the document body, it accepts the options: protrusion, expansion, activate, tracking, spacing and kerning (but specifying font sets is not allowed), and patch and nopatch.

```
5064 \def\microtypesetup{\setkeys{MT}}
5065 \MT@addto@setup{\def\microtypesetup#1{\setkeys{MTX}{#1}\selectfont}}
5066 </package>
5067 <*pdf-|lua-|xe-|
5068 \def\MT@define@optionX#1#2{%
5069   \define@key{MTX}{#1}[true]{%
5070     \edef\@tempb{\csname MT@rbba@#1\endcsname}%
5071     \MT@map@cliston{##1}{%
5072       \KV@sp@def\MT@val{###1}%
5073       \MT@ifempty\MT@val\relax{%
5074         \@tempcnta=\m@ne
5075       \MT@ifstreq\MT@val{true}{%
5076         \MT@checksetup{#1}{%
5077           \@tempcnta=\csname MT@\@tempb @level\endcsname
5078           \MT@vinfo{Enabling #1
5079             (level \number\csname MT@\@tempb @level\endcsname)\on@line}%
5080           }%
5081         }%
5082         \MT@ifstreq\MT@val{false}{%
5083           \@tempcnta=\z@
5084           \MT@vinfo{Disabling #1\on@line}%
5085         }%
5086         \MT@ifstreq\MT@val{compatibility}{%
5087           \MT@vinfo{Compatibility\on@line}%
5088         }%
5089       }%
5090     }%
5091   }%
5092 }
```

Enabling micro-typography in the middle of the document is not allowed if it has been disabled in the package options since fonts might already have been loaded and hence wouldn't be set up.

```
5076 \MT@checksetup{#1}{%
5077   \@tempcnta=\csname MT@\@tempb @level\endcsname
5078   \MT@vinfo{Enabling #1
5079     (level \number\csname MT@\@tempb @level\endcsname)\on@line}%
5080   }%
5081 }%
5082 \MT@ifstreq\MT@val{false}{%
5083   \@tempcnta=\z@
5084   \MT@vinfo{Disabling #1\on@line}%
5085 }%
5086 \MT@ifstreq\MT@val{compatibility}{%
5087   \MT@vinfo{Compatibility\on@line}%
5088 }%
5089 }
```

```

5087         \MT@checksetup{#1}{%
5088             \@tempcnta=\@ne
5089             \MT@let@nc{MT@\@tempb @level}\@ne
5090             \MT@vinfo{Setting #1 to level 1\on@line}%
5091         }%
5092     }{%
5093         \MT@ifstreq\MT@val{nocompatibility}{%
5094             \MT@checksetup{#1}{%
5095                 \@tempcnta=\tw@
5096                 \MT@let@nc{MT@\@tempb @level}\tw@
5097                 \MT@vinfo{Setting #1 to level 2\on@line}%
5098             }%
5099             {\MT@error{Value `\'MT@val\' for key `\'#1\' not recognised}
5100              {Use any of `\'true\'', `\'false\'', `\'compatibility\' or
5101               `\'nocompatibility\'}.}%
5102         }%
5103     }%
5104 }%
5105 }%
5106 \ifnum\@tempcnta>\m@ne
5107 #2\@tempcnta\relax
5108 \fi
5109 }%
5110 }%
5111 }%
5112 }

```

`\MT@checksetup`      Test whether the feature wasn't disabled in the package options.

```

5113 \def\MT@checksetup#1{%
5114     \csname ifMT@#1\endcsname
5115     \expandafter\@firstofone
5116     \else
5117         \MT@error{You cannot enable #1 if it was disabled\MessageBreak
5118                  in the package options}{Load microtype with #1 enabled.}%
5119         \expandafter\@gobble
5120     \fi
5121 }

5122 \MT@define@optionX{protrusion}\MT@protrudechars
5123 </pdf-|lua-|xe-|
5124 *pdf-|lua-|
5125 \MT@define@optionX{expansion}\MT@adjustspacing

```

`\MT@protrudechars`

```

\MT@adjustspacing 5126 <*lua-|
5127 \MT@requires@luatex4{
5128     \let\pdfprotrudechars\protrudechars
5129     \let\pdfadjustspacing\adjustspacing
5130 } \relax
5131 </lua-|
5132 \let\MT@protrudechars\pdfprotrudechars
5133 \let\MT@adjustspacing\pdfadjustspacing
5134 </pdf-|lua-|
5135 *xe-|
5136 \let\MT@protrudechars\XeTeXprotrudechars
5137 \define@key{MTX}{expansion}[true]{\MT@warning{Ignoring expansion setup}}
5138 </xe-|

```

`\MT@define@optionX@`      The same for tracking, spacing and kerning, which do not have a compatibility level.

```

5139 <*pdf-|lua-|
5140 pdf-| \MT@requires@pdftex6{
5141 lua-| \MT@requires@luatex3{
5142     \def\MT@define@optionX@#1#2{%
5143         \define@key{MTX}{#1}[true]{%

```

```

5144 \MT@map@clist@n{##1}{%
5145 \KV@sp@def\MT@val{###1}%
5146 \MT@ifempty\MT@val\relax{%
5147 \@tempcnta=\m@ne
5148 \MT@ifstreq\MT@val{true}{%
5149 \MT@checksetup{#1}{%
5150 \@tempcnta=\@ne
5151 \MT@vinfo{Enabling #1\on@line}%
5152 }%
5153 }%
5154 \MT@ifstreq\MT@val{false}{%
5155 \@tempcnta=\z@
5156 \MT@vinfo{Disabling #1\on@line}%
5157 }{\MT@error{Value `~\MT@val' for key `~#1' not recognised}
5158 {Use either `true' or `false'}}%
5159 }%
5160 }%
5161 \ifnum\@tempcnta>\m@ne
5162 #2\relax
5163 \fi
5164 }%
5165 }%
5166 }%
5167 }

```

We cannot simply let `\MT@tracking relax`, since this may select the already letter-spaced font instance.

```

5168 \MT@define@optionX@{tracking}{\ifnum\@tempcnta=\z@ \let\MT@tracking\MT@set@tr@zero
5169 \else \let\MT@tracking\MT@tracking@ \fi}
5170 (pdf-) \MT@define@optionX@{spacing}{\pdfadjustinterwordglue\@tempcnta}
5171 (pdf-) \MT@define@optionX@{kerning}{\pdfprependkern\@tempcnta
5172 (pdf-) \pdfappendkern\@tempcnta}
5173 }{
5174 (pdf-|lua-)
5175 (*pdf-|lua-|xe-)

```

Disable for older pdfTeX versions and for X<sub>Y</sub>TeX and LuaTeX.

```

5176 \define@key{MTX}{tracking}[true]{\MT@warning{Ignoring tracking setup}}
5177 (lua-)
5178 \define@key{MTX}{kerning}[true]{\MT@warning{Ignoring kerning setup}}
5179 \define@key{MTX}{spacing}[true]{\MT@warning{Ignoring spacing setup}}
5180 (pdf-)
5181 \define@key{MTX}{activate}[true]{%
5182 \setkeys{MTX}{protrusion={#1}}%
5183 (pdf-|lua-) \setkeys{MTX}{expansion={#1}}%
5184 }
5185 (pdf-|lua-|xe-)

```

`\MT@saved@setupfont` Disable everything – may be used as a temporary work-around in case setting up fonts doesn't work under certain circumstances, but only until that specific problem is fixed. These options are *undocumented*, as they completely deprive us of the possibility to act – we're blind and paralysed.

```

5186 (*package)
5187 \let\MT@saved@setupfont\MT@setupfont
5188 \define@key{MTX}{deactivate}[]{%
5189 \MT@info{Deactivate `~\MT@MT' package}%
5190 \let\MT@setupfont\relax
5191 }
5192 \define@key{MTX}{reactivate}[]{%
5193 \MT@info{Reactivate `~\MT@MT' package}%
5194 \let\MT@setupfont\MT@saved@setupfont
5195 }

```

Apply or revert patches.

```

5196 \define@key{MTX}{patch}[all]{%
5197   \def\@tempa{#1}%
5198   \MT@ifstreq\@tempa{all}
5199     {\let\@tempa\MT@patches@def}
5200     {\MT@ifstreq\@tempa{none}
5201      {\let\@tempa\empty}
5202      \relax}%
5203   \ifx\@tempa\empty\else
5204   ^^X   \MT@map@clist@c\@tempa{\MT@apply@patch{##1}}%
5205   ^^Q   \MT@warning@n1{Patches require the etex extensions. Ignoring them}%
5206   \fi
5207 }
5208 \define@key{MTX}{nopatch}[all]{%
5209   \def\@tempa{#1}%
5210   \MT@ifstreq\@tempa{all}
5211     {\let\@tempa\MT@patches@def}
5212     {\MT@ifstreq\@tempa{none}
5213      {\let\@tempa\empty}
5214      \relax}%
5215   \ifx\@tempa\empty\else
5216   ^^X   \MT@map@clist@c\@tempa{\MT@undo@patch{##1}}%
5217   \fi
5218 }
5219 </package>

```

#### 1.4.6 Processing the options

\MT@ProcessOptionsWithKV Parse options.

```

5220 <*package|letterspace>
5221 <plain>\MT@requires@latex1{
5222 \def\MT@ProcessOptionsWithKV#1{%
5223   \let\@tempc\relax
5224   \let\MT@temp\empty
5225 <plain> \MT@requires@latex2{
5226     \MT@map@clist@c\@classoptionslist{%
5227       \def\CurrentOption{##1}%
5228       \MT@ifdefined@nT{KV@#1@expandafter\MT@getkey\CurrentOption=\@nil}{%
5229         \edef\MT@temp{\MT@temp,\CurrentOption,}%
5230         \@expandtwoargs\@removeelement\CurrentOption
5231         \unusedoptionlist\unusedoptionlist
5232       }%
5233     }%
5234     \edef\MT@temp{\noexpand\setkeys{#1}%
5235       {\MT@temp\@optionlist{\@currname.\@currentext}}}%

```

plain can handle package options.

```

5236 <*plain>
5237   {\edef\MT@temp{\noexpand\setkeys{#1}%
5238     {\csname usepkg@options@usepkg@pkg\endcsname}}}
5239 </plain>
5240 \MT@temp
5241 \MT@clear@options
5242 }

```

\MT@getkey For key=val in class options.

```

5243 \def\MT@getkey#1=#2\@nil{#1}
5244 \MT@ProcessOptionsWithKV{MT}
5245 <plain>\relax
5246 </package|letterspace>
5247 <*package>

```



Now we can take the appropriate actions. We also tell the log file which options the user has chosen (in case it's interested).

```
5248 \MT@addto@setup{%
5249 \ifMT@disable
```

We disable most of what we've just defined in the 5249 lines above if we are running in disable (aka. draft) mode.

```
5250 \MT@warning@n{The `disable' option is in effect.\MessageBreak
5251             Disabling all micro-typographic extensions.\MessageBreak
5252             This might lead to different line and page breaks}%
5253 \let\MT@setupfont\relax
5254 \renewcommand*\LoadMicrotypeFile[1]{}%
5255 \renewcommand*\microtypesetup[1]{}%
5256 \renewcommand*\microtypecontext[1]{}%
5257 \renewcommand*\lsstyle{}%
5258 \else
5259 \MT@setup@PDF
5260 \MT@setup@copies
```

Fix the font sets.

```
5261 \MT@map@tlist@c\MT@font@sets\MT@fix@font@set
5262 \MT@setup@protrusion
5263 \MT@setup@expansion
5264 \MT@setup@tracking
5265 \MT@setup@wartracking
5266 \MT@setup@spacing
5267 \MT@setup@kerning
5268 \MT@setup@noligatures
5269 }
5270 </package>
```

\MT@setup@PDF pdfTeX can create DVI output, too. However, both the DVI viewer and dvips need to find actual fonts. Therefore, expansion will only work if the fonts for different degrees of expansion are readily available.

Some packages depend on the value of \pdfoutput and will get confused if it is changed after they have been loaded. These packages are, among others: color, graphics, hyperref, crop, contour, pstricks and, as a matter of course, ifpdf. Instead of testing for each package (that's not our job), we only say that it was microtype that changed it. This must be sufficient!

```
5271 < *pdf- | lua- >
5272 \def\MT@setup@PDF{%
5273 \MT@info@n{Generating \ifnum\pdfoutput<\@ne DVI \else PDF \fi output%
5274             \ifMT@opt@DVI\space (changed by \MT@MT)\fi}%
5275 }
```

\MT@setup@copies Working on font copies?

```
5276 \def\MT@setup@copies{%
5277 \ifx\MT@copy@font\relax\else \MT@info@n{Using font copies for contexts}\fi
5278 }
5279 < /pdf- | lua- >
5280 < *xe- >
5281 \let\MT@setup@PDF\relax
5282 \let\MT@setup@copies\relax
5283 < /xe- >
```

\MT@setup@protrusion Protrusion.

```
5284 < *pdf- | lua- | xe- >
5285 \def\MT@setup@protrusion{%
5286 \ifMT@protrusion
5287 \edef\MT@active@features{\MT@active@features,pr}%
5288 \MT@protrudechars\MT@pr@level
5289 \MT@info@n{Character protrusion enabled (level \number\MT@pr@level)}%
```

```

5290     \ifnum\MT@pr@factor=\MT@factor@default \else,\MessageBreak
5291         factor: \number\MT@pr@factor\fi
5292     \ifx\MT@pr@unit\empty \else,\MessageBreak unit: \MT@pr@unit\fi}%
5293     \MT@check@active@set{pr}%
5294 \else
5295     \let\MT@protrusion\relax
5296     \MT@info@n1{No character protrusion}%
5297 \fi
5298 }
5299 </pdf-|lua-|xe->

```

\MT@setup@expansion For DVI output, the user must have explicitly passed the expansion option to the package. Under LuaTeX, expansion works quite differently: the glyphs will be positioned as if they were transformed, without actually being transformed. Since this could still be considered a viable option, we don't disable the feature completely, but issue a warning.

```

5300 <(*pdf-|lua-)>
5301 \def\MT@setup@expansion{%
5302     \ifnum\pdfoutput<\@ne
5303     \ifMT@opt@expansion
5304     <(*lua-)>
5305         \ifMT@expansion
5306             \MT@requires@luatex3{%
5307                 \MT@warning@n1{Font expansion doesn't work properly with luatex in\MessageBreak
5308                     DVI mode: the glyphs won't be actually transformed,\MessageBreak
5309                     but will only be shifted. You might want to use\MessageBreak
5310                     pdflatex instead. I'll continue anyway ..}%
5311             %\MT@expansionfalse
5312         }\relax
5313     \fi
5314 </lua-)>
5315     \else
5316         \MT@expansionfalse
5317     \fi
5318 \fi
5319 \ifMT@expansion

```

Set up the values for font expansion: if stretch has not been specified, we take the default value of 20.

```

5320     \ifnum\MT@stretch=\m@ne
5321     \let\MT@stretch\MT@stretch@default
5322 \fi

```

If shrink has not been specified, it will inherit the value from stretch.

```

5323     \ifnum\MT@shrink=\m@ne
5324     \let\MT@shrink\MT@stretch
5325 \fi

```

If step has not been specified, we will just set it to 1 for recent pdfTeX versions. My tests did not show much difference neither in compilation time (within the margin of error) nor in file size (less than 1% difference for microtype.pdf with step=1 compared to step=5). With older versions, we set it to min(stretch,shrink)/5, rounded off, minimum value 1.

```

5326     \ifnum\MT@step=\m@ne
5327 <pdf-)> \MT@requires@pdfTeX6{%
5328     \def\MT@step{1}%
5329 <(*pdf-)>
5330 }{%
5331     \ifnum\MT@stretch>\MT@shrink
5332         \ifnum\MT@shrink=\z@
5333             \@tempcnta=\MT@stretch
5334         \else

```

```

5335         \@tempcnta=\MT@shrink
5336         \fi
5337       \else
5338         \ifnum\MT@stretch=\z@
5339           \@tempcnta=\MT@shrink
5340         \else
5341           \@tempcnta=\MT@stretch
5342         \fi
5343       \fi
5344       \divide\@tempcnta 5\relax
5345       \ifnum\@tempcnta=\z@ \@tempcnta=\@ne \fi
5346       \edef\MT@step{\number\@tempcnta\space}%
5347     }%
5348 /pdf-
5349     \fi
5350     \ifnum\MT@step=\z@
5351       \MT@warning@nl{The expansion step cannot be set to zero.\MessageBreak
5352         Setting it to one}%
5353     \def\MT@step{1 }%
5354   \fi

```

`\MT@auto` Automatic expansion of the font? This new feature of pdfTeX 1.20 makes the *fix* programme really usable. It must be either ‘autoexpand’ or empty (or ‘1000’ for older versions of pdfTeX). With LuaTeX, we just leave it empty, as there’s actually no difference – non-automatic font expansion doesn’t work anymore. In LuaTeX 1.0.6, the ‘autoexpand’ option seems to have been removed altogether and would trigger a warning.

```

5355     \let\MT@auto\empty
5356     \ifMT@auto

```

We turn off automatic expansion if output mode is DVI.

```

5357 *pdf-
5358     \MT@requires@pdftex4{%
5359       \ifnum\pdfoutput<\@ne
5360         \ifMT@opt@auto
5361           \MT@error{%
5362             Automatic font expansion only works for PDF output.\MessageBreak
5363             However, you are creating a DVI file}
5364           {If you have created expanded fonts instances, remove `auto' from%
5365             \MessageBreak the package options. Otherwise, you have to switch
5366             off expansion\MessageBreak completely.}%
5367         \fi
5368         \MT@autofalse
5369       \else
5370         \def\MT@auto{autoexpand}%
5371       \fi

```

Also, if pdfTeX is too old.

```

5372     }{%
5373       \MT@error{%
5374         The pdftex version you are using is too old for\MessageBreak
5375         automatic font expansion}%
5376       {If you have created expanded fonts instances, remove `auto' from\MessageBreak
5377         the package options. Otherwise, you have to switch off expansion\MessageBreak
5378         completely, or upgrade pdftex to version 1.20 or newer.}%
5379       \MT@autofalse
5380       \def\MT@auto{1000 }%
5381     }%
5382 /pdf-
5383 lua-     \MT@requires@luatex3\relax{\def\MT@auto{autoexpand}}%
5384     \else
5385 *pdf-

```

No automatic expansion.

```

5386 \MT@requires@pdftex4\relax{%
5387 \def\MT@auto{1000 }%
5388 }%
5389 </pdf-
5390 <*/lua-
5391 \MT@requires@luatex3{%
5392 \ifMT@opt@auto
5393 \MT@error{Non-automatic font expansion does not work with\MessageBreak
5394 \luatex}{Remove 'auto=false' from the package options, or use pdftex.}%
5395 \MT@autotruer
5396 \fi
5397 }\relax
5398 </lua-
5399 \fi

```

Choose the appropriate macro for selected expansion.

```

5400 \ifMT@selected
5401 \let\MT@set@ex@codes\MT@set@ex@codes@s
5402 \else
5403 \let\MT@set@ex@codes\MT@set@ex@codes@n
5404 \fi

```

Filter out stretch=0, shrink=0, since it would result in a pdfTeX error.

```

5405 \ifnum\MT@stretch=\z@
5406 \ifnum\MT@shrink=\z@
5407 \MT@warning@nl{%
5408 Both the stretch and shrink limit are set to zero.\MessageBreak
5409 Disabling font expansion}%
5410 \MT@expansionfalse
5411 \fi
5412 \fi
5413 \fi
5414 \ifMT@expansion
5415 \edef\MT@active@features{\MT@active@features,ex}%
5416 \MT@adjustspacing\MT@ex@level
5417 \MT@info@nl{\ifMT@auto A\else Non-a\fi utomatic font expansion enabled
5418 (level \number\MT@ex@level),\MessageBreak
5419 stretch: \number\MT@stretch, shrink: \number\MT@shrink,
5420 step: \number\MT@step, \ifMT@selected\else non-\fi selected}%

```

\MT@check@step Check whether stretch and shrink are multiples of step.

```

5421 \def\MT@check@step##1{%
5422 \@tempcnta=\csname MT@##1\endcsname
5423 \divide\@tempcnta \MT@step
5424 \multiply\@tempcnta \MT@step
5425 \ifnum\@tempcnta=\csname MT@##1\endcsname\else
5426 \MT@warning@nl{The ##1 amount is not a multiple of step.\MessageBreak
5427 The effective maximum ##1 is \the\@tempcnta\space
5428 (step \number\MT@step)}%
5429 \fi
5430 }%
5431 \MT@check@step{stretch}%
5432 \MT@check@step{shrink}%
5433 \MT@check@active@set{ex}%

```

\showhyphens Inside \showhyphens, font expansion should be disabled. (Since 2017/01/10, the L<sup>A</sup>T<sub>E</sub>X format contains a different version for X<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X, but since expansion doesn't work with X<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X, we don't have to bother.) Since 2019/10/01, the command is robust.

```

5434 \MT@ifdefined@n@TF{showhyphens }{%
5435 \def\MT@temp##1##2{%
5436 \expandafter\CheckCommand\csname showhyphens \endcsname[1]{##1}%
5437 \DeclareRobustCommand\showhyphens[1]{##2}}%

```

```

5438 }{%
5439   \def\MT@temp##1##2{%
5440     \CheckCommand*\showhyphens[1]{##1}%
5441     \gdef\showhyphens###1{##2}}%
5442 }%
5443 \MT@temp
5444   {\setbox0\vbox{\color@begingroup
5445     \everypar{}\parfillskip\z@skip
5446     \hsize\maxdimen\normalfont\pretolerance\m@ne\tolerance\m@ne
5447     \hbadness\z@\showboxdepth\z@\ ##1\color@endgroup}}
5448   {\setbox0\vbox{\color@begingroup\pdfadjustspacing\z@
5449     \everypar{}\parfillskip\z@skip
5450     \hsize\maxdimen\normalfont\pretolerance\m@ne\tolerance\m@ne
5451     \hbadness\z@\showboxdepth\z@\ ##1\color@endgroup}}%
5452 \else
5453   \let\MT@expansion\relax
5454   \MT@info@nl{No font expansion}%
5455 \fi
5456 }
5457 </pdf-|lua-|
5458 *xe-|
5459 \def\MT@setup@expansion{%
5460   \ifMT@expansion
5461     \ifMT@opt@expansion
5462       \MT@error{Font expansion does not work with xetex}
5463       {Use pdftex or luatex instead.}%
5464     \fi
5465   \fi
5466 }
5467 </xe-|

```

\MT@setup@tracking      Tracking, spacing and kerning.

```

5468 <*pdf-|lua-|
5469 <pdf-|MT@requires@pdftex6{%
5470 <lua-|MT@requires@luatex3{%
5471   \def\MT@setup@tracking{%
5472     \ifMT@tracking
5473       \edef\MT@active@features{\MT@active@features,tr}%
5474       \MT@info@nl{Tracking enabled}%
5475       \MT@check@active@set{tr}%

```

Enable protrusion for compensation at the line edges.

```

5476     \ifMT@protrusion\else\MT@protrudechars\@ne\fi
5477   \else
5478     \let\MT@tracking\relax
5479     \MT@info@nl{No adjustment of tracking}%
5480   \fi
5481 }
5482 </pdf-|lua-|

```

\MT@setup@spacing

```

5483 <*pdf-|
5484 \def\MT@setup@spacing{%
5485   \ifMT@spacing
5486     \edef\MT@active@features{\MT@active@features,sp}%
5487     \pdfadjustinterwordglue\@ne
5488     \MT@info@nl{Adjustment of interword spacing enabled}%

```

The ragged2e package sets interword spaces to a fixed value without glue. microtype's modifications can therefore have undesired effects. Therefore, we issue a warning.

```

5489   \MT@with@package@T{ragged2e}{%
5490     \MT@warning@nl{You are using the `ragged2e' package.\MessageBreak
5491       Adjustment of interword spacing may lead to\MessageBreak
5492       undesired results when used with `ragged2e'.\MessageBreak

```

```

5493         In this case, disable the `spacing' option}%
5494     }%
5495     \MT@check@active@set{sp}%
5496 \else
5497     \let\MT@spacing\relax
5498     \MT@info@nl{No adjustment of interword spacing}%
5499 \fi
5500 }

\MT@setup@spacing@check    Warning if \nonfrenchspacing is active, since space factors will be ignored with
                           \pdfadjustinterwordglue > 0. Why 1500? Because some packages redefine \frenchspacing.5

5501 \def\MT@setup@spacing@check{%
5502     \ifMT@spacing
5503         \ifMT@babel \else
5504             \ifnum\sfcode`. > 1500
5505                 \MT@ifstreq\MT@sp@context{nonfrench}\relax{%
5506                     \MT@warning@nl{%
5507                         \@backslashchar nonfrenchspacing is active. Adjustment of\MessageBreak
5508                         interword spacing will disable it. You might want\MessageBreak
5509                         to add \@backslashchar microtypecontext{spacing=nonfrench}'\MessageBreak
5510                         to your preamble}%
5511                     }%
5512                 \fi
5513             \fi
5514         \fi
5515     }

\MT@setup@kerning

5516 \def\MT@setup@kerning{%
5517     \ifMT@kerning
5518         \edef\MT@active@features{\MT@active@features,kn}%
5519         \pdfprependkern\@ne
5520         \pdfappendkern\@ne
5521         \MT@info@nl{Adjustment of character kerning enabled}%
5522         \MT@check@active@set{kn}%
5523     \else
5524         \let\MT@kerning\relax
5525         \MT@info@nl{No adjustment of character kerning}%
5526     \fi
5527 }
5528 </pdf->

\MT@error@doesnt@work    If pdfTeX is too old, we disable tracking, spacing and kerning, and throw an error
                           message. We also switch the features off for LuaTeX and XeTeX.

5529 <pdf-|lua->{}{
5530 <lua->
5531 \def\MT@setup@tracking{%
5532     \ifMT@tracking
5533         \MT@error{The tracking feature only works with luatex 0.62\MessageBreak
5534             or newer. Switching it off}{Upgrade luatex.}%
5535         \MT@trackingfalse
5536         \MT@let@nc\MT@tracking}\relax
5537     \else
5538         \MT@info@nl{No adjustment of tracking (luatex too old)}%
5539     \fi
5540 }
5541 }
5542 </lua->
5543 <*pdf-|lua-|xe->
5544 \def\MT@error@doesnt@work#1{%
5545     \csname ifMT@#1\endcsname
5546     \MT@error{The #1 feature only works with pdftex 1.40\MessageBreak

```

5 Cf. the c.t.t. thread ‘frenchspacing with AMS packages and babel’, started by Philipp Lehman on 16 August 2005, MID: ddtbaj\$rob\$1online.de

```

5547         or newer. Switching it off}
5548 <pdf-> {Upgrade pdftex.}%
5549 <lua-|xe-> {Use pdftex instead.}%
5550 \csname MT@#1false\endcsname
5551 \MT@let@nc{MT@#1}\relax
5552 \else
5553 \MT@info@nl{No adjustment of #1%
5554 <pdf-> \space(pdftex too old)%
5555 }%
5556 \fi
5557 }
5558 <pdf-|xe-> \def\MT@setup@tracking{\MT@error@doesnt@work{tracking}}
5559 \def\MT@setup@kerning {\MT@error@doesnt@work{kerning}}
5560 \def\MT@setup@spacing {\MT@error@doesnt@work{spacing}}
5561 <pdf->}
5562 </pdf-|lua-|xe->

```

\MT@setup@warntracking

```

5563 <letterspace>\MT@addto@setup
5564 <pdf-|lua->\def\MT@setup@warntracking

```

\MT@warn@tracking@DVI

With pdfT<sub>E</sub>X, we issue a warning, when letterspacing in DVI mode, since it will probably not work. We also switch on protrusion if it isn't already, to compensate for the letterspacing kerns.

```

5565 <*pdf-|lua-|letterspace>
5566 {%
5567 <*pdf-|letterspace>
5568 \ifnum\pdfoutput<\@ne
5569 \def\MT@warn@tracking@DVI{%
5570 <letterspace> \MT@pdf@or@lua{%
5571 \MT@warning@nl{%
5572 You are using tracking/letterspacing in DVI mode.\MessageBreak
5573 This will probably not work, unless the post-\MessageBreak
5574 processing program (dvips, dvipdfm(x), ...) is\MessageBreak
5575 able to create the virtual fonts on the fly}%
5576 <letterspace> }\relax
5577 \MT@glet\MT@warn@tracking@DVI\relax
5578 }%
5579 \else
5580 </pdf-|letterspace>
5581 \def\MT@warn@tracking@DVI{%
5582 \ifnum\pdfprotrudechars<\@ne \global\pdfprotrudechars\@ne \fi
5583 \MT@glet\MT@warn@tracking@DVI\relax
5584 }%
5585 <pdf-|letterspace> \fi
5586 \ifnum\MT@letterspace=\m@ne
5587 \let\MT@letterspace\MT@letterspace@default
5588 \else
5589 \MT@ls@too@large\MT@letterspace
5590 \fi
5591 }
5592 </pdf-|lua-|letterspace>
5593 <xe->\let\MT@setup@warntracking\relax

```

\MT@setup@noligatures

\DisableLigatures is only admissible in the preamble, therefore we can now disable the corresponding macro, if it was never called.

```

5594 <*pdf-|lua->
5595 \def\MT@setup@noligatures{%
5596 <pdf-> \MT@requires@pdftex5{%
5597 \ifMT@noligatures \else
5598 \let\MT@noligatures\relax
5599 \fi
5600 <pdf-> }\relax
5601 }

```

```
5602 </pdf-|lua-|
5603 <xe-|>\let\MT@setup@noligatures\relax
```

Remove the leading comma in `\MT@active@features`, and set the document switch to true.

```
5604 <*package>
5605 \MT@addto@setup{%
5606   \ifx\MT@active@features\empty \else
5607     \edef\MT@active@features{\expandafter\@gobble\MT@active@features}%
5608   \fi
5609   \MT@documenttrue
5610 }
```

`\MT@set@babel@context`      Interaction with babel.

```
5611 \def\MT@set@babel@context#1{%
5612   \MT@ifdefined@n@TF{MT@babel@#1}{%
5613     \MT@info{*** Changing to language context `#1'\MessageBreak\on@line}%
5614     \expandafter\MT@exp@one@n\expandafter\microtypecontext
5615     \csname MT@babel@#1\endcsname
5616   }{%
5617     \microtypecontext{protrusion=,expansion=,spacing=,kerning=}%
5618   }%
5619 }
```

`\MT@shorthandoff`      Active characters can only be switched off if babel isn't loaded after microtype.

```
5620 \ifpackageloaded{babel}{
5621   \def\MT@shorthandoff#1#2{%
5622     \MT@info@n1{Switching off #1 babel's active characters (#2)}%
5623     \shorthandoff{#2}}
5624 }{
5625   \def\MT@shorthandoff#1#2{%
5626     \MT@error{You must load `babel' before `~\MT@MT'}
5627     {Otherwise, `~\MT@MT' cannot switch off #1 babel's\MessageBreak
5628      active characters.}}
5629 }
```

We patch babel's language switching commands to enable language-dependent setup.

```
5630 \MT@addto@setup{%
5631   \ifMT@babel
5632     \ifpackageloaded{babel}{%
5633       \MT@info@n1{Redefining babel's language switching commands}%
5634       \let\MT@orig@select@language\select@language
5635       \def\select@language#1{%
5636         \MT@orig@select@language{#1}%
5637         \MT@set@babel@context{#1}%
5638       }%
5639       \let\MT@orig@foreign@language\foreign@language
5640       \def\foreign@language#1{%
5641         \MT@orig@foreign@language{#1}%
5642         \MT@set@babel@context{#1}%
5643       }%
5644       \ifMT@kerning
```

Disable French babel's active characters.

```
5645   \MT@if@false
5646   \MT@with@babel@and@T{french} \MT@if@true
5647   \MT@with@babel@and@T{frenchb} \MT@if@true
5648   \MT@with@babel@and@T{français}\MT@if@true
5649   \MT@with@babel@and@T{canadien}\MT@if@true
5650   \MT@with@babel@and@T{acadian} \MT@if@true
5651   \ifMT@if@MT@shorthandoff{French}{;!?}\fi
```

Disable Turkish babel's active characters.



```

5652      \MT@if@false
5653      \MT@with@babel@and@T{turkish} \MT@if@true
5654      \ifMT@if@MT@shorthandoff{Turkish}{:=}\fi
5655      \fi

```

In case babel was loaded before microtype:

```

5656      \MT@set@babel@context\language@name

```

The polyglossia package has a useful hook. Unfortunately, compatibility with polyglossia is less useful in itself, as only LuaTeX allows working on font copies, and currently doesn't provide the kerning or spacing feature. But who knows, maybe somebody would want more protrusion in French...

```

5657      }{%
5658      \@ifpackageloaded{polyglossia}{%
5659      \MT@info@n{Registering with polyglossia's language switching hook}%
5660      \gappto\polyglossia@language@switched{%
5661      \MT@set@babel@context\language@name}%
5662      }%
5663      \MT@set@babel@context\language@name
5664      }{%
5665      \MT@warning@n{%
5666      You did not load the babel or the polyglossia package.\MessageBreak
5667      The `babel' option won't have any effect}%
5668      }%
5669      }%
5670      \fi
5671 }

```

Now we close the \fi from \ifMT@disable.

```

5672 \MT@addto@setup{\fi

```

Set up the current font, most likely the normal font. This has to come after all of the setup (including anything from the preamble) has been dealt with.

```

5673 \selectfont}

```

\MT@curr@file This is the current file (hopefully with the correct extension).

```

5674 \edef\MT@curr@file{\jobname.tex}
5675 </package>

```

Finally, execute the setup macro at the end of the preamble, and empty it (the combine class calls it repeatedly).

```

5676 <*package|letterspace>
5677 <plain>\MT@requires@latexl{
5678 \AtBeginDocument{\MT@setup@ \MT@glet\MT@setup@ \@empty}
5679 <plain>}\relax
5680 </package|letterspace>

```

Must come at the very, very end.

```

5681 <package>\MT@ifdefined@c@T\MT@setup@spacing@check
5682 <package> {\AtBeginDocument{\MT@setup@spacing@check}}

```

Restore catcodes.

```

5683 <package|letterspace>\MT@restore@catcodes

```

That was that.

## 2 Configuration files

Let's now write the font configuration files.

```
5684 (*config)
5685
```

### 2.1 Font sets

We first declare some sets in the main configuration file.

```
5686 (*m-t)
5687 %%% -----
5688 %%% FONT SETS
5689
5690 \DeclareMicrotypeSet{all}
5691 { }
5692
5693 \DeclareMicrotypeSet{allmath}
5694 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU,TS1,OML,OMS,U} }
5695
5696 \DeclareMicrotypeSet{alltext}
5697 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU} }
5698
5699 \DeclareMicrotypeSet{allmath-nott}
5700 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU,TS1,OML,OMS,U},
5701   family   = {rm*,sf*}
5702 }
5703
5704 \DeclareMicrotypeSet{alltext-nott}
5705 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
5706   family   = {rm*,sf*}
5707 }
5708
5709 \DeclareMicrotypeSet{basicmath}
5710 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU,OML,OMS},
5711   family   = {rm*,sf*},
5712   series    = {md*},
5713   size      = {normalsize,footnotesize,small,large}
5714 }
5715
5716 \DeclareMicrotypeSet{basictext}
5717 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU},
5718   family   = {rm*,sf*},
5719   series    = {md*},
5720   size      = {normalsize,footnotesize,small,large}
5721 }
5722
5723 \DeclareMicrotypeSet{smallcaps}
5724 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
5725   shape     = {sc*,si,scit}
5726 }
5727
5728 \DeclareMicrotypeSet{footnotesize}
5729 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
5730   size      = {-small}
5731 }
5732
5733 \DeclareMicrotypeSet{scriptsize}
5734 { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
```

```

5735     size      = {-footnotesize}
5736   }
5737
5738 \DeclareMicrotypeSet{normal font}
5739   { font = */*/*/*/* }
5740

```

The default sets.

```

5741 %%% -----
5742 %%% DEFAULT SETS
5743
5744 \DeclareMicrotypeSetDefault[protrusion]{alltext}
5745 \DeclareMicrotypeSetDefault[expansion]{alltext-nott}
5746 \DeclareMicrotypeSetDefault[spacing]{alltext-nott}
5747 \DeclareMicrotypeSetDefault[kerning]{alltext}
5748 \DeclareMicrotypeSetDefault[tracking]{smallcaps}
5749

```

## 2.2 Font variants and aliases

These are the variants I happen to be using (expert encoding, oldstyle numerals, swashes, alternative, display, inferior and superior numerals): Additionally, we add the now common variants for Lining, Tabular, Oldstyle, and Tabular Oldstyle numbers.

```

5750 %%% -----
5751 %%% FONT VARIANTS AND ALIASES
5752
5753 \DeclareMicrotypeVariants{x,j,w,a,d,0,1,-LF,-TLF,-OsF,-TosF}

```

Other candidates: 2 (proportional digits), e (engraved), f (Fraktur), g (small text), h (shadow), l (outline), n (informal), p (ornaments), r (roman), s (sans serif), t (typewriter). I've omitted them since they seem hardly be used and/or they are actually more than just a variant, i.e., they shouldn't share a file.

Fonts that are 'the same': The fontspec package will set lmr as the default font, whose declarations for EU1/EU2/TU encoding are in mt-LatinModernRoman.cfg. Since 2016/12/03, the default encoding with Xe<sub>La</sub>TeX and Lua<sub>La</sub>TeX in the L<sup>A</sup>T<sub>E</sub>X format is TU, even if fontspec is not loaded.

```

5754
5755 \MT@if@false
5756 \ifx\UnicodeEncodingName\undefined\else
5757   \MT@if@fstreq{\encodingdefault}{\UnicodeEncodingName}\MT@if@true\relax
5758 \fi
5759 \ifMT@fontspec\MT@if@true\fi
5760 \ifMT@if@
5761 % -- Computer/Latin Modern Roman
5762 \DeclareMicrotypeAlias{lrm}{Latin Modern Roman}
5763 \else
5764 \DeclareMicrotypeAlias{lrm}{cmr} % lmodern
5765 \fi

```

The Latin Modern fonts, the virtual fonts from the ae and zefonts and the eco and hfoldsty packages (oldstyle numerals), as well as lmodern, all inherit the (basic) settings from Computer Modern Roman. Some of them are in part overwritten later. We mustn't forget the Latin Modern math fonts.

```

5766 \DeclareMicrotypeAlias{lmsy}{cmsy} % "
5767 \DeclareMicrotypeAlias{lmm}{cmm} % "
5768 \DeclareMicrotypeAlias{aer}{cmr} % ae
5769 \DeclareMicrotypeAlias{zer}{cmr} % zefonts

```

```

5770 \DeclareMicrotypeAlias{cmor}{cmr}          % eco
5771 \DeclareMicrotypeAlias{hfor}{cmr}          % hfoldsty
5772 \DeclareMicrotypeAlias{mlmr}{cmr}          % mlmodern
5773 \DeclareMicrotypeAlias{mlmsy}{cmsy}        % "
5774 \DeclareMicrotypeAlias{mlmm}{cmm}          % "

```

Another, new Computer Modern extension. The `newcomputermodern` package loads it by file name.

```

5775 \DeclareMicrotypeAlias{NewCM10-Book.otf}    {New Computer Modern}
5776 \DeclareMicrotypeAlias{NewCM10-Regular.otf} {New Computer Modern}

```

CMU Serif can use the settings from New Computer Modern too.

```

5777 \DeclareMicrotypeAlias{CMU Serif}          {New Computer Modern}

```

The packages `pxfonts` and `txfonts` fonts inherit Palatino and Times settings respectively, also the TeX Gyre fonts Pagella and Termes (formerly: `qfonts`).

```

5778 %% -- Palatino
5779 \DeclareMicrotypeAlias{pxr}{ppl}           % pxfonts
5780 \DeclareMicrotypeAlias{qpl}{ppl}           % TeX Gyre Pagella (formerly: qfonts/QuasiPalatino)

```

The ‘FPL Neu’ fonts, a ‘re-implementation’ of Palatino.

```

5781 \DeclareMicrotypeAlias{fp9x}{pplx}        % FPL Neu
5782 \DeclareMicrotypeAlias{fp9j}{pplj}        % "

```

The `newpx` package, a replacement for `pxfonts`.

```

5783 \DeclareMicrotypeAlias{zpllf}{pplx}        % newpxtext
5784 \DeclareMicrotypeAlias{zplosf}{pplj}       % "
5785 \DeclareMicrotypeAlias{zpltlf}{pplx}       % "
5786 \DeclareMicrotypeAlias{zpltosf}{pplj}      % "

```

The `domitian` package.

```

5787 \DeclareMicrotypeAlias{Domitian-TLF}{pplx}% domitian
5788 \DeclareMicrotypeAlias{Domitian-T0sF}{pplj}% "

```

The OpenType versions:

```

5789 \DeclareMicrotypeAlias{Palatino Linotype}{Palatino}
5790 \DeclareMicrotypeAlias{Palatino LT Std}{Palatino}
5791 \DeclareMicrotypeAlias{TeX Gyre Pagella}{Palatino}
5792 \DeclareMicrotypeAlias{Domitian}{Palatino}
5793 \DeclareMicrotypeAlias{Asana Math}{Palatino}
5794 %% -- Times New Roman
5795 \DeclareMicrotypeAlias{txr}{ptm}           % txfonts

```

The `newtx` package, a replacement for `txfonts`.

```

5796 \DeclareMicrotypeAlias{ntxlf}{ptmx}       % newtxtext
5797 \DeclareMicrotypeAlias{ntxosf}{ptmj}       % "
5798 \DeclareMicrotypeAlias{ntxtlf}{ptmx}       % "
5799 \DeclareMicrotypeAlias{ntxtosf}{ptmj}      % "

```

The `tempora` package.

```

5800 \DeclareMicrotypeAlias{Tempora-TLF}{ptmx} % tempora
5801 \DeclareMicrotypeAlias{Tempora-T0sF}{ptmj} % "
5802 \DeclareMicrotypeAlias{qtm}{ptm}          % TeX Gyre Termes (formerly: qfonts/QuasiTimes)

```

The `step` package.

```

5803 \DeclareMicrotypeAlias{STEP-TLF}{ptmx}    % step
5804 \DeclareMicrotypeAlias{STEP-T0sF}{ptmj}    % "

```

The `stix` and `stix2` packages (the latter has departed a bit from being a Times clone, but still seems close enough).

```

5805 \DeclareMicrotypeAlias{stix}{ptm}         % stix
5806 \DeclareMicrotypeAlias{stix2}{ptm}        % stix2

```

More Times variants, to be checked: pns, mns (TimesNewRomanPS); mnt (TimesNewRomanMT, TimesNRSevenMT), mtm (TimesSmallTextMT); pte (TimesEuropa); ptt (TimesTen); TimesEighteen; TimesModernEF.

MicroPress's Charter version (chmath).

```
5807 %% -- Charter
5808 \DeclareMicrotypeAlias{chr}{bch} % CH Math
```

The XCharter package extends the Charter fonts.

```
5809 \DeclareMicrotypeAlias{XCharter-TLF}{bch} % XCharter
5810 \DeclareMicrotypeAlias{XCharter-T0sF}{bch} % "
```

The mathdesign package provides math fonts matching Bitstream Charter and URW Garamond.

```
5811 \DeclareMicrotypeAlias{mdbch}{bch} % mathdesign/Charter
5812 %% -- Garamond
5813 \DeclareMicrotypeAlias{mdugm}{ugm} % mathdesign/URW Garamond
```

The garamondx package, an extension of URW Garamond, providing small caps and oldstyle figures.

```
5814 \DeclareMicrotypeAlias{zgmX}{ugm} % garamondx
5815 \DeclareMicrotypeAlias{zgmj}{ugm} % "
5816 \DeclareMicrotypeAlias{zgmI}{ugm} % "
5817 \DeclareMicrotypeAlias{zgmq}{ugm} % "
```

Because a configuration file for Adobe Garamond wouldn't be permitted for TeX Live distribution, we use EB Garamond as the base font.

```
5818 \DeclareMicrotypeAlias{pad}{EBGaramond-LF}% Adobe Garamond
5819 \DeclareMicrotypeAlias{padx}{EBGaramond-TLF}% "
5820 \DeclareMicrotypeAlias{padj}{EBGaramond-T0sF}% "
5821 %% --
```

URW Letter Gothic is similar enough to Bitstream Letter Gothic to share the configuration.

```
5822 \DeclareMicrotypeAlias{ulg}{blg} % URW LetterGothic -> Bitstream LetterGothic12Pitch
```

The eulervm package virtually extends the Euler fonts.

```
5823 \DeclareMicrotypeAlias{zeur}{eur} % Euler VM
5824 \DeclareMicrotypeAlias{zeus}{eus} % "
```

Euro symbol fonts, to save some files.

```
5825 \DeclareMicrotypeAlias{zpeus}{zpeu} % Adobe Euro sans -> serif
5826 \DeclareMicrotypeAlias{eurosans}{zpeu} % Adobe Euro sans -> serif
```

The Lato and Fontin fonts (and many, many more...) only contain a basic set of glyphs. We alias them here to the basic settings (see 3.1.5) to prevent lots of warning messages from the inheritance settings; they will still receive protrusion settings from the default (T1) configuration.

```
5827 \DeclareMicrotypeAlias{Lato}{TU-basic}
5828 \DeclareMicrotypeAlias{Lato-Regular}{TU-basic}
5829 \DeclareMicrotypeAlias{Fontin}{TU-basic}
5830 \DeclareMicrotypeAlias{Fontin-Regular}{TU-basic}
5831 \DeclareMicrotypeAlias{Bergamo Std}{TU-basic}
```

The fontawesome and fontawesome5 packages are aliased to empty settings (see 3.1.6 and 3.2.6).

```
5832 \DeclareMicrotypeAlias{FontAwesome}{TU-empty} % fontawesome
5833 \DeclareMicrotypeAlias{fontawesomefree}{TU-empty} % fontawesome5
5834 \DeclareMicrotypeAlias{fontawesomepro}{TU-empty}
5835 \DeclareMicrotypeAlias{fontawesomebrands}{TU-empty}
5836
```

## 2.3 Interaction with babel

Contexts that are to be set when switching to a language.

```

5837 %%% -----
5838 %%% INTERACTION WITH THE 'babel' PACKAGE
5839
5840 \DeclareMicrotypeBabelHook
5841   {english,UKenglish,british,USenglish,american}
5842   {kerning=, spacing=nonfrench}
5843
5844 \DeclareMicrotypeBabelHook
5845   {french,français,acadian,canadien}
5846   {kerning=french, spacing=}
5847
5848 \DeclareMicrotypeBabelHook
5849   {turkish}
5850   {kerning=turkish, spacing=}
5851
```

## 2.4 Note on admissible characters

All printable ASCII characters are allowed in the settings, with the following exceptions (on the left hand side, the replacements on the right):

```

\ : \textbackslash
{ : \textbraceleft
} : \textbraceright
^ : \textasciicircum
% : \%
# : \#
```

Comma and equal sign must be guarded with braces ('{,}', '{=}') to keep keyval happy.

Character commands are allowed as far as they have been defined in the proper  $\text{\LaTeX}$  way, that is, when they have been assigned a slot in the font encoding with `\DeclareTextSymbol` or `\DeclareTextComposite`. Characters defined via `\chardef` are also possible.

Ligatures and `\mathchardef`'ed symbols have to be specified numerically. Of course, numerical identification is possible in any other case, too.

8-bit characters are also admissible, provided they have been declared in the input encoding file. They should, however, only be used in private configuration files, where the proper input encoding is guaranteed, or else in combination with the 'inputenc' key.

With  $\text{\XeTeX}$  or  $\text{\LuaTeX}$ , in contrast, it is advisable to use the proper Unicode characters, or the font-specific glyph names prefixed with '/' (cf. section 3).

## 2.5 Character inheritance

First the lists of inheriting characters. We only declare those characters that are the same on *both* sides, i.e., not Œ for O.

```

5852 </m-t>
5853 <*m-t|ebg|zpeu|mvs>
5854 %%% -----
5855 %%% CHARACTER INHERITANCE
5856
```

```
5857 </m-t|ebg|zpeu|mvs>
5858 <*m-t>
```

### 2.5.1 OT1

Glyphs that should possibly inherit settings on one side only: 012 (‘fi’ ligature), 013 (‘fl’), 014 (‘ffi’), 015 (‘ffl’), Æ, æ, Œ, œ.

```
5859 \DeclareCharacterInheritance
5860 { encoding = OT1 }
5861 { f = {011}, % ff
5862   i = {\i},
5863   j = {\j},
5864   O = {\O},
5865   o = {\o}
5866 }
5867
```

### 2.5.2 T1

Candidates here: 028 (‘fi’), 029 (‘fl’), 030 (‘ffi’), 031 (‘ffl’), 156 (‘IJ’ ligature, since L<sup>A</sup>T<sub>E</sub>X 2005/12/01 accessible as \IJ), 188 (‘ij’, \ij), Æ, æ, Œ, œ.

```
5868 \DeclareCharacterInheritance
5869 { encoding = T1 }
5870 { A = {\`A,\`A,\^A,\~A,\"A,\r A,\k A,\u A},
5871   a = {\`a,\`a,\^a,\~a,\"a,\r a,\k a,\u a},
5872   C = {\`C,\`C,\^C,\~C,\"C,\r C,\k C,\u C},
5873   c = {\`c,\`c,\^c,\~c,\"c,\r c,\k c,\u c},
5874   D = {\`D,\`D,\^D,\~D,\"D,\r D,\k D,\u D},
5875   d = {\`d,\`d,\^d,\~d,\"d,\r d,\k d,\u d},
5876   E = {\`E,\`E,\^E,\~E,\"E,\r E,\k E,\u E},
5877   e = {\`e,\`e,\^e,\~e,\"e,\r e,\k e,\u e},
5878   f = {027}, % ff
5879   G = {\`G,\`G,\^G,\~G,\"G,\r G,\k G,\u G},
5880   g = {\`g,\`g,\^g,\~g,\"g,\r g,\k g,\u g},
5881   I = {\`I,\`I,\^I,\~I,\"I,\r I,\k I,\u I},
5882   i = {\`i,\`i,\^i,\~i,\"i,\r i,\k i,\u i},
5883   j = {\`j,\`j,\^j,\~j,\"j,\r j,\k j,\u j},
5884   L = {\`L,\`L,\^L,\~L,\"L,\r L,\k L,\u L},
5885   l = {\`l,\`l,\^l,\~l,\"l,\r l,\k l,\u l},
5886   N = {\`N,\`N,\^N,\~N,\"N,\r N,\k N,\u N},
5887   n = {\`n,\`n,\^n,\~n,\"n,\r n,\k n,\u n},
5888   O = {\`O,\`O,\^O,\~O,\"O,\r O,\k O,\u O},
5889   o = {\`o,\`o,\^o,\~o,\"o,\r o,\k o,\u o},
5890   R = {\`R,\`R,\^R,\~R,\"R,\r R,\k R,\u R},
5891   r = {\`r,\`r,\^r,\~r,\"r,\r r,\k r,\u r},
5892   S = {\`S,\`S,\^S,\~S,\"S,\r S,\k S,\u S},
5893   s = {\`s,\`s,\^s,\~s,\"s,\r s,\k s,\u s},
5894   T = {\`T,\`T,\^T,\~T,\"T,\r T,\k T,\u T},
5895   t = {\`t,\`t,\^t,\~t,\"t,\r t,\k t,\u t},
5896   U = {\`U,\`U,\^U,\~U,\"U,\r U,\k U,\u U},
5897   u = {\`u,\`u,\^u,\~u,\"u,\r u,\k u,\u u},
5898   Y = {\`Y,\`Y,\^Y,\~Y,\"Y,\r Y,\k Y,\u Y},
5899   y = {\`y,\`y,\^y,\~y,\"y,\r y,\k y,\u y},
5900   Z = {\`Z,\`Z,\^Z,\~Z,\"Z,\r Z,\k Z,\u Z},
5901   z = {\`z,\`z,\^z,\~z,\"z,\r z,\k z,\u z}
```

The ‘soft hyphen’ often has reduced right side bearing so that it may already be protruded, hence no inheritance.

```
5902 % - = {127},
5903 }
5904
```

### 2.5.3 LY1

More characters: 008 ('fl'), 012 ('fi'), 014 ('ffi'), 015 ('ffl'), Æ, æ, Œ, œ.

```

5905 \DeclareCharacterInheritance
5906   { encoding = LY1 }
5907   { A = {\`A,\`A,\^A,\~A,\"A,\r A},
5908     a = {\`a,\`a,\^a,\~a,\"a,\r a},
5909     C = {\c C},
5910     c = {\c c},
5911     D = {\DH},
5912     E = {\`E,\`E,\^E,\"E},
5913     e = {\`e,\`e,\^e,\"e},
5914     f = {011}, % ff
5915     I = {\`I,\`I,\^I,\"I},
5916     i = {\`i,\`i,\^i,\"i,\"i},
5917     L = {\L},
5918     l = {\l},
5919     N = {\~N},
5920     n = {\~n},
5921     O = {\`O,\`O,\^O,\~O,\"O,\"O},
5922     o = {\`o,\`o,\^o,\~o,\"o,\"o},
5923     S = {\v S},
5924     s = {\v s},
5925     U = {\`U,\`U,\^U,\"U},
5926     u = {\`u,\`u,\^u,\"u},
5927     Y = {\`Y,\"Y},
5928     y = {\`y,\"y},
5929     Z = {\v Z},
5930     z = {\v z}
5931   }
5932
```

### 2.5.4 OT4

The Polish OT1 extension. More interesting characters here: 009 ('fk'), 012 ('fi'), 013 ('fl'), 014 ('ffi'), 015 ('ffl'), Æ, æ, Œ, œ.

```

5933 \DeclareCharacterInheritance
5934   { encoding = OT4 }
5935   { A = {\k A},
5936     a = {\k a},
5937     C = {\`C},
5938     c = {\`c},
5939     E = {\k E},
5940     e = {\k e},
5941     f = {011}, % ff
5942     i = {\i},
5943     j = {\j},
5944     L = {\L},
5945     l = {\l},
5946     N = {\`N},
5947     n = {\`n},
5948     O = {\O,\"O},
5949     o = {\o,\"o},
5950     S = {\`S},
5951     s = {\`s},
5952     Z = {\`Z,\"Z},
5953     z = {\`z,\"z},
5954     \textquotedblleft = "FF
5955   }
5956
```



### 2.5.5 QX

The Central European QX encoding.<sup>6</sup> Ligatures: 009 ('fk'), 012 ('fi'), 013 ('fl'), 014 ('ffi'), 015 ('ffl'), Æ, æ, Œ, œ.

```

5957 \DeclareCharacterInheritance
5958 { encoding = QX }
5959 { A = {\`A,\'A,\^A,\~A,\"A,\k A,\AA},
5960   a = {\`a,\'a,\^a,\~a,\"a,\k a,\aa},
5961   C = {\'C,\c C},
5962   c = {\'c,\c c},
5963   D = {\DH},
5964   E = {\`E,\'E,\^E,\"E,\k E},
5965   e = {\`e,\'e,\^e,\"e,\k e},
5966   f = {011}, % ff
5967   I = {\`I,\'I,\^I,\"I,\k I},
5968   i = {\`i,\'i,\^i,\"i,\k i,\i},
5969   j = {\j},
5970   L = {\L},
5971   l = {\l},
5972   N = {\'N,\~N},
5973   n = {\'n,\~n},
5974   O = {\0,\`0,\'0,\^0,\~0,\"0},
5975   o = {\o,\`o,\'o,\^o,\~o,\"o},

```

The Romanian `\textcommabelow` accents are actually replacements for the `\c` variants, which had previously (and erroneously<sup>7</sup>) been included in QX encoding. They are still kept for backwards compatibility.

```

5976   S = {\'S,\c S,\textcommabelow S,\v S},
5977   s = {\'s,\c s,\textcommabelow s,\v s},
5978   T = {\c T,\textcommabelow T},
5979   t = {\c t,\textcommabelow t},
5980   U = {\`U,\'U,\^U,\"U,\k U},
5981   u = {\`u,\'u,\^u,\"u,\k u},
5982   Y = {\'Y,\"Y},
5983   y = {\'y,\"y},
5984   Z = {\'Z,\Z,\v Z},
5985   z = {\'z,\z,\v z},
5986   . = \textellipsis
5987 }
5988

```

### 2.5.6 T5

The Vietnamese encoding T5. It is so crowded with accented and double-accented characters that there is no room for any ligatures.

```

5989 \DeclareCharacterInheritance
5990 { encoding = T5 }
5991 { A = {\`A,\'A,\~A,\h A,\d A,\^A,\u A,
5992   \`Acircumflex,\'Acircumflex,\~Acircumflex,\hAcircumflex,\dAcircumflex,
5993   \`Abreve,\'Abreve,\~Abreve,\hAbreve,\dAbreve},
5994   a = {\`a,\'a,\~a,\h a,\d a,\^a,\u a,
5995   \`acircumflex,\'acircumflex,\~acircumflex,\hacircumflex,\dacircumflex,
5996   \`abreve,\'abreve,\~abreve,\h\abreve,\d\abreve},
5997   D = {\DJ},
5998   d = {\dj},
5999   E = {\`E,\'E,\~E,\h E,\d E,\^E,
6000   \`Ecircumflex,\'Ecircumflex,\~Ecircumflex,\hEcircumflex,\dEcircumflex},
6001   e = {\`e,\'e,\~e,\h e,\d e,\^e,
6002   \`ecircumflex,\'ecircumflex,\~ecircumflex,\hecircumflex,\decircumflex},

```

<sup>6</sup> Contributed by Maciej Eder.

<sup>7</sup> Cf. <https://tug.org/pipermail/tex-live/2008-August/017204.html>

```

6003 I = {\`I,\`I,\`I,\`h I,\`d I},
6004 i = {\`i,\`i,\`i,\`h i,\`d i,\`i},
6005 0 = {\`0,\`0,\`0,\`h 0,\`d 0,\`0,\`horn 0,
6006     \`\0circumflex,\`\0circumflex,\`\0circumflex,\`h\0circumflex,\`d\0circumflex,
6007     \`\0horn,\`\0horn,\`\0horn,\`h\0horn,\`d\0horn},
6008 o = {\`o,\`o,\`o,\`h o,\`d o,\`o,\`horn o,
6009     \`\ocircumflex,\`\ocircumflex,\`\ocircumflex,\`h\ocircumflex,\`d\ocircumflex,
6010     \`\ohorn,\`\ohorn,\`\ohorn,\`h\ohorn,\`d\ohorn},
6011 U = {\`U,\`U,\`U,\`h U,\`d U,\`horn U,
6012     \`\Uhorn,\`\Uhorn,\`\Uhorn,\`h\Uhorn,\`d\Uhorn},
6013 u = {\`u,\`u,\`u,\`h u,\`d u,\`horn u,
6014     \`\uhorn,\`\uhorn,\`\uhorn,\`h\uhorn,\`d\uhorn},
6015 Y = {\`Y,\`Y,\`Y,\`h Y,\`d Y},
6016 y = {\`y,\`y,\`y,\`h y,\`d y}
6017 }
6018

```

### 2.5.7 EU1, EU2, TU

The EU1 (X<sub>Y</sub>TeX), EU2 (LuaTeX), and, since fontspec version 2.5, TU encodings are not well-defined in the sense that they don't contain a fixed number of glyphs, all of which must be present. OpenType fonts may contain thousands of glyphs, but we only define those that should be present in every font (basically T1). This inheritance list should be overridden by font-specific ones.

```

6019 \DeclareCharacterInheritance
6020 { encoding = {TU,EU1,EU2} }
6021 { A = {\`A,\`A,\^A,\-A,\`A,\r A,\k A,\u A},
6022   a = {\`a,\`a,\^a,\-a,\`a,\r a,\k a,\u a},
6023   C = {\`C,\c C,\v C},
6024   c = {\`c,\c c,\v c},
6025   D = {\v D,\DH},
6026   d = {\v d,\dj},
6027   E = {\`E,\`E,\^E,\`E,\k E,\v E},
6028   e = {\`e,\`e,\^e,\`e,\k e,\v e},
6029 %   f = {/f_f}, % sometimes /f_f, sometimes /ff
6030   G = {\u G},
6031   g = {\u g},
6032   I = {\`I,\`I,\^I,\^I,\`I,\`I},
6033   i = {\`i,\`i,\^i,\^i,\`i,\`i},
6034 %   j = {\j},
6035   L = {\L,\`L,\v L},
6036   l = {\l,\`l,\v l},
6037   N = {\`N,\-N,\v N},
6038   n = {\`n,\-n,\v n},
6039   O = {\0,\`0,\`0,\^0,\-0,\`0,\H 0},
6040   o = {\0,\`0,\`0,\^0,\-0,\`0,\H o},
6041   R = {\R,\v R},
6042   r = {\`r,\v r},
6043   S = {\`S,\c S,\v S}, % \SS
6044   s = {\`s,\c s,\v s},
6045   T = {\c T,\v T},
6046   t = {\c t,\v t},
6047   U = {\`U,\`U,\^U,\`U,\H U,\r U},
6048   u = {\`u,\`u,\^u,\`u,\H u,\r u},
6049   Y = {\`Y,\`Y},
6050   y = {\`y,\`y},
6051   Z = {\`Z,\`Z,\v Z},
6052   z = {\`z,\`z,\v z}
6053 }
6054
6055 </m-t>

```

### 2.5.8 LGR

The Greek LGR encoding. EB Garamond contains some more glyphs.

```

6056 <*-t|ebg>
6057 \DeclareCharacterInheritance
6058 { encoding = LGR,
6059 <ebg> family = {EBGaramond-OsF,EBGaramond-TOsF,EBGaramond-LF,EBGaramond-TLF}
6060 }
6061 {
6062 <m-t> A = {012},
6063 <ebg> A = {009,012,253},
6064 <ebg> (1)E = {199},
6065 <ebg> H = {010},
6066 <ebg> (1)H = {159},
6067 I = {219},
6068 <ebg> (1)I = {155},
6069 O = J,
6070 <ebg> (1)O = {151},
6071 U = {013,223},
6072 W = {011},
6073 a = {014,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,
6074 144,145,146,148,149,150,248},
6075 e = {224,225,226,227,232,233,234,235},
6076 h = {152,153,154,156,157,158,160,161,162,163,164,165,166,167,168,169,170,
6077 171,172,173,174,175,249},
6078 <m-t> i = {200,201,202,203,208,209,210,211,216,217,218,240,241,242,243},
6079 <ebg> i = {008,200,201,202,203,208,209,210,211,216,217,218,240,241,242,243},
6080 o = {228,229,230,231,236,237,238,239},
6081 r = {251,252},
6082 u = {015,204,205,206,207,212,213,214,215,220,221,222,244,245,246,247},
6083 w = {176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,
6084 193,194,196,197,198,250},
6085 <ebg> \textstigma = \textvarstigma,
6086 . = {059} % ano teleia
6087 }
6088
6089 </m-t|ebg>

```

### 2.5.9 Euro symbols

Make Euro symbols settings simpler.

```

6090 <*-zpeu>
6091 \DeclareCharacterInheritance
6092 { encoding = U,
6093 family = {zpeu,zpeus,eurosans} }
6094 { E = 128 }
6095
6096 </zpeu>
6097 <*-mvs>

```

Since 2006/05/11 (that is, one week after I've added these settings, after the package had been dormant for six years!), marvosym's encoding is (correctly) U instead of OT1.

```

6098 \DeclareCharacterInheritance
6099 { encoding = {OT1,U},
6100 family = mvs }
6101 { 164 = {099,100,101} } % \EURhv,\EURcr,\EURtm
6102
6103 </mvs>

```

## 2.6 Tracking

By default, we only disable the ‘f\*’ ligatures, for those fonts that have any. Thus, ligatures and especially kerning for all other characters will be retained.

```

6104 <*m-t>
6105 %%% -----
6106 %%% TRACKING/LETTERSPACING
6107
6108 \SetTracking
6109 [ name = default,
6110   no ligatures = {f} ]
6111 { encoding = {OT1,T1,T2A,LY1,OT4,QX,EU2,TU} }
6112 { }
6113

```

## 2.7 Font expansion

These are Hàn Thế Thành’s original expansion settings. They are used for all fonts (until somebody shows mercy and creates font-specific settings).

```

6114 %%% -----
6115 %%% EXPANSION
6116
6117 \SetExpansion
6118 [ name = default ]
6119 { encoding = {OT1,OT4,QX,T1,LY1} }
6120 {
6121   A = 500,      a = 700,
6122   \AE = 500,    \ae = 700,
6123   B = 700,      b = 700,
6124   C = 700,      c = 700,
6125   D = 500,      d = 700,
6126   E = 700,      e = 700,
6127   F = 700,
6128   G = 500,      g = 700,
6129   H = 700,      h = 700,
6130   K = 700,      k = 700,
6131   M = 700,      m = 700,
6132   N = 700,      n = 700,
6133   O = 500,      o = 700,
6134   \OE = 500,    \oe = 700,
6135   P = 700,      p = 700,
6136   Q = 500,      q = 700,
6137   R = 700,
6138   S = 700,      s = 700,
6139   U = 700,      u = 700,
6140   W = 700,      w = 700,
6141   Z = 700,      z = 700,
6142   2 = 700,
6143   3 = 700,
6144   6 = 700,
6145   8 = 700,
6146   9 = 700
6147 }
6148

```

Settings for Cyrillic T2A encoding.<sup>8</sup>

```

6149 \SetExpansion
6150 [ name = T2A ]
6151 { encoding = T2A }
6152 {
6153   A = 500,      a = 700,

```

---

<sup>8</sup> Contributed by *Karl Karlsson*.

```

6154     B = 700,      b = 700,
6155     C = 700,      c = 700,
6156     D = 500,      d = 700,
6157     E = 700,      e = 700,
6158     F = 700,
6159     G = 500,      g = 700,
6160     H = 700,      h = 700,
6161     K = 700,      k = 700,
6162     M = 700,      m = 700,
6163     N = 700,      n = 700,
6164     O = 500,      o = 700,
6165     P = 700,      p = 700,
6166     Q = 500,      q = 700,
6167     R = 700,
6168     S = 700,      s = 700,
6169     U = 700,      u = 700,
6170     W = 700,      w = 700,
6171     Z = 700,      z = 700,
6172     2 = 700,
6173     3 = 700,
6174     6 = 700,
6175     8 = 700,
6176     9 = 700,
6177     \CYRA = 500,    \cyra = 700,
6178     \CYRB = 700,    \cyrb = 700,
6179     \CYRV = 700,    \cyrv = 700,
6180     \CYRG = 700,    \cyrg = 700,
6181     \CYRD = 700,    \cyrd = 700,
6182     \CYRE = 700,    \cyre = 700,
6183     \CYRZH = 700,   \cyrzh = 700,
6184     \CYRZ = 700,    \cyrz = 700,
6185     \CYRI = 700,    \cyri = 700,
6186     \CYRISHRT = 700, \cyrishrt = 700,
6187     \CYRK = 700,    \cyrk = 700,
6188     \CYRL = 700,    \cyrl = 700,
6189     \CYRM = 700,    \cyrm = 700,
6190     \CYRN = 700,    \cyrn = 700,
6191     \CYRO = 500,    \cyro = 700,
6192     \CYRP = 700,    \cyrp = 700,
6193     \CYRR = 700,    \cyrr = 700,
6194     \CYRS = 700,    \cyrs = 700,
6195     \CYRT = 700,    \cyrt = 700,
6196     \CYRU = 700,    \cyru = 700,
6197     \CYRF = 700,    \cyrf = 700,
6198     \CYRH = 700,    \cyrh = 700,
6199     \CYRC = 700,    \cyrc = 700,
6200     \CYRCH = 700,   \cyrch = 700,
6201     \CYRSH = 700,   \cyrsh = 700,
6202     \CYRSHCH = 700, \cyrshch = 700,
6203     \CYRHRSN = 700, \cyrhrdsn = 700,
6204     \CYRERY = 700,  \cyrery = 700,
6205     \CYRSFTSN = 700, \cyrsftsn = 700,
6206     \CYREREV = 700, \cyrerev = 700,
6207     \CYRYU = 700,   \cyryu = 700,
6208     \CYRYA = 700,   \cyrya = 700
6209 }
6210

```

T5 encoding does not contain \AE, \ae, \OE and \oe.

```

6211 \SetExpansion
6212 [ name      = T5 ]
6213 { encoding = T5 }
6214 {
6215     A = 500,      a = 700,
6216     B = 700,      b = 700,

```

```

6217 C = 700, c = 700,
6218 D = 500, d = 700,
6219 E = 700, e = 700,
6220 F = 700,
6221 G = 500, g = 700,
6222 H = 700, h = 700,
6223 K = 700, k = 700,
6224 M = 700, m = 700,
6225 N = 700, n = 700,
6226 O = 500, o = 700,
6227 P = 700, p = 700,
6228 Q = 500, q = 700,
6229 R = 700,
6230 S = 700, s = 700,
6231 U = 700, u = 700,
6232 W = 700, w = 700,
6233 Z = 700, z = 700,
6234 2 = 700,
6235 3 = 700,
6236 6 = 700,
6237 8 = 700,
6238 9 = 700
6239 }
6240
6241 </m-t>

```

## 2.8 Character protrusion

```

6242 %%% -----
6243 %%% PROTRUSION
6244

```

For future historians, Hàn Thế Thành's original settings (from `protcode.tex`, converted to `microtype` notation).

```

\SetProtrusion
[ name = thanh ]
{ encoding = OT1 }
{
  A = {50,50},
  F = { ,50},
  J = {50, },
  K = { ,50},
  L = { ,50},
  T = {50,50},
  V = {50,50},
  W = {50,50},
  X = {50,50},
  Y = {50,50},
  k = { ,50},
  r = { ,50},
  t = { ,50},
  v = {50,50},
  w = {50,50},
  x = {50,50},
  y = {50,50},
  . = { ,700}, {,}= { ,700},
  : = { ,500}, ; = { ,500},
  ! = { ,200}, ? = { ,200},
  ( = {50, }, ) = { ,50},
  - = { ,700},
  \textendash = { ,300}, \textemdash = { ,200},
  \textquoteleft = {700, }, \textquoteright = { ,700},
  \textquotedblleft = {500, }, \textquotedblright = { ,500}
}

```

### 2.8.1 Normal

The default settings always use the most moderate value.

```
6245 <*cfg-t>
6246 \SetProtrusion
6247 <m-t> [ name = default ]
```

We also create configuration files for the fonts

- Bitstream Charter (NFSS code bch)

```
6248 <bch> [ name = bch-default ]
```

- Bitstream Letter Gothic (blg)

```
6249 <blg> [ name = blg-default ]
```

- Computer Modern Roman (cmr)

```
6250 <cmr> [ name = cmr-default ]
```

- EB Garamond

```
6251 <ebg> [ name = EBGaramond-default ]
```

- Minion<sup>9</sup> (pmnx, pmnj)

```
6252 <pmn> [ name = pmnj-default ]
```

- Palatino (ppl, pplx, pplj)

```
6253 <ppl> [ name = ppl-default ]
```

- Times (ptm, ptmx, ptmj)

```
6254 <ptm> [ name = ptm-default ]
```

- URW Garamond (ugm)

```
6255 <ugm> [ name = ugm-default ]
6256 <m-t|cmr|pmn|ebg> { }
6257 <bch|blg|ugm> { encoding = OT1,
6258 <ppl|ptm> { encoding = {OT1,OT4},
6259 <bch> family = bch }
6260 <blg> family = blg }
6261 <ppl> family = {ppl,pplx,pplj} }
6262 <ptm> family = {ptm,ptmx,ptmj} }
6263 <ugm> family = ugm }
6264 {
6265 <m-t|bch|blg|cmr|ebg|pmn|ppl|ptm> A = {50,50},
6266 <ugm> A = {50,100},
6267 <ebg|ptm> \AE = {50, },
6268 <ugm> \AE = {150,50},
6269 <ugm> B = { ,50},
6270 <bch|ebg|pmn|ugm> C = {50, },
6271 <bch|ebg|pmn> D = { ,50},
6272 <ugm> D = { ,70},
6273 <ugm> E = { ,50},
6274 <m-t|bch|cmr|ebg|pmn|ptm> F = { ,50},
6275 <ugm> F = { ,70},
6276 <bch|ebg|pmn> G = {50, },
6277 <ugm> G = {50,50},
6278 <blg> I = {150,150},
6279 <m-t|cmr|ebg|pmn|ppl|ptm|ugm> J = {50, },
6280 <bch|blg> J = {100, },
```

---

9 Contributed by Harald Harders and Karl Karlsson.

```

6281 <!blg>      K = { ,50},
6282 <blg>        K = {50, },
6283 <m-t|bch|cmr|ebg|pmn|ppl>      L = { ,50},
6284 <blg>        L = { ,150},
6285 <ptm>        L = { ,80},
6286 <ugm>        L = { ,120},
6287 <bch|ebg|pmn|ugm>      0 = {50,50},
6288 <ebg>        \OE = {50, },
6289 <ugm>        \OE = {50,50},
6290 <blg>        P = { ,100},
6291 <ugm>        P = { ,50},
6292 <bch|ebg|pmn>      Q = {50,70},
6293 <ugm>        Q = {50,50},
6294 <bch>        R = { ,50},
6295 <ugm|ebg>      R = { ,70},
6296 <m-t|bch|cmr|pmn|ppl|ptm>      T = {50,50},
6297 <blg>        T = {100,100},
6298 <ebg|ugm>      T = {70,70},
6299 <m-t|bch|cmr|ebg|pmn|ppl|ptm>    V = {50,50},
6300 <blg|ugm>      V = {70,70},
6301 <m-t|bch|cmr|ebg|pmn|ppl|ptm>    W = {50,50},
6302 <ugm>        W = {70,70},
6303 <m-t|bch|cmr|ebg|pmn|ppl|ptm>    X = {50,50},
6304 <ugm>        X = {50,70},
6305 <m-t|bch|cmr|ebg|pmn|ppl>      Y = {50,50},
6306 <blg|ptm|ugm>    Y = {80,80},
6307 <ugm>        Z = {50,50},
6308 <blg>        f = {150,100},
6309 <blg>        i = {150,150},
6310 <blg>        j = {100,100},
6311 <m-t|bch|cmr|ebg|pmn|ppl|ptm>    k = { ,50},
6312 <ugm>        k = { ,70},
6313 <blg>        l = {150,150},
6314 <pmn>        l = { , -50},
6315 <ppl>        p = {50,50},
6316 <ebg|ugm>      p = { ,50},
6317 <ebg|ppl>      q = {50, },
6318 <!blg>        r = { ,50},
6319 <blg>        r = {100, 80},
6320 <cmr|ebg|pmn>    t = { ,70},
6321 <bch>          t = { ,50},
6322 <blg>          t = {150, 80},
6323 <ugm>          t = { ,100},
6324 <m-t|bch|cmr|ebg|pmn|ppl|ptm>    v = {50,50},
6325 <blg>          v = {100,100},
6326 <ugm>          v = {50,70},
6327 <m-t|bch|cmr|ebg|pmn|ppl|ptm>    w = {50,50},
6328 <ugm>          w = {50,70},
6329 <!blg>        x = {50,50},
6330 <blg>        x = {100,100},
6331 <m-t|bch|ebg|pmn>      y = { ,50},
6332 <blg>          y = { 50,100},
6333 <cmr|ppl|ptm>        y = {50,70},
6334 <ugm>          y = { ,70},

6335 <cmr>        0 = { ,50},
6336 <m-t>        1 = {50,50},
6337 <bch|blg|ptm|ugm>      1 = {150,150},
6338 <cmr>        1 = {100,200},
6339 <pmn>        1 = { ,50},
6340 <ppl>        1 = {100,100},
6341 <bch|cmr|ugm>      2 = {50,50},
6342 <blg>        2 = { ,100},
6343 <bch|pmn>      3 = {50, },
6344 <cmr|ugm>      3 = {50,50},
6345 <blg>        3 = {100, },

```



```

6346 <m-t>      4 = {50,50},
6347 <bch>      4 = {100,50},
6348 <blg>      4 = {100, },
6349 <cmr|ugm>   4 = {70,70},
6350 <pmn>      4 = {50, },
6351 <ptm>      4 = {70, },
6352 <cmr>      5 = { ,50},
6353 <bch>      6 = {50, },
6354 <cmr>      6 = { ,50},
6355 <m-t>      7 = {50,50},
6356 <bch|pmn|ugm> 7 = {50,80},
6357 <blg>      7 = {100,100},
6358 <cmr|ptm>   7 = {50,100},
6359 <ppl>      7 = { ,50},
6360 <cmr>      8 = { ,50},
6361 <bch>      9 = {50,50},
6362 <cmr>      9 = { ,50},
6363 <m-t|cmr|pmn|ppl|ptm|ugm> . = { ,700},
6364 <bch|ebg>   . = { ,600},
6365 <blg>      . = {400,500},
6366 <!blg>     {,}= { ,500},
6367 <blg>     {,}= {300,400},
6368 <m-t|cmr|pmn|ppl|ptm|ugm> : = { ,500},
6369 <bch|ebg>   : = { ,400},
6370 <blg>      : = {300,400},
6371 <m-t|bch|ebg|pmn|ptm> ; = { ,300},
6372 <blg>      ; = {200,300},
6373 <cmr|ppl>   ; = { ,500},
6374 <ugm>      ; = { ,400},
6375 <!blg>     ! = { ,100},
6376 <blg>      ! = {200,200},
6377 <m-t|ebg|pmn|ptm> ? = { ,100},
6378 <bch|cmr|ppl|ugm> ? = { ,200},
6379 <blg>      ? = {150,150},
6380 <pmn>      " = {300,300},
6381 <m-t|bch|cmr|ebg|pmn|ppl> @ = {50,50},
6382 <ptm>      @ = {100,100},
6383 <m-t|bch|blg|cmr|ebg|pmn|ppl|ptm> ~ = {200,250},
6384 <ugm>      ~ = {300,350},
6385 <ebg|ppl|ptm> & = {50,100},
6386 <ugm>      & = { ,100},
6387 <m-t|cmr|ebg|pmn> \% = {50,50},
6388 <bch>      \% = { ,50},
6389 <ppl|ptm>   \% = {100,100},
6390 <ugm>      \% = {50,100},
6391 <blg>      \# = {100,100},
6392 <m-t|ppl|ptm|ugm> * = {200,200},
6393 <bch|pmn>   * = {200,300},
6394 <blg>      * = {150,200},
6395 <cmr|ebg>   * = {300,300},
6396 <m-t|cmr|ebg|ppl|ptm> + = {250,250},
6397 <bch>      + = {150,250},
6398 <blg|pmn>   + = {150,200},
6399 <ugm>      + = {250,300},
6400 <blg|ugm>   {=}= {200,200},
6401 <m-t|ebg|pmn|ptm> ( = {100, }, ) = { ,200},
6402 <bch|ugm>   ( = {200, }, ) = { ,200},
6403 <cmr|blg>   ( = {300, }, ) = { ,300},
6404 <ppl>      ( = {100, }, ) = { ,300},
6405 <bch|pmn>   [= {100, }, ] = { ,100},
6406 <blg>      [= {300,100}, ] = { ,300},

6407 <m-t|ebg|pmn|ptm> / = {100,200},
6408 <bch>      / = { ,200},
6409 <blg>      / = {300,300},
6410 <cmr|ppl>   / = {200,300},

```

```

6411 <ugm> / = {100,300},
6412 <m-t|ptm> - = {500,500},
6413 <bch|cmr|ppl> - = {400,500},
6414 <blg> - = {300,400},
6415 <ebg> - = {300,500},
6416 <pmn> - = {200,400},
6417 <ugm> - = {500,600},
6418 <blg> <= {200,100}, >= {100,200},
6419 <blg> _ = {150,250},
6420 <blg> | = {250,250},
6421 <m-t|pmn> \textendash = {200,200}, \textendash = {150,150},
6422 <bch> \textendash = {200,300}, \textendash = {150,250},
6423 <cmr> \textendash = {400,300}, \textendash = {300,200},
6424 <ebg|ppl|ptm> \textendash = {300,300}, \textendash = {200,200},
6425 <ugm> \textendash = {250,300}, \textendash = {250,250},

```

Why settings for left *and* right quotes? Because in some languages they might be used like that (see the csquotes package for examples).

```

6426 <m-t|bch|pmn> \textquoteleft = {300,400}, \textquoteright = {300,400},
6427 <blg> \textquoteleft = {400,600}, \textquoteright = {400,600},
6428 <cmr> \textquoteleft = {500,700}, \textquoteright = {500,600},
6429 <ebg> \textquoteleft = {300,500}, \textquoteright = {400,400},
6430 <ppl> \textquoteleft = {500,700}, \textquoteright = {500,700},
6431 <ptm> \textquoteleft = {500,500}, \textquoteright = {300,500},
6432 <ugm> \textquoteleft = {300,600}, \textquoteright = {300,600},
6433 <m-t|ebg|bch|pmn> \textquotedblleft = {300,300}, \textquotedblright = {300,300}
6434 <blg> \textquotedblright = {300,400}
6435 <cmr> \textquotedblleft = {500,300}, \textquotedblright = {200,600}
6436 <ppl|ptm> \textquotedblleft = {300,400}, \textquotedblright = {300,400}
6437 <ugm> \textquotedblleft = {400,400}, \textquotedblright = {400,400}
6438 }
6439

```

Greek uppercase letters are in OT1 encoding only.

```

6440 <*m-t|cmr|ebg|pmn>
6441 \SetProtrusion
6442 <m-t> [ name = OT1-default,
6443 <cmr> [ name = cmr-OT1,
6444 <ebg> [ name = EBGaramond-OT1,
6445 <pmn> [ name = pmnj-OT1,
6446 <m-t> load = default ]
6447 <cmr> load = cmr-default ]
6448 <ebg> load = EBGaramond-default ]
6449 <pmn> load = pmnj-default ]
6450 <m-t> { encoding = OT1 }
6451 <cmr> { encoding = {OT1,OT4},
6452 <pmn> { encoding = OT1,
6453 <cmr> family = cmr }
6454 <pmn> family = pmnj }
6455 <ebg> { }
6456 {
6457 <m-t|cmr> \AE = {50, },
6458 <pmn> \OE = {50, }
6459 <*cmr|ebg>
6460 "00 = { ,150}, % \Gamma
6461 "01 = {100,100}, % \Delta
6462 "02 = { 50, 50}, % \Theta
6463 "03 = {100,100}, % \Lambda
6464 <ebg> "04 = { 50, 50}, % \Xi
6465 <cmr> "06 = { 50, 50}, % \Sigma
6466 "07 = {100,100}, % \Upsilon
6467 "08 = { 50, 50}, % \Phi
6468 "09 = { 50, 50}, % \Psi
6469 <ebg> "0A = { 50, 50}, % \Omega
6470 <ebg> 138 = { , 50}, % \L

```

Remaining slots can be found in the source file.

```
6471 </cmr|ebg>
6472   }
6473
```

Settings for figure variants.

```
6474 <*ebg>
6475 \SetProtrusion
6476   [ name      = EBGaramond-OT1-LF,
6477     load      = EBGaramond-OT1 ]
6478   { encoding = OT1,
6479     family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF} }
6480   {
6481     1 = {50,50},
6482     2 = {50,50},
6483     4 = {50,50},
6484     7 = {50,50},
6485   }
6486
6487 \SetProtrusion
6488   [ name      = EBGaramond-OT1-T0sF,
6489     load      = EBGaramond-OT1 ]
6490   { encoding = OT1,
6491     family   = {EBGaramond-T0sF} }
6492   {
6493     1 = {150,150},
6494     2 = {50,50},
6495     3 = {50,50},
6496     4 = {50,50},
6497     5 = {50,50},
6498     6 = {50,50},
6499     7 = {50,80},
6500     8 = {50,50},
6501     9 = {50,50},
6502   }
6503
6504 </ebg>
6505 </m-t|cmr|ebg|pmn>
```

T1 and LY1 encodings contain some more characters. The default list will be loaded first. For X<sub>Y</sub>TeX (EU1) and LuaTeX (EU2) we simply use the T1 list as default (for now).

```
6506 \SetProtrusion
6507 <m-t> [ name      = T1-default,
6508 <bch> [ name      = bch-T1,
6509 <blg> [ name      = blg-T1,
6510 <cmr> [ name      = cmr-T1,
6511 <ebg> [ name      = EBGaramond-T1,
6512 <pmn> [ name      = pmnj-T1,
6513 <ppl> [ name      = ppl-T1,
6514 <ptm> [ name      = ptm-T1,
6515 <ugm> [ name      = ugm-T1,
6516 <m-t>   load      = default ]
6517 <bch>   load      = bch-default ]
6518 <blg>   load      = blg-default ]
6519 <cmr>   load      = cmr-default ]
6520 <ebg>   load      = EBGaramond-default ]
6521 <pmn>   load      = pmnj-default ]
6522 <ppl>   load      = ppl-default ]
6523 <ptm>   load      = ptm-default ]
6524 <ugm>   load      = ugm-default ]
6525 <m-t>   { encoding = {T1,LY1,EU1,EU2,TU} }
6526 <bch|cmr|pmn|ppl> { encoding = {T1,LY1},
6527 <blg|ptm|ugm>   { encoding = {T1},
```

```

6528 <ebg> { encoding = {LY1},
6529 <bch> family = bch }
6530 <blg> family = blg }
6531 <cmr> family = cmr }
6532 <ebg> family = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OfF,EBGaramond-TOsF} }
6533 <pmn> family = pmnj }
6534 <ppl> family = {ppl,pplx,pplj} }
6535 <ptm> family = {ptm,ptmx,ptmj} }
6536 <ugm> family = ugm }
6537 {
6538 <m-t|cmr> \AE = {50, },
6539 <bch|pmn> \OE = {50, },
6540 <pmn> \TH = { ,50},
6541 <blg> \v L = { ,250},
6542 <blg> \v d = { ,250},
6543 <blg> \v l = { ,250},
6544 <blg> \v t = { ,250},
6545 <blg> 127 = {300,400},
6546 <blg> 156 = {100, }, % IJ
6547 <blg> 188 = { 80, 80}, % ij
6548 <m-t|bch|ebg|pmn|ppl|ptm> _ = {100,100},
6549 <cmr> _ = {200,200},
6550 <ugm> _ = {100,200},
6551 <m-t|ebg|pmn|ptm> \textbackslash = {100,200},
6552 <bch> \textbackslash = {150,200},
6553 <blg> \textbackslash = {250,300},
6554 <cmr|ppl> \textbackslash = {200,300},
6555 <ugm> \textbackslash = {100,300},
6556 <ugm> \textbar = {200,200},
6557 <blg> \textendash = {300,300}, \textemdash = {150,150},
6558 <blg> \textquotedbl = {300,400}, \textquotedblleft = {300,400},
6559 <cmr> \textquotedbl = {300,300}, \textquotedblleft = {200,600},

```

The EC fonts do something weird: they insert an implicit kern between quote and boundary character. Therefore, we must override the settings from OT1.

```

6560 <m-t|cmr|ebg|ppl|ptm|ugm> \quotesinglbase = {400,400}, \quotedblbase = {400,400},
6561 <blg> \quotesinglbase = {400,400}, \quotedblbase = {300,400},
6562 <bch|pmn> \quotesinglbase = {400,400}, \quotedblbase = {300,300},
6563 <m-t|bch|pmn> \guilsinglleft = {400,300}, \guilsingright = {300,400},
6564 <blg> \guilsinglleft = {300,500}, \guilsingright = {300,500},
6565 <cmr|ebg|ppl|ptm> \guilsinglleft = {400,400}, \guilsingright = {300,500},
6566 <ugm> \guilsinglleft = {400,400}, \guilsingright = {300,600},
6567 <m-t> \guillemotleft = {200,200}, \guillemotright = {200,200},
6568 <cmr> \guillemotleft = {300,200}, \guillemotright = {100,400},
6569 <bch|pmn> \guillemotleft = {200,200}, \guillemotright = {150,300},
6570 <blg|ppl|ptm> \guillemotleft = {300,300}, \guillemotright = {200,400},
6571 <ebg> \guillemotleft = {300,300}, \guillemotright = {200,300},
6572 <ugm> \guillemotleft = {300,400}, \guillemotright = {300,400},
6573 <m-t|bch|cmr|ebg|pmn|ppl|ugm> \textexclamdown = {100, }, \textquestiondown = {100, },
6574 <blg> \textexclamdown = {200, }, \textquestiondown = {100, },
6575 <ptm> \textexclamdown = {200, }, \textquestiondown = {100, },
6576 <m-t|cmr|ebg|ppl|ptm|ugm> \textbraceleft = {400,200}, \textbraceright = {200,400},
6577 <bch|blg|pmn> \textbraceleft = {200, }, \textbraceright = { ,300},
6578 <m-t|bch|cmr|ebg|ppl|ptm|ugm> \textless = {200,100}, \textgreater = {100,200}
6579 <pmn> \textless = {100, }, \textgreater = { ,100},
6580 <pmn> \textvisiblespace = {100,100} % not in LY1
6581 }
6582

```

The lmodern fonts used to restore the original settings from OT1 fonts. Now, they require even other settings, though.

```

6583 <*cmr>
6584 \SetProtrusion
6585 [ name = lmr-T1,

```

```

6586     load      = cmr-T1 ]
6587     { encoding = {T1,LY1},
6588       family   = lmr      }
6589     {
6590       \textquotedblleft = {300,400}, \textquotedblright = {300,400}
6591     }
6592
6593 </cmr>
6594 <*ebg>
6595 \SetProtrusion
6596 [ name      = EBGaramond-T1-LF,
6597   load      = EBGaramond-T1 ]
6598 { encoding = T1,
6599   family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF} }
6600 {
6601   1 = {50,50},
6602   2 = {50,50},
6603   4 = {50,50},
6604   7 = {50,50},
6605 }
6606
6607 \SetProtrusion
6608 [ name      = EBGaramond-T1-T0sF,
6609   load      = EBGaramond-T1 ]
6610 { encoding = T1,
6611   family   = {EBGaramond-T0sF} }
6612 {
6613   1 = {150,150},
6614   2 = {50,50},
6615   3 = {50,50},
6616   4 = {50,50},
6617   5 = {50,50},
6618   6 = {50,50},
6619   7 = {50,80},
6620   8 = {50,50},
6621   9 = {50,50},
6622 }
6623
6624 </ebg>

```

Settings for the T2A encoding (generic, Computer Modern Roman, and Minion).<sup>10</sup>

```

6625 <*m-t|cmr|pmn>
6626 \SetProtrusion
6627 <m-t> [ name      = T2A-default,
6628 <cmr> [ name      = cmr-T2A,
6629 <pmn> [ name      = pmnj-T2A,
6630 <m-t>   load      = default ]
6631 <cmr>   load      = cmr-default ]
6632 <pmn>   load      = pmnj-default ]
6633 { encoding = T2A,
6634 <m-t> }
6635 <cmr>   family   = cmr }
6636 <pmn>   family   = pmnj }
6637 {
6638   \CYRA = {50,50},
6639   \CYRG = { ,50},
6640   \CYRK = { ,50},
6641   \CYRT = {50,50},
6642   \CYRH = {50,50},
6643   \CYRU = {50,50},
6644 <pmn>   \CYRS = {50, },
6645 <pmn>   \CYRO = {50,50},
6646   \cyrk = { ,50},
6647   \cyrp = { ,50},

```

---

<sup>10</sup> Contributed by Karl Karlsson.

```

6648 \cyrh = {50,50},
6649 <m-t|pmn> \cyru = {50,50},
6650 <cmr> \cyru = {50,70},
6651 <m-t> _ = {100,100},
6652 <cmr> _ = {200,200},
6653 <m-t> \textbackslash = {100,200}, \quotedblbase = {400,400},
6654 <cmr> \textbackslash = {200,300}, \quotedblbase = {400,400},
6655 <pmn> \textbackslash = {100,200}, \quotedblbase = {300,300},
6656 <cmr> \textquotedbl = {300,300}, \textquotedblleft = {200,600},
6657 <m-t> \guillemotleft = {200,200}, \guillemotright = {200,200},
6658 <cmr> \guillemotleft = {300,200}, \guillemotright = {100,400},
6659 <pmn> \guillemotleft = {200,200}, \guillemotright = {150,300},
6660 <m-t|cmr> \textbraceleft = {400,200}, \textbraceright = {200,400},
6661 <pmn> \textbraceleft = {200, }, \textbraceright = { ,300},
6662 <m-t|cmr> \textless = {200,100}, \textgreater = {100,200}
6663 <pmn> \textless = {100, }, \textgreater = { ,100}
6664 }
6665
6666 </m-t|cmr|pmn>

```

Settings for the QX encoding (generic and Times).<sup>11</sup> It also includes some glyphs otherwise in TS1.

```

6667 <*m-t|ptm>
6668 \SetProtrusion
6669 <m-t> [ name = QX-default,
6670 <ptm> [ name = ptm-QX,
6671 <m-t> load = default ]
6672 <ptm> load = ptm-default ]
6673 <m-t> { encoding = QX }
6674 <ptm> { encoding = QX,
6675 <ptm> family = {ptm,ptmx,ptmj} }
6676 {
6677 \AE = {50, },
6678 <ptm> * = {200,200},
6679 {=} = {100,100},
6680 \textunderscore = {100,100},
6681 \textbackslash = {100,200},
6682 \quotedblbase = {400,400},
6683 <m-t> \guillemotleft = {200,200}, \guillemotright = {200,200},
6684 <ptm> \guillemotleft = {300,300}, \guillemotright = {200,400},
6685 \textexclamdown = {100, }, \textquestiondown = {100, },
6686 <m-t> \textbraceleft = {400,200}, \textbraceright = {200,400},
6687 <ptm> \textbraceleft = {200,200}, \textbraceright = {200,300},
6688 \textless = {200,100}, \textgreater = {100,200},
6689 \textminus = {200,200}, \textdegree = {300,300},
6690 <m-t> \copyright = {100,100}, \textregistered = {100,100}
6691 <ptm> \copyright = {100,150}, \textregistered = {100,150},
6692 <ptm> \textxgeq = { ,100}, \textxleq = {100, },
6693 <ptm> \textalpha = { , 50}, \textDelta = { 70, 70},
6694 <ptm> \textpi = { 50, 80}, \textSigma = { , 70},
6695 <ptm> \textmu = { , 80}, \texteuro = { 50, 50},
6696 <ptm> \textellipsis = {150,200}, \textasciitilde = { 80, 80},
6697 <ptm> \textapprox = { 50, 50}, \textinfty = {100,100},
6698 <ptm> \textdagger = {150,150}, \textdaggerdbl = {100,100},
6699 <ptm> \textdiv = { 50,150}, \textsection = { 80, 80},
6700 <ptm> \texttimes = {100,150}, \textpm = { 50, 80},
6701 <ptm> \textbullet = {150,150}, \textperiodcentered = {300,300},
6702 <ptm> \textquotesingle = {500,500}, \textquotedbl = {300,300},
6703 <ptm> \textperthousand = { ,50}
6704 }
6705
6706 </m-t|ptm>

```

T5 is based on OT1; it shares some but not all extra characters of T1. All accented

<sup>11</sup> Contributed by Maciej Eder.

characters are already taken care of by the inheritance list.

```

6707 <*cmr|bch>
6708 \SetProtrusion
6709 <cmr> [ name = cmr-T5,
6710 <cmr> load = cmr-default ]
6711 <bch> [ name = bch-T5,
6712 <bch> load = bch-default ]
6713 { encoding = T5,
6714 <cmr> family = cmr }
6715 <bch> family = bch }
6716 {
6717 <bch> _ = {100,100},
6718 <bch> \textbackslash = {150,200},
6719 <cmr> \textbackslash = {200,300},
6720 <cmr> \textquotedblleft = {200,600},
6721 <cmr> \textquotedbl = {300,300},
6722 <bch> \quotesinglbase = {400,400}, \quotedblbase = {300,300},
6723 <cmr> \quotesinglbase = {400,400}, \quotedblbase = {400,400},
6724 <bch> \guilsinglleft = {400,300}, \guilsinglright = {300,400},
6725 <cmr> \guilsinglleft = {400,400}, \guilsinglright = {300,500},
6726 <bch> \guillemotleft = {200,200}, \guillemotright = {150,300},
6727 <cmr> \guillemotleft = {300,200}, \guillemotright = {100,400},
6728 <bch> \textbraceleft = {200, }, \textbraceright = { ,300},
6729 <cmr> \textbraceleft = {400,200}, \textbraceright = {200,400},
6730 \textless = {200,100}, \textgreater = {100,200}
6731 }
6732
6733 </cmr|bch>

```

Minion with lining numbers.

```

6734 <*pmn>
6735 \SetProtrusion
6736 [ name = pmnx-OT1,
6737 load = pmnj-default ]
6738 { encoding = OT1,
6739 family = pmnx }
6740 {
6741 1 = {230,180}
6742 }
6743
6744 \SetProtrusion
6745 [ name = pmnx-T1,
6746 load = pmnj-T1 ]
6747 { encoding = {T1,LY1},
6748 family = pmnx }
6749 {
6750 1 = {230,180}
6751 }
6752
6753 \SetProtrusion
6754 [ name = pmnx-T2A,
6755 load = pmnj-T2A ]
6756 { encoding = {T2A},
6757 family = pmnx }
6758 {
6759 1 = {230,180}
6760 }
6761
6762 </pmn>

```

Times is the default font for LY1, therefore we provide settings for the additional characters in this encoding, too.

```

6763 <*ptm>
6764 \SetProtrusion
6765 [ name = ptm-LY1,

```

```

6766     load      = ptm-T1 ]
6767     { encoding = LY1,
6768       family   = {ptm,ptmx,ptmj} }
6769     {
6770         -                = {100,100},
6771         \texttrademark   = {100,100},
6772         \textregistered  = {100,100},
6773         \textcopyright   = {100,100},
6774         \textdegree      = {300,300},
6775         \textminus       = {200,200},
6776         \textellipsis    = {150,200},
6777 %    \texteuro          = {  ,  }, % ?
6778         \textcent        = {100,100},
6779         \textquotesingle = {500,500},
6780         \textflorin      = { 50, 70},
6781         \textdagger      = {150,150},
6782         \textdaggerdbl   = {100,100},
6783         \textperthousand = {  , 50},
6784         \textbullet      = {150,150},
6785         \textonesuperior = {100,100},
6786         \texttwosuperior = { 50, 50},
6787         \textthreesuperior = { 50, 50},
6788         \textperiodcentered = {300,300},
6789         \textplusminus   = { 50, 80},
6790         \textmultiply    = {100,100},
6791         \textdivide      = { 50,150}

```

Remaining slots in the source file.

```

6792     }
6793
6794 </ptm>

```

For the Greek LGR encoding.

```

6795 <*ebg>
6796 \SetProtrusion
6797 [ name = EBGaramond-LGR ]
6798 { }
6799 {
6800     A = {50,50},
6801     D = {100,100},
6802     F = {50,50},
6803     G = {  ,150},
6804     K = {  ,50},
6805     L = {100,100},
6806     O = {50,50},
6807     U = {100,100},
6808     T = {50,50},
6809     W = {  ,50},
6810     Y = {50,50},
6811     . = {  ,600},
6812     {,}= {  ,500},
6813     : = {  ,400},
6814     ; = {  ,300},
6815     ! = {  ,100},
6816     ? = {  ,100},
6817     ~ = {200,250},
6818     \% = {50,50},
6819     * = {300,300},
6820     + = {250,250},
6821     {=}= { 50, 50},
6822     ( = {100,  },    ) = {  ,200},
6823     / = {100,200},
6824     - = {300,500},
6825     \texteuro = { 50,100},
6826     \textendash = {300,300},    \textemdash = {200,200},

```



```

6827 \textquoteleft = {300,500}, \textquoteright = {400,400},
6828 \guillemotleft = {300,300}, \guillemotright = {200,400},
6829 }
6830
6831 \SetProtrusion
6832 [ name = EBGaramond-LGR-LF,
6833 load = EBGaramond-LGR ]
6834 { encoding = LGR,
6835 family = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF} }
6836 {
6837 1 = {50,50},
6838 2 = {50,50},
6839 4 = {50,50},
6840 7 = {50,50},
6841 }
6842
6843 \SetProtrusion
6844 [ name = EBGaramond-LGR-T0sF,
6845 load = EBGaramond-LGR ]
6846 { encoding = LGR,
6847 family = {EBGaramond-T0sF} }
6848 {
6849 1 = {150,150},
6850 2 = {50,50},
6851 3 = {50,50},
6852 4 = {50,50},
6853 5 = {50,50},
6854 6 = {50,50},
6855 7 = {50,80},
6856 8 = {50,50},
6857 9 = {50,50},
6858 }
6859
6860 </ebg>

```

### 2.8.2 Italics

To find default settings for italic is difficult, since the character shapes and their behaviour at the beginning or end of line may be wildly different for different fonts. In the generic settings we therefore omit the letters, and only set up the punctuation characters.

The italic glyphs of Computer Modern Roman feature a lot of side bearing, therefore almost all of them have to protrude.<sup>12</sup>

```

6861 \SetProtrusion
6862 <m-t> [ name = OT1-it ]
6863 <bch> [ name = bch-it ]
6864 <blg> [ name = blg-it,
6865 load = blg-default ]
6866 <cmr> [ name = cmr-it ]
6867 <ebg> [ name = EBGaramond-it ]
6868 <pmn> [ name = pmn-it ]
6869 <ppl> [ name = ppl-it ]
6870 <ptm> [ name = ptm-it ]
6871 <ugm> [ name = ugm-it ]
6872 <m-t|bch|blg|ugm> { encoding = OT1,
6873 <ppl|ptm> { encoding = {OT1,OT4},
6874 <bch> family = bch,
6875 <blg> family = blg,
6876 <ppl> family = {ppl,pplx,pplj},
6877 <ptm> family = {ptm,ptmx,ptmj},

```

---

<sup>12</sup> Settings contributed by *Hendrik Vogt*.

```

6878 <ugm>      family   = ugm,
6879 <m-t|bch|ppl|ptm>    shape   = {it,sl} }
6880 <blg|ugm>      shape   = it }
6881 <cmr|ebg|pmn>    { }
6882 {
6883 <cmr>      A = {100,100},
6884 <ptm>      A = {100,50},
6885 <ebg|pmn>  A = {50, },
6886 <ugm>      A = { ,150},
6887 <ppl>      A = {50,50},
6888 <ptm>      \AE = {100, },
6889 <ebg|ppl>  \AE = {50, },
6890 <cmr>      B = {83,-40},
6891 <ebg|ppl|ptm>    B = {50, },
6892 <pmn>      B = {20,-50},
6893 <bch|ppl|ptm|ugm>    C = {50, },
6894 <cmr>      C = {165,-75},
6895 <ebg>      C = {100, },
6896 <pmn>      C = {50,-50},
6897 <cmr>      D = {75, -28},
6898 <ebg|ppl|ptm>    D = {50,50},
6899 <pmn>      D = {20, },
6900 <cmr>      E = {80,-55},
6901 <ebg|ppl|ptm>    E = {50, },
6902 <pmn>      E = {20,-50},
6903 <cmr>      F = {85,-80},
6904 <ebg|ptm>      F = {100, },
6905 <pmn>      F = {10, },
6906 <ppl>      F = {50, },
6907 <bch|ppl|ptm|ugm>    G = {50, },
6908 <cmr>      G = {153,-15},
6909 <ebg>      G = {100, },
6910 <pmn>      G = {50,-50},
6911 <cmr>      H = {73,-60},
6912 <ebg|ppl|ptm>    H = {50, },
6913 <cmr>      I = {140,-120},
6914 <ebg|ptm>      I = {50, },
6915 <pmn>      I = {20,-50},
6916 <cmr>      J = {135,-80},
6917 <ebg>      J = {50, },
6918 <pmn>      J = {20, },
6919 <ptm>      J = {100, },
6920 <cmr>      K = {70,-30},
6921 <ebg|ppl|ptm>    K = {50, },
6922 <pmn>      K = {20, },
6923 <cmr>      L = {87, 40},
6924 <ebg|ppl|ptm>    L = {50, },
6925 <pmn>      L = {20,50},
6926 <ugm>      L = { ,100},
6927 <cmr>      M = {67,-45},
6928 <pmn>      M = { , -30},
6929 <ptm>      M = {50, },
6930 <cmr>      N = {75,-55},
6931 <pmn>      N = { , -30},
6932 <ptm>      N = {50, },
6933 <bch|pmn|ppl|ptm>    O = {50, },
6934 <cmr>      O = {150,-30},
6935 <ebg>      O = {100, },
6936 <ugm>      O = {70,50},
6937 <ppl|ptm>    \OE = {50, },
6938 <ebg>      \OE = {100, },
6939 <cmr>      P = {82,-50},
6940 <ebg|ppl|ptm>    P = {50, },
6941 <pmn>      P = {20,-50},
6942 <bch|pmn|ppl|ptm>    Q = {50, },

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6943 <cmr>      Q = {150,-30},
6944 <ebg>      Q = {100, },
6945 <ugm>      Q = {70,50},
6946 <cmr>      R = {75, 15},
6947 <ebg|ppl|ptm> R = {50, },
6948 <pmn>      R = {20, },
6949 <bch|ebg|ppl|ptm> S = {50, },
6950 <cmr>      S = {90,-65},
6951 <pmn>      S = {20,-30},
6952 <bch|ebg|ppl|ptm> $ = {50, },
6953 <cmr>      $ = {100,-20},
6954 <pmn>      $ = {20,-30},
6955 <bch|pmn|ugm> T = {70, },
6956 <cmr>      T = {220,-85},
6957 <ebg|ppl|ptm> T = {100, },
6958 <cmr>      U = {230,-55},
6959 <ebg|ppl|ptm> U = {50, },
6960 <pmn>      U = {50,-50},
6961 <cmr>      V = {260,-60},
6962 <ebg|pmn|ugm> V = {100, },
6963 <ppl|ptm> V = {100,50},
6964 <cmr>      W = {185,-55},
6965 <ebg|pmn|ugm> W = {100, },
6966 <ppl>      W = {50, },
6967 <ptm>      W = {100,50},
6968 <cmr>      X = {70,-30},
6969 <ppl|ptm> X = {50, },
6970 <cmr>      Y = {250,-60},
6971 <pmn>      Y = {50, },
6972 <ppl>      Y = {100,50},
6973 <ptm>      Y = {100, },
6974 <cmr>      Z = {90,-60},
6975 <pmn>      Z = { , -50},
6976 <cmr>      a = {150,-10},
6977 <cmr>      b = {170, },
6978 <cmr>      c = {173,-10},
6979 <cmr>      d = {150,-55},
6980 <pmn>      d = { , -50},
6981 <cmr>      e = {180, },
6982 <cmr>      f = { , -250},
6983 <ebg|pmn> f = { , -100},
6984 <cmr>      g = {150,-10},
6985 <cmr>      h = {100, },
6986 <cmr>      i = {210, },
6987 <pmn>      i = { , -30},
6988 <cmr>      j = { , -40},
6989 <pmn>      j = { , -30},
6990 <cmr>      k = {110,-50},
6991 <cmr>      l = {240,-110},
6992 <pmn>      l = { , -100},
6993 <cmr>      m = {80, },
6994 <cmr>      n = {115, },
6995 <bch>      o = {50,50},
6996 <cmr>      o = {155, },
6997 <bch>      p = { , 50},
6998 <pmn>      p = {-50, },
6999 <bch>      q = {50, },
7000 <cmr>      q = {170,-40},
7001 <cmr>      r = {155,-40},
7002 <pmn>      r = { , 50},
7003 <cmr>      s = {130, },
7004 <bch>      t = { , 50},
7005 <cmr>      t = {230,-10},
7006 <cmr>      u = {120, },
7007 <cmr>      v = {140,-25},

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7008 <pmn|ugm>      v = {50, },
7009 <bch>            w = { ,50},
7010 <cmr>            w = {98,-20},
7011 <pmn|ugm>      w = {50, },
7012 <cmr>            x = {65,-40},
7013 <bch>            y = { ,50},
7014 <cmr>            y = {130,-20},
7015 <cmr>            z = {110,-80},
7016 <cmr>            0 = {170,-85},
7017 <bch|ptm>       1 = {150,100},
7018 <cmr>            1 = {230,110},
7019 <ebg>            1 = {150, },
7020 <pmn>            1 = {50, },
7021 <ppl>            1 = {100, },
7022 <ugm>            1 = {150,150},
7023 <cmr>            2 = {130,-70},
7024 <ebg|ppl|ptm>  2 = {50, },
7025 <pmn>            2 = {-50, },
7026 <bch>            3 = {50, },
7027 <cmr>            3 = {140,-70},
7028 <pmn>            3 = {-100, },
7029 <ptm>            3 = {100,50},
7030 <bch>            4 = {100, },
7031 <cmr>            4 = {130,80},
7032 <ebg>            4 = {150, },
7033 <ppl|ptm>        4 = {50, },
7034 <cmr>            5 = {160, },
7035 <ptm>            5 = {50, },
7036 <bch>            6 = {50, },
7037 <cmr>            6 = {175,-30},
7038 <bch|ebg|ptm>   7 = {100, },
7039 <cmr>            7 = {250,-150},
7040 <pmn>            7 = {20, },
7041 <ppl>            7 = {50, },
7042 <cmr>            8 = {130,-40},
7043 <cmr>            9 = {155,-80},
7044 <m-t|cmr|ebg|pmn|ppl> . = { ,500},
7045 <blg>            . = {400,600},
7046 <bch|ptm|ugm>    . = { ,700},
7047 <blg>            {,}= {300,500},
7048 <m-t|ebg|pmn|ppl> {,}= { ,500},
7049 <cmr>            {,}= { ,450},
7050 <bch|ugm>         {,}= { ,600},
7051 <ptm>            {,}= { ,700},
7052 <m-t|cmr|ebg|ppl> : = { ,300},
7053 <bch|ugm>         : = { ,400},
7054 <pmn>             : = { ,200},
7055 <ptm>             : = { ,500},
7056 <m-t|cmr|ebg|ppl> ; = { ,300},
7057 <bch|ugm>         ; = { ,400},
7058 <pmn>             ; = { ,200},
7059 <ptm>             ; = { ,500},
7060 <ptm>             ! = { ,100},
7061 <bch>             ? = { ,200},
7062 <ptm>             ? = { ,100},
7063 <ppl>             ? = { ,300},
7064 <pmn>             " = {400,200},
7065 <m-t|ebg|pmn|ppl|ptm> & = {50,50},
7066 <bch>             & = { ,80},
7067 <cmr>             & = {130,30},
7068 <ugm>             & = {50,100},
7069 <m-t|ebg|pmn>    \% = {100, },
7070 <cmr>             \% = {180,50},
7071 <bch>             \% = {50,50},
7072 <ppl|ptm>        \% = {100,100},

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7073 <ugm> \% = {100,50},
7074 <m-t|pmn|ppl> * = {200,200},
7075 <bch> * = {300,200},
7076 <cmr> * = {380,20},
7077 <ebg> * = {500,100},
7078 <ptm|ugm> * = {400,200},
7079 <m-t|pmn|ppl> + = {150,200},
7080 <cmr> + = {180,200},
7081 <bch|ugm> + = {250,250},
7082 <ebg|ptm> + = {250,200},
7083 <m-t|ebg|pmn|ppl> @ = {50,50},
7084 <bch> @ = {80,50},
7085 <cmr> @ = {180,10},
7086 <ptm> @ = {150,150},
7087 <m-t|bch|ugm> ~ = {150,150},
7088 <cmr|ebg|pmn|ppl|ptm> ~ = {200,150},
7089 <ugm> {=} = {200,200},
7090 <m-t|bch|ebg|pmn|ppl|ptm|ugm> ( = {200, }, ) = { ,200},
7091 <cmr> ( = {300, }, ) = { ,70},
7092 <m-t|ebg|ppl|ptm|ugm> / = {100,200},
7093 <cmr> / = {100,100},
7094 <bch> / = { ,150},
7095 <pmn> / = {100,150},
7096 <m-t> - = {300,300},
7097 <bch|ebg> - = {300,400},
7098 <pmn> - = {200,300},
7099 <cmr> - = {500,300},
7100 <ppl> - = {300,500},
7101 <ptm> - = {500,500},
7102 <ugm> - = {400,700},
7103 <blg> - = {0,300},
7104 <m-t|pmn> \textendash = {200,200}, \textendash = {150,150},
7105 <bch> \textendash = {200,300}, \textendash = {150,200},
7106 <cmr> \textendash = {500,300}, \textendash = {400,170},
7107 <ebg|ppl|ptm|ugm> \textendash = {300,300}, \textendash = {200,200},
7108 <m-t|bch|pmn|ugm> \textquoteleft = {400,200}, \textquoteright = {400,200},
7109 <blg> \textquoteleft = {400,400}, \textquoteright = {400,400},
7110 <cmr> \textquoteleft = {800,200}, \textquoteright = {800,-20},
7111 <ebg> \textquoteleft = {800,200}, \textquoteright = {800,200},
7112 <ppl> \textquoteleft = {700,400}, \textquoteright = {700,400},
7113 <ptm> \textquoteleft = {800,500}, \textquoteright = {800,500},
7114 <m-t|bch|pmn> \textquotedblleft = {400,200}, \textquotedblright = {400,200}
7115 <blg> \textquotedblright = {300,300}
7116 <cmr> \textquotedblleft = {540,100}, \textquotedblright = {500,100}
7117 <ebg> \textquotedblleft = {700,200}, \textquotedblright = {700,200}
7118 <ppl> \textquotedblleft = {500,300}, \textquotedblright = {500,300}
7119 <ptm> \textquotedblleft = {700,400}, \textquotedblright = {700,400}
7120 <ugm> \textquotedblleft = {600,200}, \textquotedblright = {600,200}
7121 }
7122
7123 <*cmr|ebg|pmn>
7124 \SetProtrusion
7125 <cmr> [ name = cmr-it-OT1,
7126 <ebg> [ name = EBGaramond-it-OT1,
7127 <pmn> [ name = pmnj-it-OT1,
7128 <cmr> load = cmr-it ]
7129 <ebg> load = EBGaramond-it ]
7130 <pmn> load = pmnj-it ]
7131 <cmr> { encoding = {OT1,OT4},
7132 <pmn> { encoding = OT1,
7133 <cmr> family = cmr,
7134 <pmn> family = pmnj,
7135 <cmr> shape = it }
7136 <pmn> shape = {it,sl} }
7137 <ebg> { }

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7138 {
7139 <cmr> \AE = {100, },
7140 <pmn> \AE = { , -50},
7141 <cmr> \OE = {100, },
7142 <pmn> \OE = {50, }
7143 <*cmr|ebg>
7144 <cmr> "00 = {200,150}, % \Gamma
7145 <ebg> "00 = { ,150}, % \Gamma
7146 <cmr> "01 = {150,100}, % \Delta
7147 <ebg> "01 = {100,100}, % \Delta
7148 <cmr> "02 = {150, 50}, % \Theta
7149 <ebg> "02 = { 50, 50}, % \Theta
7150 <cmr> "03 = {150, 50}, % \Lambda
7151 <ebg> "03 = {100,100}, % \Lambda
7152 <cmr> "04 = {100,100}, % \Xi
7153 <ebg> "04 = { 50, 50}, % \Xi
7154 <cmr> "05 = {100,100}, % \Pi
7155 <cmr> "06 = {100, 50}, % \Sigma
7156 <cmr> "07 = {200,150}, % \Upsilon
7157 <ebg> "07 = {100,100}, % \Upsilon
7158 <cmr> "08 = {150, 50}, % \Phi
7159 <ebg> "08 = { 50, 50}, % \Phi
7160 <cmr> "09 = {150,100}, % \Psi
7161 <ebg> "09 = { 50, 50}, % \Psi
7162 "0A = { 50, 50}, % \Omega
7163 <ebg> 138 = { , 50}, % \L
7164 </cmr|ebg>
7165 }
7166
7167 </cmr|ebg|pmn>
7168 <*ebg>
7169 \SetProtrusion
7170 [ name = EBGaramond-it-OT1-LF,
7171 load = EBGaramond-it-OT1 ]
7172 { encoding = OT1,
7173 family = {EBGaramond-LF,EBGaramond-TLF},
7174 shape = it }
7175 {
7176 1 = {50,50},
7177 2 = {50,50},
7178 3 = {80,50},
7179 4 = {50,50},
7180 5 = {50,50},
7181 6 = {50,50},
7182 7 = {50,50},
7183 8 = {50,50},
7184 9 = {50, },
7185 }
7186
7187 \SetProtrusion
7188 [ name = EBGaramond-it-OT1-OfF,
7189 load = EBGaramond-it-OT1 ]
7190 { encoding = OT1,
7191 family = {EBGaramond-OfF},
7192 shape = it }
7193 {
7194 1 = {50,50},
7195 2 = {50,50},
7196 3 = { ,80},
7197 4 = {50,50},
7198 7 = {50,50},
7199 }
7200
7201 \SetProtrusion
7202 [ name = EBGaramond-it-OT1-TOfF,

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7203     load      = EBGaramond-it-OT1 ]
7204     { encoding = OT1,
7205       family   = {EBGaramond-T0sF},
7206       shape    = it }
7207     {
7208       0 = {150,150},
7209       1 = {150,150},
7210       2 = {80,80},
7211       3 = {50,80},
7212       4 = {50,80},
7213       5 = {50,80},
7214       6 = {50,50},
7215       7 = {50,100},
7216       8 = {50,50},
7217       9 = {50,80},
7218     }
7219
7220 </ebg>
7221 \SetProtrusion
7222 <m-t> [ name      = T1-it-default,
7223 <bch> [ name      = bch-it-T1,
7224 <blg> [ name      = blg-it-T1,
7225 <cmr> [ name      = cmr-it-T1,
7226 <ebg> [ name      = EBGaramond-it-T1,
7227 <pmn> [ name      = pmnj-it-T1,
7228 <ppl> [ name      = ppl-it-T1,
7229 <ptm> [ name      = ptm-it-T1,
7230 <ugm> [ name      = ugm-it-T1,
7231 <m-t> load      = OT1-it ]
7232 <bch> load      = bch-it ]
7233 <blg> load      = blg-T1 ]
7234 <cmr> load      = cmr-it ]
7235 <pmn> load      = pmnj-it ]
7236 <ebg> load      = EBGaramond-it ]
7237 <ppl> load      = ppl-it ]
7238 <ptm> load      = ptm-it ]
7239 <ugm> load      = ugm-it ]
7240 <m-t|bch|cmr|pmn|ppl> { encoding = {T1,LY1},
7241 <ebg> { encoding = {LY1},
7242 <blg|ptm|ugm> { encoding = T1,
7243 <bch> family    = bch,
7244 <blg> family    = blg,
7245 <cmr> family    = cmr,
7246 <pmn> family    = pmnj,
7247 <ebg> family    = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-0sF,EBGaramond-T0sF},
7248 <ppl> family    = {ppl,pplx,pplj},
7249 <ptm> family    = {ptm,ptmx,ptmj},
7250 <ugm> family    = ugm,
7251 <m-t|bch|pmn|ppl|ptm> shape    = {it,sl} }
7252 <blg|cmr|ebg|ugm> shape    = it }
7253 {
7254 <m-t|bch|pmn> _ = { ,100},
7255 <blg> _ = {0,300},
7256 <cmr|ugm> _ = {100,200},
7257 <ebg|ppl|ptm> _ = {100,100},
7258 <blg> . = {400,600},
7259 <blg> {,}= {300,500},
7260 <cmr> \AE = {100, },
7261 <pmn> \AE = { , -50},
7262 <bch|pmn> \OE = { 50, },
7263 <cmr> \OE = {100, },
7264 <pmn> 031 = { , -100}, % ffl
7265 <cmr|ptm> 156 = {100, }, % IJ
7266 <ebg> 156 = {50, }, % IJ
7267 <pmn> 156 = {20, }, % IJ

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7268 <pmn> 188 = { , -30}, % ij
7269 <pmn> \v t = { , 100},
7270 <m-t|ebg|ppl|ptm> \textbackslash = {100,200},
7271 <cmr|ugm> \textbackslash = {300,300},
7272 <bch> \textbackslash = {150,150},
7273 <pmn> \textbackslash = {100,150},
7274 <ugm> \textbar = {200,200},
7275 <cmr> \textquotedblleft = {500,300},
7276 <blg> \textquoteleft = {400,400}, \textquoteright = {400,400},
7277 <blg> \textquotedbl = {300,300}, \textquotedblleft = {300,300},
7278 <blg> \textquotedblright = {300,300}, \quotedblbase = {200,600},
7279 <m-t|ptm> \quotesinglbase = {300,700}, \quotedblbase = {400,500},
7280 <cmr> \quotesinglbase = {300,700}, \quotedblbase = {200,600},
7281 <bch|pmn> \quotesinglbase = {200,500}, \quotedblbase = {150,500},
7282 <ebg|ppl> \quotesinglbase = {500,500}, \quotedblbase = {400,400},
7283 <ugm> \quotesinglbase = {300,700}, \quotedblbase = {300,500},
7284 <m-t|ppl|ptm> \guilsinglleft = {400,400}, \guilsinglright = {300,500},
7285 <bch|pmn> \guilsinglleft = {300,400}, \guilsinglright = {200,500},
7286 <cmr> \guilsinglleft = {500,300}, \guilsinglright = {400,400},
7287 <ebg> \guilsinglleft = {500,400}, \guilsinglright = {300,500},
7288 <ugm> \guilsinglleft = {400,400}, \guilsinglright = {300,600},
7289 <m-t|ppl> \guillemotleft = {300,300}, \guillemotright = {300,300},
7290 <bch|pmn> \guillemotleft = {200,300}, \guillemotright = {150,400},
7291 <cmr> \guillemotleft = {400,100}, \guillemotright = {200,300},
7292 <ebg> \guillemotleft = {300,300}, \guillemotright = {200,400},
7293 <ptm> \guillemotleft = {300,400}, \guillemotright = {200,400},
7294 <ugm> \guillemotleft = {300,400}, \guillemotright = {300,400},
7295 <m-t|ebg|ppl|ugm> \textexclamdown = {100, }, \textquestiondown = {200, },
7296 <cmr|ptm> \textexclamdown = {200, }, \textquestiondown = {200, },
7297 <pmn> \textexclamdown = {-50, }, \textquestiondown = {-50, },
7298 <m-t|ppl|ugm> \textbraceleft = {200,100}, \textbraceright = {200,200},
7299 <bch|pmn> \textbraceleft = {200, }, \textbraceright = { ,200},
7300 <cmr|ebg|ptm> \textbraceleft = {400,100}, \textbraceright = {200,200},
7301 <bch|pmn> \textless = {100, }, \textgreater = { ,100},
7302 <cmr|ebg|ppl|ptm> \textless = {300,100}, \textgreater = {200,100}
7303 <pmn> \textvisiblespace = {100,100}
7304 }
7305
7306 <*ebg>
7307 \SetProtrusion
7308 [ name = EBGaramond-it-T1-LF,
7309 load = EBGaramond-it-T1 ]
7310 { encoding = T1,
7311 family = {EBGaramond-LF,EBGaramond-TLF},
7312 shape = it }
7313 {
7314 1 = {50,50},
7315 2 = {50,50},
7316 3 = {80,50},
7317 4 = {50,50},
7318 5 = {50,50},
7319 6 = {50,50},
7320 7 = {50,50},
7321 8 = {50,50},
7322 9 = {50, },
7323 }
7324
7325 \SetProtrusion
7326 [ name = EBGaramond-it-T1-OsF,
7327 load = EBGaramond-it-T1 ]
7328 { encoding = T1,
7329 family = {EBGaramond-OsF},
7330 shape = it }
7331 {
7332 1 = {50,50},

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7333     2 = {50,50},
7334     3 = {  ,80},
7335     4 = {50,50},
7336     7 = {50,50},
7337 }
7338
7339 \SetProtrusion
7340 [ name      = EBGaramond-it-T1-T0sF,
7341   load      = EBGaramond-it-T1 ]
7342 { encoding = T1,
7343   family   = {EBGaramond-T0sF},
7344   shape     = it }
7345 {
7346   0 = {150,150},
7347   1 = {150,150},
7348   2 = {80,80},
7349   3 = {50,80},
7350   4 = {50,80},
7351   5 = {50,80},
7352   6 = {50,50},
7353   7 = {50,100},
7354   8 = {50,50},
7355   9 = {50,80},
7356 }
7357
7358 (/ebg)
7359 <*-t|cmr|pmn>
7360 \SetProtrusion
7361 <m-t> [ name      = T2A-it-default,
7362 <cmr> [ name      = cmr-it-T2A,
7363 <pmn> [ name      = pmnj-it-T2A,
7364 <m-t>   load      = OT1-it   ]
7365 <cmr>   load      = cmr-it   ]
7366 <pmn>   load      = pmnj-it  ]
7367 { encoding = T2A,
7368 <cmr>   family   = cmr,
7369 <pmn>   family   = pmnj,
7370 <m-t|pmn> shape   = {it,sl} }
7371 <cmr>   shape   = it        }
7372 {
7373 <cmr>   \CYRA = {100,50},
7374 <pmn>   \CYRA = {50,  },
7375 <cmr>   \CYRB = {50,  },
7376 <cmr>   \CYRV = {50,  },
7377 <pmn>   \CYRV = {20,-50},
7378 <cmr>   \CYRG = {100, },
7379 <pmn>   \CYRG = {10,  },
7380 <cmr>   \CYRD = {50,  },
7381 <cmr>   \CYRE = {50,  },
7382 <pmn>   \CYRE = {20,-50},
7383 <cmr>   \CYRZH = {50,  },
7384 <cmr>   \CYRZ = {50,  },
7385 <pmn>   \CYRZ = {20,-50},
7386 <cmr>   \CYRI = {50,  },
7387 <pmn>   \CYRI = {  ,-30},
7388 <cmr>   \CYRISHRT = {50,  },
7389 <cmr>   \CYRK = {50,  },
7390 <pmn>   \CYRK = {20,  },
7391 <cmr>   \CYRL = {50,  },
7392 <cmr>   \CYRM = {50,  },
7393 <pmn>   \CYRM = {  ,-30},
7394 <cmr>   \CYRN = {50,  },
7395 <cmr>   \CYRO = {100, },
7396 <pmn>   \CYRO = {50,  },
7397 <cmr>   \CYRP = {50,  },

```

```

7398 <cmr> \CYRR = {50, },
7399 <pmn> \CYRR = {20,-50},
7400 <cmr> \CYRS = {100, },
7401 <pmn> \CYRS = {50, },
7402 <cmr> \CYRT = {100, },
7403 <pmn> \CYRT = {70, },
7404 <cmr> \CYRU = {100, },
7405 <pmn> \CYRU = {50, },
7406 <cmr> \CYRF = {100, },
7407 <cmr> \CYRH = {50, },
7408 <cmr> \CYRC = {50, },
7409 <cmr> \CYRCH = {100, },
7410 <cmr> \CYRSH = {50, },
7411 <cmr> \CYRSHCH = {50, },
7412 <cmr> \CYRHRDSN = {100, },
7413 <cmr> \CYRERY = {50, },
7414 <cmr> \CYRSFTSN = {50, },
7415 <cmr> \CYREREV = {50, },
7416 <cmr> \CYRYU = {50, },
7417 <cmr> \CYRYA = {50, },
7418 <pmn> \CYRYA = { ,20},
7419 <pmn> \cyrr = {-50, },
7420 <m-t|pmn> _ = { ,100},
7421 <cmr> _ = {100,200},
7422 <pmn> 031 = { , -100}, % ff1
7423 <pmn> \v t = { ,100},
7424 <m-t> \textbackslash = {100,200}, \quotedblbase = {400,500},
7425 <cmr> \textbackslash = {300,300}, \quotedblbase = {200,600},
7426 <pmn> \textbackslash = {100,150}, \quotedblbase = {150,500},
7427 <m-t> \guillemotleft = {300,300}, \guillemotright = {300,300},
7428 <cmr> \guillemotleft = {400,100}, \guillemotright = {200,300},
7429 <pmn> \guillemotleft = {200,300}, \guillemotright = {150,400},
7430 <m-t> \textbraceleft = {200,100}, \textbraceright = {200,200},
7431 <cmr> \textbraceleft = {400,100}, \textbraceright = {200,200},
7432 <pmn> \textbraceleft = {200, }, \textbraceright = { ,200},
7433 <cmr> \textquotedblleft = {500,300},
7434 <cmr> \textless = {300,100}, \textgreater = {200,100}
7435 <pmn> \textless = {100, }, \textgreater = { ,100}
7436 }
7437
7438 </m-t|cmr|pmn>
7439 <*m-t|ptm>
7440 \SetProtrusion
7441 <m-t> [ name = QX-it-default,
7442 <ptm> [ name = ptm-it-QX,
7443 <m-t> load = OT1-it ]
7444 <ptm> load = ptm-it ]
7445 { encoding = {QX},
7446 <ptm> family = {ptm,ptmx,ptmj},
7447 shape = {it,sl} }
7448 {
7449 <ptm> 009 = { , 50}, % fk
7450 {=} = {100,100},
7451 <m-t> \textunderscore = {100,100},
7452 <ptm> \textunderscore = {100,150},
7453 \textbackslash = {100,200},
7454 \quotedblbase = {300,400},
7455 <m-t> \guillemotleft = {300,300}, \guillemotright = {300,300},
7456 <ptm> \guillemotleft = {200,400}, \guillemotright = {200,400},
7457 \textexclamdown = {200, }, \textquestiondown = {200, },
7458 \textbraceleft = {200,100}, \textbraceright = {200,200},
7459 \textless = {100,100}, \textgreater = {100,100},
7460 \textminus = {200,200}, \textdegree = {300,150},
7461 <m-t> \copyright = {100,100}, \textregistered = {100,100}
7462 <ptm> \textregistered = {100,150}, \copyright = {100,150},

```

```

7463 <ptm> \textDelta = { 70, }, \textdelta = { , 50},
7464 <ptm> \textpi = { 50, 80}, \textmu = { , 80},
7465 <ptm> \texteuro = {200, }, \textellipsis = {100,200},
7466 <ptm> \textquoteleft = {500,400}, \textquoteright = {500,400},
7467 <ptm> \textquotedblleft = {500,300}, \textquotedblright = {400,400},
7468 <ptm> \textapprox = { 50, 50}, \textinfty = {100,100},
7469 <ptm> \textdagger = {150,150}, \textdaggerdbl = {100,100},
7470 <ptm> \textdiv = {150,150}, \textasciitilde = { 80, 80},
7471 <ptm> \texttimes = {100,150}, \textpm = { 50, 80},
7472 <ptm> \textbullet = {300,100}, \textperiodcentered = {300,300},
7473 <ptm> \textquotesingle = {500,500}, \textquotedbl = {300,300},
7474 <ptm> \textperthousand = { ,50}
7475 }
7476
7477 </m-t|ptm>
7478 <*cmr|bch>
7479 \SetProtrusion
7480 <cmr> [ name = cmr-it-T5,
7481 <cmr> load = cmr-it ]
7482 <bch> [ name = bch-it-T5,
7483 <bch> load = bch-it ]
7484 { encoding = T5,
7485 <bch> family = bch,
7486 <cmr> family = cmr,
7487 shape = it }
7488 {
7489 <bch> _ = { ,100},
7490 <cmr> _ = {100,200},
7491 <bch> \textbackslash = {150,150},
7492 <cmr> \textbackslash = {300,300},
7493 <bch> \quotesinglbase = {200,500}, \quotedblbase = {150,500},
7494 <cmr> \quotesinglbase = {300,700}, \quotedblbase = {200,600},
7495 <bch> \guilsinglleft = {300,400}, \guilsinglright = {200,500},
7496 <cmr> \guilsinglleft = {500,300}, \guilsinglright = {400,400},
7497 <bch> \guillemotleft = {200,300}, \guillemotright = {150,400},
7498 <cmr> \guillemotleft = {400,100}, \guillemotright = {200,300},
7499 <bch> \textbraceleft = {200, }, \textbraceright = { ,200},
7500 <cmr> \textbraceleft = {400,100}, \textbraceright = {200,200},
7501 <bch> \textless = {100, }, \textgreater = { ,100}
7502 <cmr> \textless = {300,100}, \textgreater = {200,100}
7503 }
7504
7505 </cmr|bch>

```

Slanted is very similar to italic.

```

7506 <*cmr>
7507 \SetProtrusion
7508 [ name = cmr-sl,
7509 load = cmr-it-OT1 ]
7510 { encoding = {OT1,OT4},
7511 family = cmr,
7512 shape = sl }
7513 {
7514 L = { ,50},
7515 f = { , -50},
7516 - = {300, },
7517 \textendash = {400, }, \textemdash = {300, }
7518 }
7519
7520 \SetProtrusion
7521 [ name = cmr-sl-T1,
7522 load = cmr-it-T1 ]
7523 { encoding = {T1,LY1},
7524 family = cmr,
7525 shape = sl }

```

```

7526 {
7527   L = { ,50},
7528   f = { ,-50},
7529   - = {300, },
7530   \textendash = {400, }, \textemdash = {300, }
7531 }
7532
7533 \SetProtrusion
7534 [ name = cmr-sl-T2A,
7535   load = cmr-it-T2A ]
7536 { encoding = T2A,
7537   family = cmr,
7538   shape = sl }
7539 {
7540   L = { ,50},
7541   f = { ,-50},
7542   - = {300, },
7543   \textendash = {400, }, \textemdash = {300, }
7544 }
7545
7546 \SetProtrusion
7547 [ name = cmr-sl-T5,
7548   load = cmr-it-T5 ]
7549 { encoding = T5,
7550   family = cmr,
7551   shape = sl }
7552 {
7553   L = { ,50},
7554   f = { ,-50},
7555   - = {300, },
7556   \textendash = {400, }, \textemdash = {300, }
7557 }
7558
7559 \SetProtrusion
7560 [ name = lmr-it-T1,
7561   load = cmr-it-T1 ]
7562 { encoding = {T1,LY1},
7563   family = lmr,
7564   shape = {it,sl} }
7565 {
7566   \textquotedblleft = { ,200}, \textquotedblright = { ,200},
7567   \quotesinglbase = { ,400}, \quotedblbase = { ,500}
7568 }
7569

```

Oldstyle numerals are slightly different.

```

7570 \SetProtrusion
7571 [ name = cmr(oldstyle)-it,
7572   load = cmr-it-T1 ]
7573 { encoding = T1,
7574   family = {hfor,cmor},
7575   shape = {it,sl} }
7576 {
7577   1 = {250, 50},
7578   2 = {150,-100},
7579   3 = {100,-50},
7580   4 = {150,150},
7581   6 = {200, },
7582   7 = {200, 50},
7583   8 = {150,-50},
7584   9 = {100, 50}
7585 }
7586
7587 </cmr>
7588 <*pmn>

```

```

7589 \SetProtrusion
7590 [ name      = pmnx-it,
7591   load      = pmnj-it ]
7592 { encoding = OT1,
7593   family   = pmnx,
7594   shape     = {it,s1} }
7595 {
7596   1 = {100,150}
7597 }
7598
7599 \SetProtrusion
7600 [ name      = pmnx-it-T1,
7601   load      = pmnj-it-T1 ]
7602 { encoding = {T1,LY1},
7603   family   = pmnx,
7604   shape     = {it,s1} }
7605 {
7606   1 = {100,150}
7607 }
7608
7609 \SetProtrusion
7610 [ name      = pmnx-it-T2A,
7611   load      = pmnj-it-T2A ]
7612 { encoding = {T2A},
7613   family   = pmnx,
7614   shape     = {it,s1} }
7615 {
7616   1 = {100,150}
7617 }
7618
7619 /pmn
7620 *ptm
7621 \SetProtrusion
7622 [ name      = ptm-it-LY1,
7623   load      = ptm-it-T1 ]
7624 { encoding = {LY1},
7625   family   = {ptm,ptmx,ptmj},
7626   shape     = {it,s1} }
7627 {
7628   - = {100,100},
7629   \texttrademark = {100,100},
7630   \textregistered = {100,100},
7631   \textcopyright = {100,100},
7632   \textdegree = {300,100},
7633   \textminus = {200,200},
7634   \textellipsis = {100,200},
7635   \% = { , }, \% ?
7636   \textcent = {100,100},
7637   \textquotesingle = {500, },
7638   \textflorin = {100, 70},
7639   \textdagger = {150,150},
7640   \textdaggerdbl = {100,100},
7641   \textbullet = {150,150},
7642   \textonesuperior = {150,100},
7643   \texttwosuperior = {150, 50},
7644   \textthreesuperior = {150, 50},
7645   \textparagraph = {100, },
7646   \textperiodcentered = {500,300},
7647   \textonequarter = { 50, },
7648   \textonehalf = { 50, },
7649   \textplusminus = {100,100},
7650   \textmultiply = {150,150},
7651   \textdivide = {150,150}
7652 }
7653

```

7654 *</ptm>*

### 2.8.3 Small caps

Small caps should inherit the values from their big brothers. Since values are relative to character width, we don't need to adjust them any further (but we have to reset some characters).

```

7655 <*(blg|ugm)>
7656 \SetProtrusion
7657 <m-t> [ name = OT1-sc,
7658 <bch> [ name = bch-sc,
7659 <cmr> [ name = cmr-sc-OT1,
7660 <ebg> [ name = EBGaramond-sc-OT1-Prop,
7661 <pmn> [ name = pmnj-sc,
7662 <ppl> [ name = ppl-sc,
7663 <ptm> [ name = ptm-sc,
7664 <m-t> load = default ]
7665 <bch> load = bch-default ]
7666 <cmr> load = cmr-OT1 ]
7667 <ebg> load = EBGaramond-OT1-LF ]
7668 <pmn> load = pmnj-default ]
7669 <ppl> load = ppl-default ]
7670 <ptm> load = ptm-default ]
7671 <m-t|bch|ebg|pmn> { encoding = OT1,
7672 <cmr|ppl|ptm> { encoding = {OT1,OT4},
7673 <bch> family = bch,
7674 <cmr> family = cmr,
7675 <ebg> family = {EBGaramond-LF,EBGaramond-OfF},
7676 <pmn> family = pmnj,
7677 <ppl> family = {ppl,pplx,pplj},
7678 <ptm> family = {ptm,ptmx,ptmj},
7679 shape = sc }
7680 {
7681 a = {50,50},
7682 <cmr|ebg|ppl|ptm> \ae = {50, },
7683 <bch|pmn> c = {50, },
7684 <bch|ebg|pmn> d = { ,50},
7685 <m-t|bch|cmr|ebg|pmn|ptm> f = { ,50},
7686 <bch|ebg|pmn> g = {50, },
7687 <m-t|cmr|ebg|pmn|ppl|ptm> j = {50, },
7688 <bch> j = {100, },
7689 <m-t|bch|cmr|ebg|pmn|ppl> l = { ,50},
7690 <ptm> l = { ,80},
7691 <m-t|bch|cmr|pmn|ppl> o13 = { ,50}, % fl
7692 <ptm> o13 = { ,80}, % fl
7693 <bch|ebg|pmn> o = {50,50},
7694 <ebg|pmn> \oe = {50, },
7695 <ppl> p = { 0, 0},
7696 <bch|ebg|pmn> q = {50,70},
7697 <ppl> q = { 0, },
7698 <m-t|cmr|ebg|pmn|ppl|ptm> r = { , 0},
7699 t = {50,50},
7700 <m-t|bch|cmr|ebg|pmn|ppl> y = {50,50}
7701 <ptm> y = {80,80}
7702 }
7703
7704 <*ebg>
7705 \SetProtrusion
7706 [ name = EBGaramond-sc-OT1-Tab,
7707 load = EBGaramond-OT1-TOfF ]
7708 { encoding = OT1,
7709 family = {EBGaramond-TLF,EBGaramond-TOfF},
7710 shape = sc }

```

```

7711 {
7712     a = {50,50},
7713     \ae = {50, },
7714     d = { ,50},
7715     f = { ,50},
7716     g = {50, },
7717     j = {50, },
7718     l = { ,50},
7719     o = {50,50},
7720     \oe = {50, },
7721     q = {50,70},
7722     r = { , 0},
7723     t = {50,50},
7724     y = {50,50}
7725 }
7726
7727 </ebg>
7728 \SetProtrusion
7729 <m-t> [ name      = Tl-sc,
7730 <bch> [ name      = bch-sc-Tl,
7731 <cmr> [ name      = cmr-sc-Tl,
7732 <ebg> [ name      = EBGaramond-sc-Tl,
7733 <pmn> [ name      = pmnj-sc-Tl,
7734 <ppl> [ name      = ppl-sc-Tl,
7735 <ptm> [ name      = ptm-sc-Tl,
7736 <m-t>   load      = Tl-default ]
7737 <bch>   load      = bch-Tl      ]
7738 <cmr>   load      = cmr-Tl      ]
7739 <ebg>   load      = EBGaramond-Tl      ]
7740 <pmn>   load      = pmnj-Tl     ]
7741 <ppl>   load      = ppl-Tl      ]
7742 <ptm>   load      = ptm-Tl     ]
7743 <!ebg> { encoding = {Tl,LYl},
7744 <ebg> { encoding = {LYl},
7745 <bch>   family    = bch,
7746 <cmr>   family    = cmr,
7747 <ebg>   family    = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OfF,EBGaramond-TOfF},
7748 <pmn>   family    = pmnj,
7749 <ppl>   family    = {ppl,pplx,pplj},
7750 <ptm>   family    = {ptm,ptmx,ptmj},
7751     shape      = sc }
7752 {
7753     a = {50,50},
7754 <cmr|ebg|ppl|ptm> \ae = {50, },
7755 <bch|pmn>          c = {50, },
7756 <bch|ebg|pmn>      d = { ,50},
7757 <m-t|bch|cmr|ebg|pmn|ptm> f = { ,50},
7758 <bch|ebg|pmn>      g = {50, },
7759 <m-t|cmr|ebg|pmn|ppl|ptm> j = {50, },
7760 <bch>              j = {100, },
7761 <m-t|bch|cmr|ebg|pmn|ppl> l = { ,50},
7762 <ptm>              l = { ,80},
7763 <m-t|bch|cmr|pmn|ppl> 029 = { ,50}, % fl
7764 <ptm>              029 = { ,80}, % fl
7765 <bch|ebg|pmn>      o = {50,50},
7766 <bch|ebg|pmn>      \oe = {50, },
7767 <ppl>              p = { 0, 0},
7768 <bch|ebg|pmn>      q = {50,70},
7769 <ppl>              q = { 0, },
7770 <m-t|cmr|ebg|pmn|ppl|ptm> r = { , 0},
7771     t = {50,50},
7772 <m-t|bch|cmr|ebg|pmn|ppl> y = {50,50}
7773 <ptm>              y = {80,80}
7774 }
7775

```

```

7776 </(big|ugm)>
7777 <*m-t|cmr>
7778 \SetProtrusion
7779 <m-t> [ name      = T2A-sc,
7780 <cmr>  [ name      = cmr-sc-T2A,
7781 <m-t>   load      = T2A-default ]
7782 <cmr>   load      = cmr-T2A   ]
7783 { encoding = T2A,
7784 <cmr>     family   = cmr,
7785     shape    = sc }
7786 {
7787     \cyra = {50,50},
7788     \cyrg = { ,50},
7789     \cyrt = {50,50},
7790     \cyyr = { ,50}
7791 }
7792
7793 </m-t|cmr>
7794 <*m-t>
7795 \SetProtrusion
7796 [ name      = QX-sc,
7797   load      = QX-default ]
7798 { encoding = QX,
7799   shape    = sc }
7800 {
7801   a = {50,50},
7802   f = { ,50},
7803   j = {50, },
7804   l = { ,50},
7805   013 = { ,50}, % fl
7806   r = { , 0},
7807   t = {50,50},
7808   y = {50,50}
7809 }
7810
7811 </m-t>
7812 <*cmr|bch>
7813 \SetProtrusion
7814 <bch> [ name      = bch-sc-T5,
7815 <bch>  [ load      = bch-T5 ]
7816 <cmr> [ name      = cmr-sc-T5,
7817 <cmr>  [ load      = cmr-T5 ]
7818 { encoding = T5,
7819 <bch>     family   = bch,
7820 <cmr>     family   = cmr,
7821     shape    = sc }
7822 {
7823   a = {50,50},
7824 <bch>     c = {50, },
7825 <bch>     d = { ,50},
7826     f = { ,50},
7827 <bch>     g = {50, },
7828 <bch>     j = {100, },
7829 <cmr>     j = {50, },
7830     l = { ,50},
7831 <bch>     o = {50,50},
7832 <bch>     q = { 0, },
7833 <cmr>     r = { , 0},
7834     t = {50,50},
7835     y = {50,50}
7836 }
7837
7838 </cmr|bch>
7839 <*ebg>
7840 \SetProtrusion

```



```

7841 [ name      = EBGaramond-sc-T1-Prop,
7842     load      = EBGaramond-T1-LF ]
7843 { encoding = T1,
7844   family   = {EBGaramond-LF,EBGaramond-OfF},
7845   shape     = sc }
7846 {
7847   a = {50,50},
7848   \ae = {50, },
7849   d = { ,50},
7850   f = { ,50},
7851   g = {50, },
7852   j = {50, },
7853   l = { ,50},
7854   o = {50,50},
7855   \oe = {50, },
7856   q = {50,70},
7857   r = { , 0},
7858   t = {50,50},
7859   y = {50,50}
7860 }
7861
7862 \SetProtrusion
7863 [ name      = EBGaramond-sc-T1-Tab,
7864     load      = EBGaramond-T1-TOfF ]
7865 { encoding = T1,
7866   family   = {EBGaramond-TLF,EBGaramond-TOfF},
7867   shape     = sc }
7868 {
7869   a = {50,50},
7870   \ae = {50, },
7871   d = { ,50},
7872   f = { ,50},
7873   g = {50, },
7874   j = {50, },
7875   l = { ,50},
7876   o = {50,50},
7877   \oe = {50, },
7878   q = {50,70},
7879   r = { , 0},
7880   t = {50,50},
7881   y = {50,50}
7882 }
7883
7884 </ebg>
7885 < *pmn>
7886 \SetProtrusion
7887 [ name      = pmnx-sc,
7888     load      = pmnj-sc ]
7889 { encoding = OT1,
7890   family   = pmnx,
7891   shape     = sc }
7892 {
7893   l = {230,180}
7894 }
7895
7896 \SetProtrusion
7897 [ name      = pmnx-sc-T1,
7898     load      = pmnj-sc-T1 ]
7899 { encoding = {T1,LY1},
7900   family   = pmnx,
7901   shape     = sc }
7902 {
7903   l = {230,180}
7904 }
7905

```

## 2.8.4 Italic small caps

Minion provides real small caps in italics. The `slantsc` package calls them `scit`, Philipp Lehman's `fontinstallationguide` suggests `si`.

```

7906 \SetProtrusion
7907 [ name      = pmnj-scit,
7908   load      = pmnj-it  ]
7909 { encoding = OT1,
7910   family   = pmnj,
7911   shape     = {scit,si} }
7912 {
7913   a = {50, },
7914   \ae = { , -50},
7915   b = {20, -50},
7916   c = {50, -50},
7917   d = {20, 0},
7918   e = {20, -50},
7919   f = {10, 0},
7920   012 = {10, -50}, % fi
7921   013 = {10, -50}, % fl
7922   014 = {10, -50}, % ffi
7923   015 = {10, -50}, % ffl
7924   g = {50, -50},
7925   i = {20, -50},
7926   j = {20, 0},
7927   k = {20, },
7928   l = {20, 50},
7929   m = { , -30},
7930   n = { , -30},
7931   o = {50, },
7932   \oe = {50, -50},
7933   p = {20, -50},
7934   q = {50, },
7935   r = {20, 0},
7936   s = {20, -30},
7937   t = {70, },
7938   u = {50, -50},
7939   v = {100, },
7940   w = {100, },
7941   y = {50, },
7942   z = { , -50}
7943 }
7944
7945 \SetProtrusion
7946 [ name      = pmnj-scit-T1,
7947   load      = pmnj-it-T1  ]
7948 { encoding = {T1,LY1},
7949   family   = pmnj,
7950   shape     = {scit,si}   }
7951 {
7952   a = {50, },
7953   \ae = { , -50},
7954   b = {20, -50},
7955   c = {50, -50},
7956   d = {20, 0},
7957   e = {20, -50},
7958   f = {10, 0},
7959   028 = {10, -50}, % fi
7960   029 = {10, -50}, % fl
7961   030 = {10, -50}, % ffi
7962   031 = {10, -50}, % ffl
7963   g = {50, -50},
7964   i = {20, -50},
7965   188 = {20, 0}, % ij
7966   j = {20, 0},

```

```

7967     k = {20, },
7968     l = {20,50},
7969     m = { , -30},
7970     n = { , -30},
7971     o = {50, },
7972     \oe = {50,-50},
7973     p = {20,-50},
7974     q = {50, },
7975     r = {20, 0},
7976     s = {20,-30},
7977     t = {70, },
7978     u = {50,-50},
7979     v = {100, },
7980     w = {100, },
7981     y = {50, },
7982     z = { , -50}
7983 }
7984
7985 \SetProtrusion
7986 [ name    = pmnx-scit,
7987   load    = pmnj-scit ]
7988 { encoding = OT1,
7989   family   = pmnx,
7990   shape    = {scit,si} }
7991 {
7992   l = {100,150}
7993 }
7994
7995 \SetProtrusion
7996 [ name    = pmnx-scit-T1,
7997   load    = pmnj-scit-T1 ]
7998 { encoding = {T1,LY1},
7999   family   = pmnx,
8000   shape    = {scit,si} }
8001 {
8002   l = {100,150}
8003 }
8004
8005 </pmn>
8006 <*ebg>

```

For small caps italics, we copy the definitions from the small caps settings, except that we first load the italics settings.

```

8007 \SetProtrusion
8008 [ name    = EBGaramond-scit-OT1-Prop,
8009   load    = EBGaramond-it-OT1-LF ]
8010 { encoding = OT1,
8011   family   = {EBGaramond-LF,EBGaramond-0sF},
8012   shape    = scit }
8013 {
8014   a = {50,50},
8015   \ae = {50, },
8016   d = { , 50},
8017   f = { , 50},
8018   g = {50, },
8019   j = {50, },
8020   l = { , 50},
8021   o = {50,50},
8022   \oe = {50, },
8023   q = {50,70},
8024   r = { , 0},
8025   t = {50,50},
8026   y = {50,50}
8027 }
8028

```

```
8029 \SetProtrusion
8030 [ name      = EBGaramond-scit-OT1-Tab,
8031   load      = EBGaramond-it-OT1-T0sF ]
8032 { encoding = OT1,
8033   family   = {EBGaramond-TLF,EBGaramond-T0sF},
8034   shape     = scit }
8035 {
8036   a = {50,50},
8037   \ae = {50, },
8038   d = { ,50},
8039   f = { ,50},
8040   g = {50, },
8041   j = {50, },
8042   l = { ,50},
8043   o = {50,50},
8044   \oe = {50, },
8045   q = {50,70},
8046   r = { , 0},
8047   t = {50,50},
8048   y = {50,50}
8049 }
8050
8051 \SetProtrusion
8052 [ name      = EBGaramond-scit-T1-Prop,
8053   load      = EBGaramond-it-T1-LF ]
8054 { encoding = T1,
8055   family   = {EBGaramond-LF,EBGaramond-0sF},
8056   shape     = scit }
8057 {
8058   a = {50,50},
8059   \ae = {50, },
8060   d = { ,50},
8061   f = { ,50},
8062   g = {50, },
8063   j = {50, },
8064   l = { ,50},
8065   o = {50,50},
8066   \oe = {50, },
8067   q = {50,70},
8068   r = { , 0},
8069   t = {50,50},
8070   y = {50,50}
8071 }
8072
8073 \SetProtrusion
8074 [ name      = EBGaramond-scit-T1-Tab,
8075   load      = EBGaramond-it-T1-T0sF ]
8076 { encoding = T1,
8077   family   = {EBGaramond-TLF,EBGaramond-T0sF},
8078   shape     = scit }
8079 {
8080   a = {50,50},
8081   \ae = {50, },
8082   d = { ,50},
8083   f = { ,50},
8084   g = {50, },
8085   j = {50, },
8086   l = { ,50},
8087   o = {50,50},
8088   \oe = {50, },
8089   q = {50,70},
8090   r = { , 0},
8091   t = {50,50},
8092   y = {50,50}
8093 }
```

8094  
8095 */ebg*

### 2.8.5 Text companion

Finally the TS1 encoding. Still quite incomplete for Times and especially Palatino.  
Anybody?

```
8096 \SetProtrusion
8097 m-t [ name = textcomp ]
8098 bch [ name = bch-textcomp ]
8099 blg [ name = blg-textcomp ]
8100 cmr [ name = cmr-textcomp ]
8101 ebg [ name = EBGaramond-textcomp ]
8102 pmn [ name = pmn-textcomp ]
8103 ppl [ name = ppl-textcomp ]
8104 ptm [ name = ptm-textcomp ]
8105 ugm [ name = ugm-textcomp ]
8106 m-t { encoding = TS1 }
8107 !m-t { encoding = TS1,
8108 bch family = bch }
8109 blg family = blg }
8110 cmr family = cmr }
8111 ebg family = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OfF,EBGaramond-TOsF} }
8112 pmn family = {pmnx,pmnj} }
8113 ppl family = {ppl,pplx,pplj} }
8114 ptm family = {ptm,ptmx,ptmj} }
8115 ugm family = ugm }
8116 {
8117 blg \textquotestraightbase = {400,500},
8118 cmr \textquotestraightbase = {300,300},
8119 ebg|pmn \textquotestraightbase = {400,400},
8120 blg \textquotestraightdblbase = {300,400},
8121 cmr|pmn \textquotestraightdblbase = {300,300},
8122 ebg \textquotestraightdblbase = {400,400},
8123 bch|cmr|ebg|pmn|ugm \texttwelvewardash = {200,200},
8124 bch|cmr|ebg|pmn \textthreequartersemdash = {150,150},
8125 ugm \textthreequartersemdash = {200,200},
8126 blg \textquotesingle = {500,600},
8127 cmr|pmn \textquotesingle = {300,400},
8128 ebg \textquotesingle = {400,500},
8129 ptm \textquotesingle = {500,500},
8130 ugm \textquotesingle = {300,500},
8131 bch|cmr|pmn \textasteriskcentered = {200,300},
8132 blg \textasteriskcentered = {150,200},
8133 ebg \textasteriskcentered = {300,300},
8134 ugm \textasteriskcentered = {100,200},
8135 pmn \textfactionsolidus = {-200,-200},
8136 cmr \textoneoldstyle = {100,100},
8137 pmn \textoneoldstyle = { , 50},
8138 cmr \textthreeoldstyle = { , 50},
8139 ebg|pmn \textthreeoldstyle = { 50, },
8140 cmr \textfouroldstyle = { 50, 50},
8141 ebg|pmn \textfouroldstyle = { 50, },
8142 cmr|ebg|pmn \textsevenoldstyle = { 50, 80},
8143 cmr \textlangle = {400, },
8144 cmr \textrangle = { ,400},
8145 m-t|bch|pmn|ptm \textminus = {200,200},
8146 cmr|ebg|ppl \textminus = {300,300},
8147 blg|ugm \textminus = {250,300},
8148 bch|ebg|pmn \textlbrackdbl = {100, },
8149 blg \textlbrackdbl = {200, },
8150 bch|ebg|pmn \textrbrackdbl = { ,100},
8151 blg \textrbrackdbl = { ,200},
8152 pmn \textasciigrave = {200,500},
```

```

8153 <bch|blg|cmr|ebg|pmn> \texttildelow = {200,250},
8154 <pmn> \textasciibreve = {300,400},
8155 <pmn> \textasciicaron = {300,400},
8156 <pmn> \textacutedbl = {200,300},
8157 <pmn> \textgravedbl = {150,300},
8158 <bch|pmn|ugm> \textdagger = { 80, 80},
8159 <blg> \textdagger = {200,200},
8160 <cmr|ebg> \textdagger = {100,100},
8161 <ptm> \textdagger = {150,150},
8162 <blg> \textdaggerdbl = {150,150},
8163 <cmr|ebg|pmn> \textdaggerdbl = { 80, 80},
8164 <ptm> \textdaggerdbl = {100,100},
8165 <bch> \textbardbl = {100,100},
8166 <blg|ugm> \textbardbl = {150,150},
8167 <bch> \textbullet = {200,200},
8168 <blg> \textbullet = {400,500},
8169 <cmr|ebg|pmn> \textbullet = { ,100},
8170 <ptm> \textbullet = {150,150},
8171 <ugm> \textbullet = { 50,100},
8172 <bch|cmr|pmn> \textcelsius = { 50, },
8173 <ebg> \textcelsius = { 80, },
8174 <bch> \textflorin = { 50, 50},
8175 <blg> \textflorin = {100,100},
8176 <ebg|ugm> \textflorin = { ,100},
8177 <pmn> \textflorin = { 50,100},
8178 <ptm> \textflorin = { 50, 70},
8179 <cmr> \textcolonmonetary = { , 50},
8180 <ebg|pmn> \textcolonmonetary = { 50, },
8181 <pmn> \textinterrobang = { ,100},
8182 <pmn> \textinterrobangdown = {100, },
8183 <m-t|ebg|ptm> \texttrademark = {100,100},
8184 <bch> \texttrademark = {150,150},
8185 <blg|cmr|ppl> \texttrademark = {200,200},
8186 <pmn> \texttrademark = { 50, 50},
8187 <ugm> \texttrademark = {100,150},
8188 <bch|ugm> \textcent = { 50, },
8189 <ptm> \textcent = {100,100},
8190 <bch> \textsterling = { 50, },
8191 <ugm> \textsterling = { , 50},
8192 <bch> \textbrokenbar = {200,200},
8193 <blg> \textbrokenbar = {250,250},
8194 <ugm> \textbrokenbar = {200,300},
8195 <pmn> \textasciidieresis = {300,400},
8196 <m-t|bch|cmr|ebg|ptm|ugm> \textcopyright = {100,100},
8197 <pmn> \textcopyright = {100,150},
8198 <ppl> \textcopyright = {200,200},
8199 <bch|cmr|ugm> \textordfeminine = {100,200},
8200 <ebg|pmn> \textordfeminine = {200,200},
8201 <bch|cmr|ebg|pmn|ugm> \textlnot = {200, },
8202 <blg> \textlnot = {200,100},
8203 <m-t|bch|cmr|ebg|ptm|ugm> \textregistered = {100,100},
8204 <pmn> \textregistered = { 50,150},
8205 <ppl> \textregistered = {200,200},
8206 <pmn> \textasciimacron = {150,200},
8207 <m-t|ppl|ptm> \textdegree = {300,300},
8208 <bch> \textdegree = {150,200},
8209 <blg|ugm> \textdegree = {200,200},
8210 <cmr|ebg> \textdegree = {400,400},
8211 <pmn> \textdegree = {150,400},
8212 <bch|cmr|ebg|pmn|ugm> \textpm = {150,200},
8213 <blg> \textpm = {100,100},
8214 <ptm> \textpm = { 50, 80},
8215 <bch|blg|ugm> \texttwosuperior = {100,200},
8216 <cmr> \texttwosuperior = { 50,100},
8217 <ebg|pmn> \texttwosuperior = {200,200},

```

```

8218 <ptm> \texttwosuperior = { 50, 50},
8219 <bch|blg|ugm> \textthreesuperior = {100,200},
8220 <cmr> \textthreesuperior = { 50,100},
8221 <ebg|pmn> \textthreesuperior = {200,200},
8222 <ptm> \textthreesuperior = { 50, 50},
8223 <pmn> \textasciicute = {300,400},
8224 <bch|ugm> \textmu = { ,100},
8225 <bch|ebg|pmn> \textparagraph = { ,100},
8226 <bch|cmr|ebg|pmn> \textperiodcentered = {300,400},
8227 <blg> \textperiodcentered = {400,500},
8228 <ptm> \textperiodcentered = {300,300},
8229 <ugm> \textperiodcentered = {200,500},
8230 <bch|blg|ugm> \textonesuperior = {200,300},
8231 <cmr|ebg|pmn> \textonesuperior = {200,200},
8232 <ptm> \textonesuperior = {100,100},
8233 <bch|ebg|pmn|ugm> \textordmasculine = {200,200},
8234 <blg|cmr> \textordmasculine = {100,200},
8235 <bch|cmr|pmn> \texteuro = {100, },
8236 <ebg> \texteuro = { 50,100},
8237 <bch> \texttimes = {200,200},
8238 <blg|ptm> \texttimes = {100,100},
8239 <cmr> \texttimes = {150,250},
8240 <ebg> \texttimes = {100,150},
8241 <pmn> \texttimes = { 70,100},
8242 <ugm> \texttimes = {200,300},
8243 <bch|ebg|pmn> \textdiv = {150,200}
8244 <blg> \textdiv = {100,100}
8245 <cmr> \textdiv = {150,250}
8246 <ptm> \textdiv = { 50,100},
8247 <ugm> \textdiv = {200,300},
8248 <ptm> \textperthousand = { ,50}
8249 <ugm> \textsection = { ,100},
8250 <ugm> \textonehalf = { 50,100},
8251 <ugm> \textonequarter = { 50,100},
8252 <ugm> \textthreequarters = { 50,100},
8253 <ugm> \textsurd = { ,100}

```

Remaining slots in the source file.

```

8254 }
8255
8256 <*cmr|ebg|pmn|ugm>
8257 \SetProtrusion
8258 <cmr> [ name = cmr-textcomp-it ]
8259 <ebg> [ name = EBGaramond-textcomp-it ]
8260 <pmn> [ name = pmn-textcomp-it ]
8261 <ugm> [ name = ugm-textcomp-it ]
8262 { encoding = TS1,
8263 <cmr> family = cmr,
8264 <ebg> family = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OfF,EBGaramond-TOfF},
8265 <pmn> family = {pmnx,pmnj},
8266 <ugm> family = ugm,
8267 <cmr|pmn> shape = {it,sl} }
8268 <ebg|ugm> shape = it }
8269 {
8270 <cmr> \textquotestraightbase = {300,600},
8271 <ebg|pmn> \textquotestraightbase = {400,400},
8272 <cmr> \textquotestraightdblbase = {300,600},
8273 <ebg> \textquotestraightdblbase = {300,400},
8274 <pmn> \textquotestraightdblbase = {300,300},
8275 \texttwelveudash = {200,200},
8276 <cmr|ebg|pmn> \textthreequartersemdash = {150,150},
8277 <ugm> \textthreequartersemdash = {200,200},
8278 <cmr> \textquotesingle = {600,300},
8279 <ebg> \textquotesingle = {800,100},
8280 <pmn> \textquotesingle = {300,200},

```

```

8281 <ugm> \textquotesingle = {500,500},
8282 <cmr> \textasteriskcentered = {300,200},
8283 <ebg> \textasteriskcentered = {500,100},
8284 <pmn> \textasteriskcentered = {200,300},
8285 <ugm> \textasteriskcentered = {300,150},
8286 <pmn> \textfractionsolidus = {-200,-200},
8287 <cmr> \textoneoldstyle = {100, 50},
8288 <ebg> \textoneoldstyle = {100, },
8289 <pmn> \textoneoldstyle = { 50, },
8290 <ebg> \texttwooldstyle = { 50, },
8291 <pmn> \texttwooldstyle = {-50, },
8292 <cmr> \textthreeoldstyle = {100, 50},
8293 <pmn> \textthreeoldstyle = {-100, },
8294 <cmr> \textfouroldstyle = { 50, 50},
8295 <ebg> \textfouroldstyle = { 50,100},
8296 <cmr> \textsevenoldstyle = { 50, 80},
8297 <ebg> \textsevenoldstyle = { 50, },
8298 <pmn> \textsevenoldstyle = { 20, },
8299 <cmr> \textlangle = {400, },
8300 <cmr> \textrangle = { ,400},
8301 <cmr|ebg> \textminus = {300,300},
8302 <pmn> \textminus = {200,200},
8303 <ugm> \textminus = {250,300},
8304 <ebg|pmn> \textlbrackdbl = {100, },
8305 <ebg|pmn> \textrbrackdbl = { ,100},
8306 <pmn> \textasciigrave = {300,300},
8307 <cmr|ebg|pmn> \texttildebelow = {200,250},
8308 <pmn> \textasciibreve = {300,300},
8309 <pmn> \textasciicaron = {300,300},
8310 <pmn> \textacutedbl = {200,300},
8311 <pmn> \textgravedbl = {150,300},
8312 <cmr> \textdagger = {100,100},
8313 <ebg> \textdagger = {200,100},
8314 <pmn> \textdagger = { 80, 50},
8315 <ugm> \textdagger = { 80, 80},
8316 <cmr|ebg> \textdaggerdbl = { 80, 80},
8317 <pmn> \textdaggerdbl = { 80, 50},
8318 <ugm> \textbardbl = {150,150},
8319 <cmr> \textbullet = {200,100},
8320 <ebg> \textbullet = {300, },
8321 <pmn> \textbullet = { 30, 70},
8322 <ugm> \textbullet = { 50,100},
8323 <cmr> \textcelsius = {100, },
8324 <ebg> \textcelsius = {200, },
8325 <pmn> \textcelsius = { 50,-50},
8326 <ebg> \textflorin = {100, },
8327 <pmn> \textflorin = { 50,100},
8328 <ugm> \textflorin = { ,100},
8329 <cmr> \textcolonmonetary = {150, },
8330 <ebg> \textcolonmonetary = {100, },
8331 <pmn> \textcolonmonetary = { 50,-50},
8332 <cmr|ebg> \texttrademark = {200, },
8333 <pmn> \texttrademark = { 50,100},
8334 <ugm> \texttrademark = {150, 50},
8335 <ugm> \textcent = { 50, },
8336 <ugm> \textsterling = { , 50},
8337 <ugm> \textbrokenbar = {200,300},
8338 <pmn> \textasciidieresis = {300,200},
8339 <cmr> \textcopyright = {100, },
8340 <ebg> \textcopyright = {200,100},
8341 <pmn> \textcopyright = {100,150},
8342 <ugm> \textcopyright = {300, },
8343 <cmr> \textordfeminine = {100,100},
8344 <pmn> \textordfeminine = {200,200},
8345 <ugm> \textordfeminine = {100,200},

```



```

8346 <cmr|ebg> \textlnot = {300, },
8347 <pmn|ugm> \textlnot = {200, },
8348 <cmr> \textregistered = {100, },
8349 <ebg> \textregistered = {200,100},
8350 <pmn> \textregistered = { 50,150},
8351 <ugm> \textregistered = {300, },
8352 <pmn> \textasciimacron = {150,200},
8353 <cmr|ebg> \textdegree = {500,100},
8354 <pmn> \textdegree = {150,150},
8355 <ugm> \textdegree = {300,200},
8356 <cmr> \textpm = {150,100},
8357 <ebg> \textpm = {200,150},
8358 <pmn|ugm> \textpm = {150,200},
8359 <cmr> \textonesuperior = {400, },
8360 <ebg> \textonesuperior = {300,100},
8361 <pmn> \textonesuperior = {200,100},
8362 <ugm> \textonesuperior = {300,300},
8363 <cmr> \texttwosuperior = {400, },
8364 <ebg> \texttwosuperior = {300, },
8365 <pmn> \texttwosuperior = {200,100},
8366 <ugm> \texttwosuperior = {300,200},
8367 <cmr> \textthreesuperior = {400, },
8368 <ebg> \textthreesuperior = {300, },
8369 <pmn> \textthreesuperior = {200,100},
8370 <ugm> \textthreesuperior = {300,200},
8371 <ugm> \textmu = { ,100},
8372 <pmn> \textasciicute = {300,200},
8373 <cmr> \textparagraph = {200, },
8374 <pmn> \textparagraph = { ,100},
8375 <cmr> \textperiodcentered = {500,500},
8376 <ebg|pmn|ugm> \textperiodcentered = {300,400},
8377 <cmr> \textordmasculine = {100,100},
8378 <pmn> \textordmasculine = {200,200},
8379 <ugm> \textordmasculine = {300,200},
8380 <cmr> \texteuro = {200, },
8381 <ebg> \texteuro = {100, },
8382 <pmn> \texteuro = {100,-50},
8383 <cmr> \texttimes = {200,200},
8384 <ebg> \texttimes = {200,100},
8385 <pmn> \texttimes = { 70,100},
8386 <ugm> \texttimes = {200,300},
8387 <cmr|ebg> \textdiv = {200,200},
8388 <pmn> \textdiv = {150,200},
8389 <ugm> \textdiv = {200,300},
8390 <ugm> \textsection = { ,200},
8391 <ugm> \textonehalf = { 50,100},
8392 <ugm> \textonequarter = { 50,100},
8393 <ugm> \textthreequarters = { 50,100},
8394 <ugm> \textsurd = { ,100}
8395 }
8396
8397 </cmr|ebg|pmn|ugm>

```

## 2.8.6 Computer Modern math

Now to the math symbols for Computer Modern Roman. Definitions have been extracted from `fontmath.ltx`. I did not spend too much time fiddling with these settings, so they can surely be improved.

The math font ‘operators’ (also used for the `\mathrm` and `\mathbf` alphabets) is OT1/cmr, which we’ve already set up above. It’s declared as:

```

\DeclareSymbolFont{operators} {OT1}{cmr}{m}{n}
\SetSymbolFont{operators}{bold}{OT1}{cmr}{bx}{n}

```

$\backslash\mathrm{it}$  (OT1/cmr/m/it) is also already set up.

There are (for the moment) no settings for  $\backslash\mathrm{mathsf}$  and  $\backslash\mathrm{mathtt}$ .

Math font ‘letters’ (also used as  $\backslash\mathrm{mathnormal}$ ) is declared as:

```
\DeclareSymbolFont{letters}    {OML}{cmm}{m}{it}
\SetSymbolFont{letters}    {bold}{OML}{cmm}{b}{it}
```

```
8398 <*cmr>
8399 \SetProtrusion
8400 [ name      = cmr-math-letters ]
8401 { encoding = OML,
8402   family   = cmm,
8403   series    = {m,b},
8404   shape     = it   }
8405 {
8406   A = {100, 50}, % \mathnormal
8407   B = { 50,   },
8408   C = { 50,   },
8409   D = { 50, 50},
8410   E = { 50,   },
8411   F = {100, 50},
8412   G = { 50, 50},
8413   H = { 50, 50},
8414   I = { 50, 50},
8415   J = {150, 50},
8416   K = { 50,100},
8417   L = { 50, 50},
8418   M = { 50,   },
8419   N = { 50,   },
8420   O = { 50,   },
8421   P = { 50,   },
8422   Q = { 50, 50},
8423   R = { 50,   },
8424   S = { 50,   },
8425   T = { 50,100},
8426   U = { 50, 50},
8427   V = {100,100},
8428   W = { 50,100},
8429   X = { 50,100},
8430   Y = {100,100},
8431   f = {100,100},
8432   h = {   ,100},
8433   i = {   , 50},
8434   j = {   , 50},
8435   k = {   , 50},
8436   r = {   , 50},
8437   v = {   , 50},
8438   w = {   , 50},
8439   x = {   , 50},
8440   "0B = { 50,100}, % \alpha
8441   "0C = { 50, 50}, % \beta
8442   "0D = {200,150}, % \gamma
8443   "0E = { 50, 50}, % \delta
8444   "0F = { 50, 50}, % \epsilon
8445   "10 = { 50,150}, % \zeta
8446   "12 = { 50,   }, % \theta
8447   "13 = {   ,100}, % \iota
8448   "14 = {   ,100}, % \kappa
8449   "15 = {100, 50}, % \lambda
8450   "16 = {   , 50}, % \mu
8451   "17 = {   , 50}, % \nu
8452   "18 = {   , 50}, % \xi
8453   "19 = { 50,100}, % \pi
8454   "1A = { 50, 50}, % \rho
8455   "1B = {   ,150}, % \sigma
```

```

8456 "1C = { 50,150}, % \tau
8457 "1D = { 50, 50}, % \upsilon
8458 "1F = { 50,100}, % \chi
8459 "20 = { 50, 50}, % \psi
8460 "21 = { , 50}, % \omega
8461 "22 = { , 50}, % \varepsilon
8462 "23 = { , 50}, % \vartheta
8463 "24 = { , 50}, % \varpi
8464 "25 = {100, }, % \varrho
8465 "26 = {100,100}, % \varsigma
8466 "27 = { 50, 50}, % \varphi
8467 "28 = {100,100}, % \leftharpoonup
8468 "29 = {100,100}, % \leftharpoondown
8469 "2A = {100,100}, % \rightharpoonup
8470 "2B = {100,100}, % \rightharpoondown
8471 "2C = {300,200}, % \lhook
8472 "2D = {200,300}, % \rhook
8473 "2E = { ,100}, % \triangleright
8474 "2F = {100, }, % \triangleleft
8475 "3A = { ,500}, % ., \ldotp
8476 "3B = { ,500}, % ,
8477 "3C = {200,100}, % <
8478 "3D = {300,400}, % /
8479 "3E = {100,200}, % >
8480 "3F = {200,200}, % \star
8481 "5B = { ,100}, % \flat
8482 "5E = {200,200}, % \smile
8483 "5F = {200,200}, % \frown
8484 "7C = {100, }, % \jmath
8485 "7D = { ,100} % \wp

```

Remaining slots in the source file.

```

8486 }
8487

```

Math font ‘symbols’ (also used for the `\mathcal` alphabet) is declared as:

```

\DeclareSymbolFont{symbols} {OMS}{cmsy}{m}{n}
\SetSymbolFont{symbols} {bold}{OMS}{cmsy}{b}{n}

```

```

8488 \SetProtrusion
8489 [ name = cmr-math-symbols ]
8490 { encoding = OMS,
8491   family = cmsy,
8492   series = {m,b},
8493   shape = n }
8494 {
8495   A = {150, 50}, % \mathcal
8496   C = { ,100},
8497   D = { , 50},
8498   F = { 50,150},
8499   I = { ,100},
8500   J = {100,150},
8501   K = { ,100},
8502   L = {100, },
8503   M = { 50, 50},
8504   N = { 50,100},
8505   P = { , 50},
8506   Q = { 50, },
8507   R = { , 50},
8508   T = { 50,150},
8509   V = { 50, 50},
8510   W = { , 50},
8511   X = {100,100},
8512   Y = {100, },
8513   Z = {100,150},

```

```

8514 "00 = {300,300}, % -
8515 "01 = { ,700}, % \cdot, \cdotp
8516 "02 = {150,250}, % \times
8517 "03 = {150,250}, % *, \ast
8518 "04 = {200,300}, % \div
8519 "05 = {150,250}, % \diamond
8520 "06 = {200,200}, % \pm
8521 "07 = {200,200}, % \mp
8522 "08 = {100,100}, % \oplus
8523 "09 = {100,100}, % \ominus
8524 "0A = {100,100}, % \otimes
8525 "0B = {100,100}, % \oslash
8526 "0C = {100,100}, % \odot
8527 "0D = {100,100}, % \bigcirc
8528 "0E = {100,100}, % \circ
8529 "0F = {100,100}, % \bullet
8530 "10 = {100,100}, % \asymp
8531 "11 = {100,100}, % \equiv
8532 "12 = {200,100}, % \subseteq
8533 "13 = {100,200}, % \supseteq
8534 "14 = {200,100}, % \leq
8535 "15 = {100,200}, % \geq
8536 "16 = {200,100}, % \preceq
8537 "17 = {100,200}, % \succeq
8538 "18 = {200,200}, % \sim
8539 "19 = {150,150}, % \approx
8540 "1A = {200,100}, % \subset
8541 "1B = {100,200}, % \supset
8542 "1C = {200,100}, % \ll
8543 "1D = {100,200}, % \gg
8544 "1E = {300,100}, % \prec
8545 "1F = {100,300}, % \succ
8546 "20 = {100,200}, % \leftarrow
8547 "21 = {200,100}, % \rightarrow
8548 "22 = {100,100}, % \uparrow
8549 "23 = {100,100}, % \downarrow
8550 "24 = {100,100}, % \leftrightarrows
8551 "25 = {100,100}, % \nearrow
8552 "26 = {100,100}, % \searrow
8553 "27 = {100,100}, % \simeq
8554 "28 = {100,100}, % \Leftarrow
8555 "29 = {100,100}, % \Rightarrow
8556 "2A = {100,100}, % \Uparrow
8557 "2B = {100,100}, % \Downarrow
8558 "2C = {100,100}, % \Leftrightarrow
8559 "2D = {100,100}, % \nrightarrow
8560 "2E = {100,100}, % \swarrow
8561 "2F = { ,100}, % \propto
8562 "30 = { ,400}, % \prime
8563 "31 = {100,100}, % \infty
8564 "32 = {150,100}, % \in
8565 "33 = {100,150}, % \ni
8566 "34 = {100,100}, % \triangle, \bigtriangleup
8567 "35 = {100,100}, % \bigtriangledown
8568 "38 = { ,100}, % \forall
8569 "39 = {100, }, % \exists
8570 "3A = {200, }, % \neg
8571 "3E = {200,200}, % \top
8572 "3F = {200,200}, % \bot, \perp
8573 "5E = {100,200}, % \wedge
8574 "5F = {100,200}, % \vee
8575 "60 = { ,300}, % \vdash
8576 "61 = {300, }, % \dashv
8577 "62 = {100,100}, % \lfloor
8578 "63 = {100,100}, % \rfloor

```

```

8579 "64 = {100,100}, % \lceil
8580 "65 = {100,100}, % \rceil
8581 "66 = {150, }, % \lbrace
8582 "67 = { ,150}, % \rbrace
8583 "68 = {400, }, % \langle
8584 "69 = { ,400}, % \rangle
8585 "6C = {100,100}, % \updownarrow
8586 "6D = {100,100}, % \Updownarrow
8587 "6E = {100,300}, % \, \backslash, \setminus
8588 "72 = {100,100}, % \nabla
8589 "79 = {200,200}, % \dagger
8590 "7A = {100,100}, % \ddagger
8591 "7B = {100, }, % \mathparagraph
8592 "7C = {100,100}, % \clubsuit
8593 "7D = {100,100}, % \diamondsuit
8594 "7E = {100,100}, % \heartsuit
8595 "7F = {100,100} % \spadesuit

```

Remaining slots in the source file.

```

8596 }
8597

```

We don't bother about 'largesymbols', since it will only be used in display math, where protrusion doesn't work anyway. It's declared as:

```
\DeclareSymbolFont{largesymbols}{OMX}{cmex}{m}{n}
```

```

8598 </cmr>
8599 </cfg-t>

```

## 2.8.7 AMS symbols

Settings for the AMS math fonts (amssymb).

```
8600 <*cfg-u>
```

Symbol font 'a'.

```

8601 <*msa>
8602 \SetProtrusion
8603 [ name = AMS-a ]
8604 { encoding = U,
8605   family = msa }
8606 {
8607   "05 = {150,250}, % \centerdot
8608   "06 = {100,100}, % \lozenge
8609   "07 = { 50, 50}, % \blacklozenge
8610   "08 = { 50, 50}, % \circlearrowright
8611   "09 = { 50, 50}, % \circlearrowleft
8612   "0A = {100,100}, % \rightleftharpoons
8613   "0B = {100,100}, % \leftrightharpoons
8614   "0D = {-50,200}, % \Vdash
8615   "0E = {-50,200}, % \Vvdash
8616   "0F = {-70,150}, % \vDash
8617   "10 = {100,150}, % \twoheadrightarrow
8618   "11 = {100,150}, % \twoheadleftarrow
8619   "12 = { 50,100}, % \leftleftarrows
8620   "13 = { 50, 80}, % \rightrightarrows
8621   "14 = {120,120}, % \upuparrows
8622   "15 = {120,120}, % \downdownarrows
8623   "16 = {200,200}, % \upharpoonright
8624   "17 = {200,200}, % \downharpoonright
8625   "18 = {200,200}, % \upharpoonleft
8626   "19 = {200,200}, % \downharpoonleft
8627   "1A = { 80,100}, % \rightarrowtail
8628   "1B = { 80,100}, % \leftarrowtail

```

```

8629 "1C = { 50, 50}, % \leftrightarrows
8630 "1D = { 50, 50}, % \rightleftarrows
8631 "1E = {250, }, % \Lsh
8632 "1F = { ,250}, % \Rsh
8633 "20 = {100,100}, % \rightsquigarrow
8634 "21 = {100,100}, % \leftrightsquigarrow
8635 "22 = {100, 50}, % \looparrowleft
8636 "23 = { 50,100}, % \looparrowright
8637 "24 = { 50, 80}, % \circeq
8638 "25 = { ,100}, % \succsim
8639 "26 = { ,100}, % \gtrsim
8640 "27 = { ,100}, % \gtrapprox
8641 "28 = {150, 50}, % \multimap
8642 "2B = {100,150}, % \doteqdot
8643 "2C = {100,150}, % \triangleq
8644 "2D = {100, 50}, % \precsim
8645 "2E = {100, 50}, % \lessim
8646 "2F = { 50, 50}, % \lessapprox
8647 "30 = {100, 50}, % \eqslantless
8648 "31 = { 50, 50}, % \eqslantgtr
8649 "32 = {100, 50}, % \curlyeqprec
8650 "33 = { 50,100}, % \curlyeqsucc
8651 "34 = {100, 50}, % \preccurlyeq
8652 "36 = { 50, }, % \leqslant
8653 "38 = { , 50}, % \backprime
8654 "39 = {250,250}, % \dabar@ : the dash bar in \dash(left,right)arrow
8655 "3C = { 50,100}, % \succcurlyeq
8656 "3E = { , 50}, % \geqslant
8657 "40 = { , 50}, % \sqsubset
8658 "41 = { 50, }, % \sqsupset
8659 "42 = { ,150}, % \vartriangleright, \rhd
8660 "43 = {150, }, % \vartriangleleft, \lhd
8661 "44 = { ,100}, % \trianglerighteq, \unrhd
8662 "45 = {100, }, % \trianglelefteq, \unlhd
8663 "46 = {100,100}, % \bigstar
8664 "48 = { 50, 50}, % \blacktriangledown
8665 "49 = { ,100}, % \blacktriangleright
8666 "4A = {100, }, % \blacktriangleleft
8667 "4B = { ,150}, % \dashrightarrow (the arrow)
8668 "4C = {150, }, % \dashleftarrow
8669 "4D = { 50, 50}, % \vartriangle
8670 "4E = { 50, 50}, % \blacktriangle
8671 "4F = { 50, 50}, % \triangledown
8672 "50 = { 50, 50}, % \eqcirc
8673 "56 = { ,150}, % \rightarrow
8674 "57 = {150, }, % \leftarrow
8675 "58 = {100,300}, % \checkmark
8676 "5C = { 50, 50}, % \angle
8677 "5D = { 50, 50}, % \measuredangle
8678 "5E = { 50, 50}, % \sphericalangle
8679 "5F = { , 50}, % \varpropto
8680 "60 = {100,100}, % \smallsmile
8681 "61 = {100,100}, % \smallfrown
8682 "62 = { 50, }, % \Subset
8683 "63 = { , 50}, % \Supset
8684 "66 = {150,150}, % \curlywedge
8685 "67 = {150,150}, % \curlyvee
8686 "68 = { 50,150}, % \leftthreetimes
8687 "69 = {100, 50}, % \rightthreetimes
8688 "6C = { 50, 50}, % \bumpeq
8689 "6D = { 50, 50}, % \Bumpeq
8690 "6E = {100, }, % \lll
8691 "6F = { ,100}, % \ggg
8692 "70 = { 50,100}, % \ulcorner
8693 "71 = {100, 50}, % \urcorner

```

```

8694      "75 = {150,200}, % \dotplus
8695      "76 = { 50,100}, % \backsim
8696      "78 = { 50,100}, % \llcorner
8697      "79 = {100, 50}, % \lrcorner
8698      "7C = {100,100}, % \intercal
8699      "7D = { 50, 50}, % \circledcirc
8700      "7E = { 50, 50}, % \circledast
8701      "7F = { 50, 50} % \circleddash

```

Remaining slots in the source file.

```

8702      }
8703
8704 \<msa>

```

Symbol font ‘b’.

```

8705 \<msb>
8706 \SetProtrusion
8707 [ name      = AMS-b ]
8708 { encoding = U,
8709   family   = msb }
8710 {
8711     A = { 50, 50}, % \mathbb
8712     C = { 50, 50},
8713     G = {   , 50},
8714     L = {   , 50},
8715     P = {   , 50},
8716     R = {   , 50},
8717     T = {   , 50},
8718     V = { 50, 50},
8719     X = { 50, 50},
8720     Y = { 50, 50},
8721     "00 = { 50, 50}, % \lvertneqq
8722     "01 = { 50, 50}, % \gvertneqq
8723     "02 = { 50, 50}, % \lneq
8724     "03 = { 50, 50}, % \ngeq
8725     "04 = {100, 50}, % \lless
8726     "05 = { 50,150}, % \ngtr
8727     "06 = {100, 50}, % \nprec
8728     "07 = { 50,150}, % \nsucc
8729     "08 = { 50, 50}, % \lneqq
8730     "09 = { 50, 50}, % \gneqq
8731     "0A = {100,100}, % \lneqslant
8732     "0B = {100,100}, % \ngeqslant
8733     "0C = {100, 50}, % \lneq
8734     "0D = { 50,100}, % \gneq
8735     "0E = {100, 50}, % \npreceq
8736     "0F = { 50,100}, % \nsucceq
8737     "10 = { 50,   }, % \precnsim
8738     "11 = { 50, 50}, % \succnsim
8739     "12 = { 50, 50}, % \lnsim
8740     "13 = { 50, 50}, % \gnsim
8741     "14 = { 50, 50}, % \lneqq
8742     "15 = { 50, 50}, % \ngeqq
8743     "16 = { 50, 50}, % \precneqq
8744     "17 = { 50, 50}, % \succneqq
8745     "18 = { 50, 50}, % \precnapprox
8746     "19 = { 50, 50}, % \succnapprox
8747     "1A = { 50, 50}, % \lnapprox
8748     "1B = { 50, 50}, % \gnapprox
8749     "1C = {150,200}, % \nsim
8750     "1D = { 50, 50}, % \ncong
8751     "1E = {100,150}, % \diagup
8752     "1F = {100,150}, % \diagdown
8753     "20 = {100, 50}, % \varsubsetneq
8754     "21 = { 50,100}, % \varsupsetneq

```

```

8755 "22 = {100, 50}, % \nsubseteqq
8756 "23 = { 50,100}, % \nsupseteqq
8757 "24 = {100, 50}, % \subsetneqq
8758 "25 = { 50,100}, % \supsetneqq
8759 "26 = {100, 50}, % \varsubsetneqq
8760 "27 = { 50,100}, % \varsupsetneqq
8761 "28 = {100, 50}, % \subseteq
8762 "29 = { 50,100}, % \supseteq
8763 "2A = {100, 50}, % \subset
8764 "2B = { 50,100}, % \supset
8765 "2C = { 50,100}, % \parallel
8766 "2D = {100,150}, % \mid
8767 "2E = {150,150}, % \shortmid
8768 "2F = {100,100}, % \shortparallel
8769 "30 = { ,150}, % \nvdash
8770 "31 = { ,150}, % \Vdash
8771 "32 = { ,100}, % \nvDash
8772 "33 = { ,100}, % \nVDash
8773 "34 = { ,100}, % \ntrianglerighteq
8774 "35 = {100, }, % \trianglelefteq
8775 "36 = {100, }, % \triangleleft
8776 "37 = { ,100}, % \triangleright
8777 "38 = {100,200}, % \leftarrow
8778 "39 = {100,200}, % \rightarrow
8779 "3A = {100,100}, % \Leftarrow
8780 "3B = { 50,100}, % \Rightarrow
8781 "3C = {100,100}, % \Leftrightarrow
8782 "3D = {100,200}, % \leftrightarrows
8783 "3E = { 50, 50}, % \divideontimes
8784 "3F = { 50, 50}, % \varnothing
8785 "60 = {200, }, % \Finv
8786 "61 = { , 50}, % \Game
8787 "68 = {100,100}, % \eqsim
8788 "69 = { 50, }, % \beth
8789 "6A = { 50, }, % \gimel
8790 "6B = {150, }, % \daleth
8791 "6C = {200, }, % \lessdot
8792 "6D = { ,200}, % \gtrdot
8793 "6E = {100,200}, % \ltimes
8794 "6F = {150,100}, % \rtimes
8795 "70 = { 50,100}, % \shortmid
8796 "71 = { 50, 50}, % \shortparallel
8797 "72 = {200,300}, % \smallsetminus
8798 "73 = {100,200}, % \thicksim
8799 "74 = { 50,100}, % \thickapprox
8800 "75 = { 50, 50}, % \approx
8801 "76 = { 50,100}, % \succapprox
8802 "77 = { 50, 50}, % \precapprox
8803 "78 = {100,100}, % \curvearrowleft
8804 "79 = { 50,150}, % \curvearrowright
8805 "7A = { 50,200}, % \digamma
8806 "7B = {100, 50}, % \varkappa
8807 "7F = {200, } % \backepsilon

```

Remaining slots in the source file.

```

8808 }
8809
8810 </msb>

```

### 2.8.8 Euler

Euler Roman font (package `euler`).

```

8811 <*eur>
8812 \SetProtrusion

```



```

8813 [ name      = euler ]
8814 { encoding = U,
8815   family   = eur  }
8816 {
8817   "01 = {100,100},
8818   "03 = {100,150},
8819   "06 = {   ,100},
8820   "07 = {100,150},
8821   "08 = {100,100},
8822   "0A = {100,100},
8823   "0B = {   , 50},
8824   "0C = {   ,100},
8825   "0D = {100,100},
8826   "0E = {   ,100},
8827   "0F = {100,100},
8828   "10 = {100,100},
8829   "13 = {   ,100},
8830   "14 = {   ,100},
8831   "15 = {   , 50},
8832   "16 = {   , 50},
8833   "17 = { 50,100},
8834   "18 = { 50,100},
8835   "1A = {   , 50},
8836   "1B = {   , 50},
8837   "1C = { 50,100},
8838   "1D = { 50,100},
8839   "1E = { 50,100},
8840   "1F = { 50,100},
8841   "20 = {   , 50},
8842   "21 = {   , 50},
8843   "22 = { 50,100},
8844   "24 = {   , 50},
8845   "27 = { 50,100},
8846   1   = {100,100},
8847   7   = { 50,100},
8848   "3A = {300,500},
8849   "3B = {200,400},
8850   "3C = {200,100},
8851   "3D = {200,200},
8852   "3E = {100,200},
8853   A   = {   ,100},
8854   D   = {   , 50},
8855   J   = { 50,   },
8856   K   = {   , 50},
8857   L   = {   , 50},
8858   Q   = {   , 50},
8859   T   = { 50,   },
8860   X   = { 50, 50},
8861   Y   = { 50,   },
8862   h   = {   , 50},
8863   k   = {   , 50}
8864 }
8865

```

Extended by the eulervm package.

```

8866 \SetProtrusion
8867 [ name      = euler-vm,
8868   load      = euler ]
8869 { encoding = U,
8870   family   = zeur  }
8871 {
8872   "28 = {100,200},
8873   "29 = {100,200},
8874   "2A = {100,150},
8875   "2B = {100,150},

```

```

8876     "2C = {200,300},
8877     "2D = {200,300},
8878     "2E = {    ,100},
8879     "2F = {100,   },
8880     "3F = {150,150},
8881     "5B = {    ,100},
8882     "5E = {100,100},
8883     "5F = {100,100},
8884     "80 = {    , 50},
8885     "81 = {200,250},
8886     "82 = {100,200}
8887 }
8888
8889 /eur

```

Euler Script font (euca1).

```

8890 (*eus)
8891 \SetProtrusion
8892 [ name      = euscript ]
8893 { encoding = U,
8894   family   = eus   }
8895 {
8896     A = {100,100},
8897     B = { 50,100},
8898     C = { 50, 50},
8899     D = { 50,100},
8900     E = { 50,100},
8901     F = { 50,   },
8902     G = { 50,   },
8903     H = {    ,100},
8904     K = {    , 50},
8905     L = {    ,150},
8906     M = {    , 50},
8907     N = {    , 50},
8908     O = { 50, 50},
8909     P = { 50, 50},
8910     T = {    ,100},
8911     U = {    , 50},
8912     V = { 50, 50},
8913     W = { 50, 50},
8914     X = { 50, 50},
8915     Y = { 50,   },
8916     Z = { 50,100},
8917     "00 = {250,250},
8918     "18 = {200,200},
8919     "3A = {200,150},
8920     "40 = {    ,100},
8921     "5E = {100,100},
8922     "5F = {100,100},
8923     "66 = { 50,   },
8924     "67 = {    , 50},
8925     "6E = {200,200}
8926 }
8927
8928 \SetProtrusion
8929 [ name      = euscript-vm,
8930   load      = euscript ]
8931 { encoding = U,
8932   family   = zeus   }
8933 {
8934     "01 = {600,600},
8935     "02 = {200,200},
8936     "03 = {200,200},
8937     "04 = {200,200},
8938     "05 = {150,150},

```

```
8939 "06 = {200,200},
8940 "07 = {200,200},
8941 "08 = {100,100},
8942 "09 = {100,100},
8943 "0A = {100,100},
8944 "0B = {100,100},
8945 "0C = {100,100},
8946 "0D = {100,100},
8947 "0E = {150,150},
8948 "0F = {100,100},
8949 "10 = {150,150},
8950 "11 = {100,100},
8951 "12 = {150,100},
8952 "13 = {100,150},
8953 "14 = {150,100},
8954 "15 = {100,150},
8955 "16 = {200,100},
8956 "17 = {100,200},
8957 "19 = {150,150},
8958 "1A = {150,100},
8959 "1B = {100,150},
8960 "1C = {100,100},
8961 "1D = {100,100},
8962 "1E = {250,100},
8963 "1F = {100,250},
8964 "20 = {150,200},
8965 "21 = {150,200},
8966 "22 = {150,150},
8967 "23 = {150,150},
8968 "24 = {100,200},
8969 "25 = {150,150},
8970 "26 = {150,150},
8971 "27 = {100,100},
8972 "28 = {100,100},
8973 "29 = {100,150},
8974 "2A = {100,100},
8975 "2B = {100,100},
8976 "2C = {100,100},
8977 "2D = {150,150},
8978 "2E = {150,150},
8979 "2F = {100,100},
8980 "30 = {100,100},
8981 "31 = {100,100},
8982 "32 = {100,100},
8983 "33 = {100,100},
8984 "34 = {100,100},
8985 "35 = {100,100},
8986 "3E = {150,150},
8987 "3F = {150,150},
8988 "60 = { ,200},
8989 "61 = {200, },
8990 "62 = {100,100},
8991 "63 = {100,100},
8992 "64 = {100,100},
8993 "65 = {100,100},
8994 "68 = {300, },
8995 "69 = { ,300},
8996 "6C = {100,100},
8997 "6D = {100,100},
8998 "6F = {100,100},
8999 "72 = {100,100},
9000 "73 = {200,100},
9001 "76 = { ,100},
9002 "77 = {100, },
9003 "78 = { 50, 50},
```

```

9004      "79 = {100,100},
9005      "7A = {100,100},
9006      "7D = {150,150},
9007      "7E = {100,100},
9008      "A8 = {100,100},
9009      "A9 = {100,100},
9010      "AB = {200,200},
9011      "BA = {    ,200},
9012      "BB = {    ,200},
9013      "BD = {200,200},
9014      "DE = {200,200}
9015    }
9016
9017 </eus>

```

Euler Fraktur font (eufrak).

```

9018 <(*euf)
9019 \SetProtrusion
9020   [ name      = mathfrak ]
9021   { encoding = U,
9022     family   = euf   }
9023   {
9024     A = {    , 50},
9025     B = {    , 50},
9026     C = { 50, 50},
9027     D = {    , 80},
9028     E = { 50,   },
9029     G = {    , 50},
9030     L = {    , 80},
9031     O = {    , 50},
9032     T = {    , 80},
9033     X = { 80, 50},
9034     Z = { 80, 50},
9035     b = {    , 50},
9036     c = {    , 50},
9037     k = {    , 50},
9038     p = {    , 50},
9039     q = { 50,   },
9040     v = {    , 50},
9041     w = {    , 50},
9042     x = {    , 50},
9043     1 = {100,100},
9044     2 = { 80, 80},
9045     3 = { 80, 50},
9046     4 = { 80, 50},
9047     7 = { 50, 50},
9048     "12 = {500,500},
9049     "13 = {500,500},
9050     ! = {    ,200},
9051     ' = {200,300},
9052     ( = {200,   },
9053     ) = {    ,200},
9054     * = {200,200},
9055     + = {200,250},
9056     - = {200,200},
9057     {,} = {300,300},
9058     . = {400,400},
9059     {=} = {200,200},
9060     : = {    ,200},
9061     ; = {    ,200},
9062     ] = {    ,200}
9063   }
9064
9065 </euf>
9066 </cfg-u>

```

### 2.8.9 Euro symbols

Settings for various Euro symbols (Adobe Euro fonts (packages eurosans, europs), ITC Euro fonts (package euroitc) and marvosym<sup>13</sup>). The euroitc settings are hidden in the package itself (1.3.7) for ‘free software’ compliance reasons. (Not quite sure whether this is what Karl really had in mind ...)

```

9067 <*cfg-e>
9068 \SetProtrusion
9069 <zpeu> { encoding = U,
9070 <mvs> { encoding = {OT1,U},
9071 <zpeu> family = zpeu }
9072 <mvs> family = mvs }
9073 {
9074 <zpeu> E = {50, }
9075 <mvs> 164 = {50,50}, % \EUR
9076 <mvs> 068 = {50,-100} % \EURdig
9077 }
9078
9079 <*zpeu>
9080 \SetProtrusion
9081 { encoding = U,
9082 family = zpeu,
9083 shape = it* }
9084 {
9085 E = {100,-50}
9086 }
9087
9088 \SetProtrusion
9089 { encoding = U,
9090 family = {zpeus,eurosans} }
9091 {
9092 E = {100,50}
9093 }
9094
9095 \SetProtrusion
9096 { encoding = U,
9097 family = {zpeus,eurosans},
9098 shape = it* }
9099 {
9100 E = {200, }
9101 }
9102
9103 </zpeu>
9104 </cfg-e>

```

## 2.9 Interword spacing

Default unit is space.

```

9105 <*m-t|cmr>
9106 %%% -----
9107 %%% INTERWORD SPACING
9108
9109 </m-t|cmr>
9110 <*m-t>
9111 \SetExtraSpacing
9112 [ name = default ]
9113 { encoding = {OT1,T1,LY1,OT4,QX,T5} }
9114 {

```

These settings are only a first approximation. The following reasoning is from a

---

13 Of course, there are many more symbols in this font. Feel free to contribute protrusion settings!

Figure 1:

Example of interword spacing (from: M. Siemoneit, *Typographisches Gestalten*, Frankfurt/M. 1989). The numbers indicate the preference for shrinking the interword space.

2      6      7      5      3              4              1

Das Aus kam in der letzten Runde, wobei
Das Aus kam in der letzten Runde, wobei
Das Aus kam in der letzten Runde, wobei
Das Aus kam in der letzten Runde, wobei
Das Aus kam in der letzten Runde, wobei

mail from *Ulrich Dirr*, who also provided the sample in figure 1. I do not claim to have coped with the task.

‘The idea is – analog to the tables for expansion and protrusion – to have tables for optical reduction/expansion of spaces in dependence of the actual character so that the distance between words is optically equal.

When reducing distances the (weighting) order is:

- after commas

9115            { , } = { , -500, 500 } ,

- in front of capitals which have optical more room on their left side, e.g., ‘A’, ‘J’, ‘T’, ‘V’, ‘W’, and ‘Y’ [this is not yet possible – RS]

- in front of capitals which have circle/oval shapes on their left side, e.g., ‘C’, ‘G’, ‘O’, and ‘Q’ [ditto – RS]

- after ‘r’ (because of the bigger optical room on the righthand side)

9116            r = { , -300, 300 } ,

- [before or] after lowercase characters with ascenders

9117            b = { , -200, 200 } ,

9118            d = { , -200, 200 } ,

9119            f = { , -200, 200 } ,

9120            h = { , -200, 200 } ,

9121            k = { , -200, 200 } ,

9122            l = { , -200, 200 } ,

9123            t = { , -200, 200 } ,

- [before or] after lowercase characters with x-height plus descender with additional optical space, e.g., ‘v’, or ‘w’

9124            c = { , -100, 100 } ,

9125            p = { , -100, 100 } ,

9126            v = { , -100, 100 } ,

9127            w = { , -100, 100 } ,

9128            z = { , -100, 100 } ,

9129            x = { , -100, 100 } ,

9130            y = { , -100, 100 } ,

- [before or] after lowercase characters with x-height plus descender without additional optical space

9131            i = { , 50, -50 } ,

9132            m = { , 50, -50 } ,

9133            n = { , 50, -50 } ,

9134            u = { , 50, -50 } ,

- after colon and semicolon

9135            : = { , 200, -200 } ,

9136            ; = { , 200, -200 } ,

- after punctuation which ends a sentence, e.g., period, exclamation mark, question mark

```
9137      . = { ,250,-250},
9138      ! = { ,250,-250},
9139      ? = { ,250,-250}
```

The order has to be reversed when enlarging is needed.’

```
9140    }
9141
9142    </m-t>
```

Questions are:

- Is the result really better?
- Is it overdone? (Try with a factor < 1000.)
- Should the first parameter also be used? (Probably.)
- What about quotation marks, parentheses etc.?

Furthermore, there seems to be a pdfTeX bug with spacing in combination with a non-zero `\spaceskip` (reported by *Axel Berger*):

```
\parfillskip0pt
\rightskip0pt plus 1em
\spaceskip\fontdimen2\font
test test\par
\pdfadjustinterwordglue2
\stbscode\font`t=-50
test test
\bye
```

Some more characters in T2A.<sup>14</sup>

```
9143    < *cmr >
9144    \SetExtraSpacing
9145      [ name      = T2A,
9146        load      = default ]
9147      { encoding = T2A,
9148        family    = cmr }
9149      {
9150        \cyrg = { , -300, 300},
9151        \cyrb = { , -200, 200},
9152        \cyrk = { , -200, 200},
9153        \cyrs = { , -100, 100},
9154        \cyrr = { , -100, 100},
9155        \cyrh = { , -100, 100},
9156        \cyru = { , -100, 100},
9157        \cyrt = { , 50, -50},
9158        \cyrp = { , 50, -50},
9159        \cyri = { , 50, -50},
9160        \cyrishrt = { , 50, -50},
9161      }
9162
```

### 2.9.1 Nonfrenchspacing

The following settings simulate `\nonfrenchspacing` (since space factors will be ignored when spacing adjustment is in effect). They may be used for English contexts.

From the TeXbook:

---

14 Contributed by *Karl Karlsson*.

‘If the space factor  $f$  is different from 1000, the interword glue is computed as follows: Take the normal space glue for the current font, and add the extra space if  $f \geq 2000$ . [...] Then the stretch component is multiplied by  $f/1000$ , while the shrink component is multiplied by  $1000/f$ .’

The ‘extra space’ (`\fontdimen 7`) for Computer Modern Roman is a third of `\fontdimen 2`, i.e., 333.

```
9163 \SetExtraSpacing
9164   [ name      = nonfrench-cmr,
9165     load      = default,
9166     context   = nonfrench ]
9167   { encoding = {OT1,T1,LY1,OT4,QX,T5},
9168     family   = cmr }
9169   {
```

`latex.ltx` has:

```
\def\nonfrenchspacing{
  \sfcode`\ . 3000
  \sfcode`\ ? 3000
  \sfcode`\ ! 3000
```

```
9170   . = {333,2000,-667},
9171   ? = {333,2000,-667},
9172   ! = {333,2000,-667},
```

```
\sfcode`\: 2000
```

```
9173   : = {333,1000,-500},
```

```
\sfcode`\; 1500
```

```
9174   ; = {   , 500,-333},
```

```
\sfcode`\, 1250
```

```
9175   {,}= {   , 250,-200}
```

```
}
```

```
9176   }
```

```
9177
```

```
9178 </cmr>
```

`fontinst`, however, which is also used to create the `psnfss` font metrics, sets `\fontdimen 7` to 240 by default. Therefore, the fallback settings use this value for the first component.

```
9179 <*-t>
9180 \SetExtraSpacing
9181   [ name      = nonfrench-default,
9182     load      = default,
9183     context   = nonfrench ]
9184   { encoding = {OT1,T1,LY1,OT4,QX,T5} }
9185   {
9186     . = {240,2000,-667},
9187     ? = {240,2000,-667},
9188     ! = {240,2000,-667},
9189     : = {240,1000,-500},
9190     ; = {   , 500,-333},
9191     {,}= {   , 250,-200}
9192   }
9193
```



Empty settings to prevent spurious warnings.

```
9194 \SetExtraSpacing
9195   [ name = empty ]
9196   { encoding = {TS1} }
9197   { }
9198
```

## 2.10 Additional kerning

Default unit is 1 em.

```
9199 %%% -----
9200 %%% ADDITIONAL KERNING
9201
```

A dummy list to be loaded when no context is active.

```
9202 \SetExtraKerning
9203   [ name = empty ]
9204   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1} }
9205   { }
9206
```

### 2.10.1 French

The ratio of `\fontdimen 2` to `\fontdimen 6` varies for different fonts, so that either the kerning of the colon (which should be a space, i.e., `\fontdimen 2`) or that of the other punctuation characters (T<sub>E</sub>X's `\thinspace`, i.e., one sixth of `\fontdimen 6`) may be inaccurate, depending on which unit we choose (space or 1em). For Times, for example, a thin space would be 665. I don't know whether French typography really wants a thin space, or rather (as it happens to turn out with CMR) half a space. (Wikipedia<sup>15</sup> claims it should be a quarter of an em, which seems too much to me; then again, it also says that this was a thin space in French typography.)

```
9207 \SetExtraKerning
9208   [ name      = french-default,
9209     context   = french,
9210     unit      = space ]
9211   { encoding = {OT1,T1,LY1} }
9212   {
9213     : = {1000,}, % = \fontdimen2
9214     ; = {500, }, % ~ \thinspace
9215     ! = {500, },
9216     ? = {500, }
9217   }
9218
```

These settings have the disadvantage that a word following a left guillemet will not be hyphenated. This might be fixed in pdfT<sub>E</sub>X.

```
9219 \SetExtraKerning
9220   [ name      = french-guillemets,
9221     context   = french-guillemets,
9222     load      = french-default,
9223     unit      = space ]
9224   { encoding = {T1,LY1} }
9225   {
9226     \guillemotleft = { ,800}, % = 0.8\fontdimen2
9227     \guillemotright = {800, }
9228   }
9229
```

---

15 [https://fr.wikipedia.org/wiki/Espace\\_typographique](https://fr.wikipedia.org/wiki/Espace_typographique), 5 July 2007.

```
9230 \SetExtraKerning
9231   [ name      = french-guillemets-OT1,
9232     context    = french-guillemets,
9233     load       = french-default,
9234     unit       = space   ]
9235   { encoding = OT1      }
9236   { }
9237
```

### 2.10.2 Turkish

```
9238 \SetExtraKerning
9239   [ name      = turkish,
9240     context    = turkish ]
9241   { encoding = {OT1,T1,LY1} }
9242   {
9243     : = {167, }, % = \thinspace
9244     ! = {167, },
9245     {=} = {167, }
9246   }
9247
9248 </m-t>
9249 </config>
```



```

9283 },
9284 <NewComputerModern> (l)I = {Ι,ϊ,Ϊ,ϝ,Ϋ,ϙ,Ψ,ψ,I,ι}, % Greek
9285 J = {Ĵ},
9286 K = {K̲},
9287     K̲}, % Greek
9288 L = {L̲,L̄,L̇,L̈}, % L,L,L̄
9289 M = {M̲}, % Greek
9290 N = {N̲,N̄,Ṅ,N̈,N̉,N̊},
9291     N̲}, % Greek
9292 O = {Ò,ó,Ô,Õ,Ö,Ø,Θ,θ,Ο,ο,Ό,ό,ὀ,ὁ,ὂ,ὃ,ὅ,὆,὇,Ὀ,Ὁ,ὰ,ά,ὲ,ἐ,ὦ,ὸ},
9293     Ο}, % Greek
9294 <NewComputerModern> (l)O = {O˘,O˙,O˚,O¨,O˜,O˛,O,O}, % Greek accents except O that has in-
dep. protrusion numbers (below)
9295 P = {P}, % Greek
9296 <NewComputerModern> (l)P = {Ṕ}, % Greek accents fully protruded left
9297 R = {R̲,R̄,Ṙ,R̈,R̉,R̊},
9298 S = {S̲,S̄,Ṡ,S̈,S̉,S̊},
9299 T = {T̲,T̄,Ṫ,T̈,T̉,T̊},
9300     T̲}, % Greek
9301 U = {Û,ü,Ů,ů,Ȭ,ȭ,Ȱ,ȩ,Ȳ,ȳ,U̲,u̲,Ǫ,ǫ,ǖ,Ǘ,Ǚ,ǚ,Ǟ,ǟ},
9302 W = {Ẁ,Ẃ,Ẅ,Ẏ},
9303 X = {X}, % Greek
9304 Y = {Ỳ,Ȳ,Ẏ,Ÿ,Ỷ,Y̊},
9305 <NewComputerModern> Υ = {Υ̲,Ῡ,Υ̇},
9306 <NewComputerModern> (l)Υ = {Υ̲,Ῡ,Υ̇,Ϋ,Υ̉,Υ̊,Υ̋},
9307 Z = {Ζ̲,Ζ̄,Ζ̇,Z̈},
9308     Ζ̲}, % Greek
9309 a = {à,á,â,ã,ä,å,ā,ă,ą,ǻ,Ǽ,ǽ,ǿ,Ǿ,Ǻ,ǻ,ǣ,ǿ,Ǿ,Ǻ},
9310 æ = {æ},
9311 c = {ç,ć,č,c̣,č̣},
9312 d = {đ,d̡,d̢},
9313 e = {è,é,ê,ë,ė,ë,ẻ,e̊,e̋,ě,e̍,e̎,ȅ},
9314 f = {ff}, % Unicode 64256, glyph name in Latin Modern Roman: /f_f ; in New Com-
puter Modern: /ff
9315 g = {g̲,ḡ,ġ,g̈,g̉,g̊},
9316 h = {h̲,h̄,ḣ,ḧ,h̉,h̊},
9317 i = {ì,í,î,ï,ī,ı̇,ı̈,ı̉,ı̊,ı̋},
9318 j = {j̲},
9319 k = {k̲},
9320 l = {ĺ,ľ,l̇,l̈,l̉,l̊}, % Ll,l̄
9321 n = {ñ,n̄,ṅ,n̈,n̉,n̊},
9322 o = {ò,ó,ô,õ,ø,ö,œ,ő,ơ,Ỏ,ỏ,ố,ồ,ỗ,ộ,ổ,ỗ,ớ,ở,ỡ,ợ},
9323 <NewComputerModern> ,o,ó,ô,õ,ø,ö,œ,ő,ơ,Ỏ,ỏ,ố,ồ,ỗ,ộ,ổ,ỗ,ớ,ở,ỡ,ợ % Greek
9324 },
9325 r = {r̲,r̄,ṙ,r̈,r̉,r̊},
9326 s = {s̲,s̄,ṡ,s̈,s̉,s̊},
9327 t = {t̲,t̄,ṫ,ẗ,t̉,t̊}, % t̲
9328 u = {ù,ú,û,ü,ũ,ū,ű,ů,Ȭ,ȭ,Ȱ,ȩ,Ȳ,ȳ,U̲,u̲,Ǫ,ǫ,ǖ,Ǘ,Ǚ,ǚ,Ǟ,ǟ},
9329 w = {w̲,w̄,ẇ,ẅ,w̉,ẘ},
9330 y = {ý,ȳ,ẏ,ÿ,ỷ,ẙ},
9331 z = {z̲,z̄,ż,z̈,z̉,z̊},
9332 <*NewComputerModern>
9333 α = {α̲,ᾱ,α̇,α̈,α̉,α̊,α̋,α̌,α̍,α̎,α̏},
9334 ε = {ε̲,ε̄,ε̇,ε̈,ε̉,ε̊,ε̋,ε̌,ε̍,ε̎,ε̏},
9335 η = {η̲,η̄,η̇,η̈,η̉,η̊,η̋,η̌,η̍,η̎,η̏},
9336 ι = {ι̲,ῑ,ι̇,ϊ,ι̉,ι̊},
9337 ῑ = {ῑ̲,ῑ̄,ῑ̇,ῑ̈,ῑ̉,ῑ̊},
9338 υ = {ύ,υ̇,ύ̈,ύ̉,ύ̊,ύ̋,ύ̌,ύ̍,ύ̎,ύ̏},
9339 ω = {ώ,ω̇,ώ̈,ώ̉,ώ̊,ώ̋,ώ̌,ώ̍,ώ̎,ώ̏,φ̲,φ̄,φ̇,φ̈,φ̉,φ̊,φ̋,φ̌,φ̍,φ̎,φ̏},
9340 </NewComputerModern>
9341 }

```



9404 g = {ǵ,ǥ,ǧ,ǩ,ǫ,ǭ},  
9405 h = {Ĥ,h,H,h,Ħ,h,ĥ,h,  
9406 ħ,h}, % Cyr  
9407 i = {İ,ı,İ,İ,İ,İ,İ,İ,İ,İ,İ,İ,  
9408 İ,İ}, % Cyr  
9409 j = {Ĵ,J,  
9410 J}, % Cyr  
9411 k = {Ķ,k,K,k,K},  
9412 l = {Ł,ł,L,l,Ł,ł}, % Ł,Ł  
9413 m = {Ṁ,m,M},  
9414 n = {ñ,n,N,ň,n,ñ,n,N}, % 'n  
9415 o = {ò,ó,ô,õ,ö,ō,ő,ð,ø,Ȯ,Ȫ,Ȭ,Ȱ,Ȳ,ȳ,ȴ,ȵ,  
9416 ō,o,œ,ə,ē}, % Cyr  
9417 p = {Ṗ,p,  
9418 P,P}, % Cyr  
9419 q = {q}, % Cyr  
9420 r = {ŕ,r,ŗ,ř,ŕ,ŗ,ř,r},  
9421 s = {š,s,Š,š,ś,ś,ŝ,ŝ,Ş,ş,  
9422 S}, % Cyr  
9423 t = {ţ,ț,T,t,T,t}, % ț  
9424 u = {ù,ú,û,ü,ũ,ū,ů,ű,ű,ű,ű,ű,ű,ű,ű,ű,ű,  
9425 v = {v,v},  
9426 w = {Ẃ,w,W,w,W,w,W,  
9427 W}, % Cyr  
9428 x = {x,x,  
9429 X,X}, % Cyr  
9430 y = {Y,y,Y,y,Y,y,Y,y,Y,y,  
9431 Y,y,Y,y,Y,y}, % Cyr  
9432 z = {Z,z,Z,z,Z,z,Z,z},  
9433 % Cyrillic  
9434 Г = {Г,Г,Г,Г,Г},  
9435 Ж = {Ж,Ж,Ж},  
9436 З = {З,З},  
9437 Л = {Л},  
9438 П = {П},  
9439 У = {У,У,У,У},  
9440 Ч = {Ч,Ч,Ч,Ч},  
9441 Ё = {Ё},  
9442 Ә = {Ә},  
9443 Ў = {Ў},  
9444 г = {г,г,г,г,г},  
9445 ж = {ж,ж,ж},  
9446 з = {з,з},  
9447 и = {и,и,и,и,и},  
9448 к = {к,к,к,к,к,к,к},  
9449 л = {л},  
9450 м = {м},  
9451 н = {н,н,н,н},  
9452 п = {п},  
9453 т = {т},  
9454 х = {х,х},  
9455 ч = {ч,ч,ч,ч},  
9456 ш = {ш},  
9457 ы = {ы},  
9458 э = {э},  
9459 е = {е},  
9460 ə = {ə},  
9461 γ = {γ},  
9462 Γ = {Γ}, % Greek  
9463 Π = {Π}, % Greek  
9464 % missing: tipa, math, symbols, ...  
9465 }

9466 *</CharisSIL>*

[illegible]

9530	W = {Ŵ,ŵ,W̄,w̄,Ẇ,ẇ,
9531	W}, % Cyrillic
9532	X = {X̂,X̃,
9533	X <sub>x</sub> ,X <sub>y</sub> ,X <sub>z</sub> ,
9534	X <sub>z</sub> , % Cyrillic
9535	X}, % Greek
9536	Y = {Ȳ,Y̆,Ẏ,Ÿ,Ỷ,Y̊,Y̋,
9537	Y̌,Y̍}, % Cyrillic
9538	Z = {Ẑ,Z̃,Z̄,Z̅,Z̆,Ż,
9539	Z̈}, % Greek
9540	a = {ǎ,ă,â,ã,ä,ą,ā,ā,ā,ā,ā,ā,ā,ā,ā,ā,ā,ā,ā,
9541	ā,ā,ā}, % Cyrillic
9542	b = {b,b,b},
9543	c = {ċ,ć,ċ,ć,ċ,ć,
9544	c,ç}, % Cyrillic
9545	c}, % Roman numeral
9546	d = {ď,d,đ,d,d,d,d,d,
9547	đ}, % Roman numeral
9548	e = {ě,é,ē,ē,ē,ē,ē,ē,ē,ē,ē,ē,ē,ē,ē,ē,ē,
9549	ē,ē,ē,ē}, % Cyrillic
9550	f = {f,f,f,/f.long,/f.DEU,/f_f},
9551	fl = {ffl,/longs_l,/longs_long_s_l,/f_l},
9552	fi = {ffi,/longs_i,/longs_long_s_i,/f_i},
9553	/f.short = {/f_f.short},
9554	g = {ğ,ğ,ğ,ğ,ğ,ğ,ğ,ğ},
9555	h = {h,h,h,h,h,h,h,h,h,h,
9556	h,h}, % Cyrillic
9557	i = {і,i,i,i,i,i,i,i,i,i,i,i,i,i/i.TRK,
9558	i,ї}, % Cyrillic
9559	i,ii,iii}, % Roman numeral
9560	j = {j,j},
9561	j}, % Cyrillic
9562	k = {ķ,k,k,k,k,k,k},
9563	l = {ł,l,l,l,l,l,l,l,l,l,
9564	l}, % palochka
9565	l}, % Roman numeral
9566	m = {m,m,m,
9567	m}, % Roman numeral
9568	n = {ñ,n,n,n,n,n,n,n,n,n}, % ñ
9569	o = {ò,ó,ô,ö,ø,ø,ð,ð,ð,ð,ð,ð,ð,ð,ð,ð,ð,ð,ð,
9570	ó,ø}, % Cyrillic
9571	p = {p,p,
9572	p,p}, % Cyrillic
9573	q = {q},
9574	r = {r,r,r,r,r,r,r,r,r},
9575	s = {ś,s,ş,ş,ş,ş,ş,ş,ş,ş,
9576	s}, % Cyrillic
9577	t = {t,t,t,t,t,t,t,t,t},
9578	u = {ú,ú,û,û,ü,ü,ü,ü,ü,ü,ü,ü,ü,ü,ü,ü,ü,
9579	v = {v,y,
9580	v}, % Roman numeral
9581	w = {ŵ,w,w,w,w,w,w,w,
9582	w}, % Cyrillic
9583	x = {x,x,
9584	x,x}, % Cyrillic
9585	x}, % Roman numeral
9586	y = {ý,ÿ,ÿ,ÿ,ÿ,ÿ,ÿ,ÿ,ÿ,
9587	ÿ,ÿ,ÿ,ÿ,ÿ}, % Cyrillic
9588	z = {ž,z,z,z,z,z,z},
9589	Æ = {Æ,Æ,
9590	Æ}, % Cyrillic
9591	æ = {æ,æ,
9592	æ}, % Cyrillic
9593	DZ = {DŽ},
9594	Dz = {Dž},



```

9595     dz = {dz},
9596 % Smallcaps
9597     /a.sc = {/A.sc},
9598     /ae.sc = {/AE.sc},
9599     /d.sc = {/D.sc},
9600     /f.sc = {/F.sc},
9601     /g.sc = {/G.sc},
9602     /j.sc = {/J.sc},
9603     /l.sc = {/L.sc},
9604     /o.sc = {/O.sc},
9605     /oe.sc = {/OE.sc},
9606     /q.sc = {/Q.sc},
9607     /r.sc = {/R.sc},
9608     /t.sc = {/T.sc},
9609     /y.sc = {/Y.sc},
9610 % Cyrillic
9611     Г = {Г,Ғ,Ҕ,Җ},
9612     Ж = {Ж,Җ,Ҙ,Ж},
9613     З = {З,Ӣ},
9614     И = {И,Ӣ,Ӣ,Ӣ,Ӣ},
9615     К = {К,К,К,К,К,К},
9616     Л = {Л,Л,Л},
9617     П = {П},
9618     У = {У,У,У,У},
9619     Ц = {Ц,Ц,Ц},
9620     Ч = {Ч,Ч,Ч,Ч},
9621     Ш = {Ш},
9622     Ы = {Ы},
9623     Ь = {Ь},
9624     Э = {Э},
9625     В = {В},
9626     Ё = {Ё},
9627     Ә = {Ә},
9628     г = {г,ґ,ғ,г},
9629     ж = {ж,ж,ж,ж},
9630     з = {з,ӓ},
9631     и = {и,и,и,и,и},
9632     к = {к,к,к,к}, % к,к
9633     л = {л,л,л},
9634     м = {м},
9635     н = {н,н,н,н}, % н
9636     п = {п},
9637     т = {т},
9638     ц = {ц},
9639     ч = {ч,ч,ч,ч},
9640     ш = {ш},
9641     ы = {ы},
9642     э = {э},
9643     ө = {ө,ӧ},
9644     в = {в},
9645     у = {у},
9646     е = {е},
9647     ә = {ә},
9648 % Greek
9649     Υ = {Υ,Υ,Υ,Υ,Υ},
9650 (l)Υ = {Υ,Υ,Υ,Υ,Υ,Υ,Υ,Υ},
9651 (l)Ω = {Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω,Ω},
9652     Ω = {Ω,Ω}, % math
9653     Δ = {Δ}, % math
9654     Π = {Π}, % math
9655     α = {α,α,α,α,α,α,α,α,α,α,α,α,α,α,α,α,α,α,α,α},
9656     ε = {ε,ε,ε,ε,ε,ε,ε,ε,ε,ε},
9657     η = {η,η,η,η,η,η,η,η,η,η,η,η,η,η,η,η,η,η,η,η},
9658     ι = {ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι,ι},
9659     ο = {ο,ο,ο,ο,ο,ο,ο,ο,ο,ο},

```

```

9660   ρ = {̑,̒},
9661   υ = {̣,̤,̥,̦,̧,̨,̩,̪,̫,̬,̭,̮,̯,̰,̱,̲,̳,̴,̵,̶,̷,̸,̹,̺,̻,̼},
9662   ω = {̡,̢,̣,̤,̥,̦,̧,̨,̩,̪,̫,̬,̭,̮,̯,̰,̱,̲,̳,̴,̵,̶,̷,̸,̹,̺,̻,̼},
9663 % other
9664   (i) = {(2),(3),(4),(5),(6),(7),(8),(9),(10),(11),(12),(13),(14),(15),(16),(17),(18),(19),(20)},
9665   (a) = {(b),(c),(d),(e),(f),(g),(h),(i),(j),(k),(l),(m),(n),(o),(p),(q),(r),(s),(t),(u),(v),(w),(x),(y),(z)},
9666   [A] = {[B],[C],[D],[E],[F],[G],[H],[I],[J],[K],[L],[M],[N],[O],[P],[Q],[R],[S],[T],[U],[V],[W],[X],[Y],[Z]},
9667   ! = {!},
9668   ? = {??},
9669   . = {/onedotenleader},
9670   /endash = {/figuredash},
9671   }
9672 </EBGaramond>

```

### 3.1.4 Palatino

```

9673 <*Palatino>
9674 \DeclareCharacterInheritance
9675   { encoding = {TU,EU1,EU2},
9676     family = {Palatino} }

```

Unfortunately, I don't have a Palatino variant containing all of the following glyphs. The settings are typeset in T<sub>E</sub>X Gyre Pagella; missing glyphs, printed in red, are taken from Charis SIL; glyphs missing even in Charis SIL appear as '◆'. To see the real settings, consult `mt-Palatino.cfg`.

```

9677   { A = {Ā,Ă,Ȧ,Ǡ,Ȧ̅,Ȧ̆,Ȧ̇,Ȧ̈,Ȧ̉,Ȧ̊,Ȧ̋,Ȧ̌,Ȧ̍,Ȧ̎,Ȧ̏,Ȧ̐,Ȧ̑,Ȧ̒,Ȧ̓,Ȧ̔,Ȧ̕,Ȧ̖,Ȧ̗,Ȧ̘,Ȧ̙,Ȧ̚,Ȧ̛,Ȧ̜,Ȧ̝,Ȧ̞,Ȧ̟,Ȧ̠,Ȧ̡,Ȧ̢,Ạ̇,Ȧ̤,Ḁ̇,Ȧ̦,Ȧ̧,Ą̇,Ȧ̩,Ȧ̪,Ȧ̫,Ȧ̬,Ȧ̭,Ȧ̮,Ȧ̯,Ȧ̰,Ȧ̱,Ȧ̲,Ȧ̳,Ȧ̴,Ȧ̵,Ȧ̶,Ȧ̷,Ȧ̸,Ȧ̹,Ȧ̺,Ȧ̻,Ȧ̼,A},
9678     B = {Ḃ,Ḃ̄,Ḃ̅,Ḃ̆,Ḃ̇,Ḃ̈,Ḃ̉,Ḃ̊,Ḃ̋,Ḃ̌,Ḃ̍,Ḃ̎,Ḃ̏,Ḃ̐,Ḃ̑,Ḃ̒,Ḃ̓,Ḃ̔,Ḃ̕,Ḃ̖,Ḃ̗,Ḃ̘,Ḃ̙,Ḃ̚,Ḃ̛,Ḃ̜,Ḃ̝,Ḃ̞,Ḃ̟,Ḃ̠,Ḃ̡,Ḃ̢,Ḅ̇,Ḃ̤,Ḃ̥,Ḃ̦,Ḃ̧,Ḃ̨,Ḃ̩,Ḃ̪,Ḃ̫,Ḃ̬,Ḃ̭,Ḃ̮,Ḃ̯,Ḃ̰,Ḇ̇,Ḃ̲,Ḃ̳,Ḃ̴,Ḃ̵,Ḃ̶,Ḃ̷,Ḃ̸,Ḃ̹,Ḃ̺,Ḃ̻,Ḃ̼,B},
9679     C = {Ĉ,Ĉ̄,Ĉ̅,Ĉ̆,Ĉ̇,Ĉ̈,Ĉ̉,Ĉ̊,Ĉ̋,Ĉ̌,Ĉ̍,Ĉ̎,Ĉ̏,Ĉ̐,Ĉ̑,Ĉ̒,Ĉ̓,Ĉ̔,Ĉ̕,Ĉ̖,Ĉ̗,Ĉ̘,Ĉ̙,Ĉ̚,Ĉ̛,Ĉ̜,Ĉ̝,Ĉ̞,Ĉ̟,Ĉ̠,Ĉ̡,Ĉ̢,Ĉ̣,Ĉ̤,Ĉ̥,Ĉ̦,Ç̂,Ĉ̨,Ĉ̩,Ĉ̪,Ĉ̫,Ĉ̬,Ĉ̭,Ĉ̮,Ĉ̯,Ĉ̰,Ĉ̱,Ĉ̲,Ĉ̳,Ĉ̴,Ĉ̵,Ĉ̶,Ĉ̷,Ĉ̸,Ĉ̹,Ĉ̺,Ĉ̻,Ĉ̼,C},
9680     D = {Ḑ,Ḑ̄,Ḑ̅,Ḑ̆,Ḑ̇,Ḑ̈,Ḑ̉,Ḑ̊,Ḑ̋,Ḑ̌,Ḑ̍,Ḑ̎,Ḑ̏,Ḑ̐,Ḑ̑,Ḑ̒,Ḑ̓,Ḑ̔,Ḑ̕,Ḑ̖,Ḑ̗,Ḑ̘,Ḑ̙,Ḑ̚,Ḑ̛,Ḑ̜,Ḑ̝,Ḑ̞,Ḑ̟,Ḑ̠,Ḑ̡,Ḑ̢,Ḑ̣,Ḑ̤,Ḑ̥,Ḑ̦,Ḑ̧,Ḑ̨,Ḑ̩,Ḑ̪,Ḑ̫,Ḑ̬,Ḑ̭,Ḑ̮,Ḑ̯,Ḑ̰,Ḑ̱,Ḑ̲,Ḑ̳,Ḑ̴,Ḑ̵,Ḑ̶,Ḑ̷,Ḑ̸,Ḑ̹,Ḑ̺,Ḑ̻,Ḑ̼,D},
9681     E = {Ē,Ē̄,Ē̅,Ē̆,Ē̇,Ē̈,Ē̉,Ē̊,Ē̋,Ē̌,Ē̍,Ē̎,Ē̏,Ē̐,Ē̑,Ē̒,Ē̓,Ē̔,Ē̕,Ē̖,Ē̗,Ē̘,Ē̙,Ē̚,Ē̛,Ē̜,Ē̝,Ē̞,Ē̟,Ē̠,Ē̡,Ē̢,Ẹ̄,Ē̤,Ē̥,Ē̦,Ȩ̄,Ę̄,Ē̩,Ē̪,Ē̫,Ē̬,Ḙ̄,Ē̮,Ē̯,Ḛ̄,Ē̱,Ē̲,Ē̳,Ē̴,Ē̵,Ē̶,Ē̷,Ē̸,Ē̹,Ē̺,Ē̻,Ē̼,E},
9682     F = {Ḟ},
9683     G = {Ĝ,Ĝ̄,Ĝ̅,Ĝ̆,Ĝ̇,Ĝ̈,Ĝ̉,Ĝ̊,Ĝ̋,Ĝ̌,Ĝ̍,Ĝ̎,Ĝ̏,Ĝ̐,Ĝ̑,Ĝ̒,Ĝ̓,Ĝ̔,Ĝ̕,Ĝ̖,Ĝ̗,Ĝ̘,Ĝ̙,Ĝ̚,Ĝ̛,Ĝ̜,Ĝ̝,Ĝ̞,Ĝ̟,Ĝ̠,Ĝ̡,Ĝ̢,Ĝ̣,Ĝ̤,Ĝ̥,Ĝ̦,Ģ̂,Ĝ̨,Ĝ̩,Ĝ̪,Ĝ̫,Ĝ̬,Ĝ̭,Ĝ̮,Ĝ̯,Ĝ̰,Ĝ̱,Ĝ̲,Ĝ̳,Ĝ̴,Ĝ̵,Ĝ̶,Ĝ̷,Ĝ̸,Ĝ̹,Ĝ̺,Ĝ̻,Ĝ̼,G},
9684     H = {Ĥ,Ĥ̄,Ĥ̅,Ĥ̆,Ĥ̇,Ĥ̈,Ĥ̉,Ĥ̊,Ĥ̋,Ĥ̌,Ĥ̍,Ĥ̎,Ĥ̏,Ĥ̐,Ĥ̑,Ĥ̒,Ĥ̓,Ĥ̔,Ĥ̕,Ĥ̖,Ĥ̗,Ĥ̘,Ĥ̙,Ĥ̚,Ĥ̛,Ĥ̜,Ĥ̝,Ĥ̞,Ĥ̟,Ĥ̠,Ĥ̡,Ĥ̢,Ḥ̂,Ĥ̤,Ĥ̥,Ĥ̦,Ḩ̂,Ĥ̨,Ĥ̩,Ĥ̪,Ĥ̫,Ĥ̬,Ĥ̭,Ḫ̂,Ĥ̯,Ĥ̰,Ĥ̱,Ĥ̲,Ĥ̳,Ĥ̴,Ĥ̵,Ĥ̶,Ĥ̷,Ĥ̸,Ĥ̹,Ĥ̺,Ĥ̻,Ĥ̼,H},
9685     I = {İ,İ̇,İ̈,İ̉,İ̊,İ̋,İ̌,İ̍,İ̎,İ̏,İ̐,İ̑,İ̒,İ̓,İ̔,İ̕,İ̖,İ̗,İ̘,İ̙,İ̚,İ̛,İ̜,İ̝,İ̞,İ̟,İ̠,İ̡,İ̢,Ị̇,İ̤,İ̥,İ̦,İ̧,Į̇,İ̩,İ̪,İ̫,İ̬,İ̭,İ̮,İ̯,Ḭ̇,İ̱,İ̲,İ̳,İ̴,İ̵,İ̶,İ̷,İ̸,İ̹,İ̺,İ̻,İ̼,I},
9686     J = {Ĵ},
9687     K = {Ḳ,Ḳ̄,Ḳ̅,Ḳ̆,Ḳ̇,Ḳ̈,Ḳ̉,Ḳ̊,Ḳ̋,Ḳ̌,Ḳ̍,Ḳ̎,Ḳ̏,Ḳ̐,Ḳ̑,Ḳ̒,Ḳ̓,Ḳ̔,Ḳ̕,Ḳ̖,Ḳ̗,Ḳ̘,Ḳ̙,Ḳ̚,Ḳ̛,Ḳ̜,Ḳ̝,Ḳ̞,Ḳ̟,Ḳ̠,Ḳ̡,Ḳ̢,Ḳ̣,Ḳ̤,Ḳ̥,Ḳ̦,Ķ̣,Ḳ̨,Ḳ̩,Ḳ̪,Ḳ̫,Ḳ̬,Ḳ̭,Ḳ̮,Ḳ̯,Ḳ̰,Ḳ̱,Ḳ̲,Ḳ̳,Ḳ̴,Ḳ̵,Ḳ̶,Ḳ̷,Ḳ̸,Ḳ̹,Ḳ̺,Ḳ̻,Ḳ̼,K},
9688     L = {Ĺ,Ĺ̄,Ĺ̅,Ĺ̆,Ĺ̇,Ĺ̈,Ĺ̉,Ĺ̊,Ĺ̋,Ĺ̌,Ĺ̍,Ĺ̎,Ĺ̏,Ĺ̐,Ĺ̑,Ĺ̒,Ĺ̓,Ĺ̔,Ĺ̕,Ĺ̖,Ĺ̗,Ĺ̘,Ĺ̙,Ĺ̚,Ĺ̛,Ĺ̜,Ĺ̝,Ĺ̞,Ĺ̟,Ĺ̠,Ĺ̡,Ĺ̢,Ḷ́,Ĺ̤,Ĺ̥,Ĺ̦,Ļ́,Ĺ̨,Ĺ̩,Ĺ̪,Ĺ̫,Ĺ̬,Ḽ́,Ĺ̮,Ĺ̯,Ĺ̰,Ḻ́,Ĺ̲,Ĺ̳,Ĺ̴,Ĺ̵,Ĺ̶,Ĺ̷,Ĺ̸,Ĺ̹,Ĺ̺,Ĺ̻,Ĺ̼,L}, % Ḷ
9689     M = {Ḟ,Ḟ̄,Ḟ̅,Ḟ̆,Ḟ̇,Ḟ̈,Ḟ̉,Ḟ̊,Ḟ̋,Ḟ̌,Ḟ̍,Ḟ̎,Ḟ̏,Ḟ̐,Ḟ̑,Ḟ̒,Ḟ̓,Ḟ̔,Ḟ̕,Ḟ̖,Ḟ̗,Ḟ̘,Ḟ̙,Ḟ̚,Ḟ̛,Ḟ̜,Ḟ̝,Ḟ̞,Ḟ̟,Ḟ̠,Ḟ̡,Ḟ̢,Ḟ̣,Ḟ̤,Ḟ̥,Ḟ̦,Ḟ̧,Ḟ̨,Ḟ̩,Ḟ̪,Ḟ̫,Ḟ̬,Ḟ̭,Ḟ̮,Ḟ̯,Ḟ̰,Ḟ̱,Ḟ̲,Ḟ̳,Ḟ̴,Ḟ̵,Ḟ̶,Ḟ̷,Ḟ̸,Ḟ̹,Ḟ̺,Ḟ̻,Ḟ̼,M},
9690     N = {Ñ,Ñ̄,Ñ̅,Ñ̆,Ñ̇,Ñ̈,Ñ̉,Ñ̊,Ñ̋,Ñ̌,Ñ̍,Ñ̎,Ñ̏,Ñ̐,Ñ̑,Ñ̒,Ñ̓,Ñ̔,Ñ̕,Ñ̖,Ñ̗,Ñ̘,Ñ̙,Ñ̚,Ñ̛,Ñ̜,Ñ̝,Ñ̞,Ñ̟,Ñ̠,Ñ̡,Ñ̢,Ṇ̃,Ñ̤,Ñ̥,Ñ̦,Ņ̃,Ñ̨,Ñ̩,Ñ̪,Ñ̫,Ñ̬,Ṋ̃,Ñ̮,Ñ̯,Ñ̰,Ṉ̃,Ñ̲,Ñ̳,Ñ̴,Ñ̵,Ñ̶,Ñ̷,Ñ̸,Ñ̹,Ñ̺,Ñ̻,Ñ̼,N},
9691     O = {Ȯ,Ȱ,Ȯ̅,Ȯ̆,Ȯ̇,Ȯ̈,Ȯ̉,Ȯ̊,Ȯ̋,Ȯ̌,Ȯ̍,Ȯ̎,Ȯ̏,Ȯ̐,Ȯ̑,Ȯ̒,Ȯ̓,Ȯ̔,Ȯ̕,Ȯ̖,Ȯ̗,Ȯ̘,Ȯ̙,Ȯ̚,Ơ̇,Ȯ̜,Ȯ̝,Ȯ̞,Ȯ̟,Ȯ̠,Ȯ̡,Ȯ̢,Ọ̇,Ȯ̤,Ȯ̥,Ȯ̦,Ȯ̧,Ǫ̇,Ȯ̩,Ȯ̪,Ȯ̫,Ȯ̬,Ȯ̭,Ȯ̮,Ȯ̯,Ȯ̰,Ȯ̱,Ȯ̲,Ȯ̳,Ȯ̴,Ȯ̵,Ȯ̶,Ȯ̷,Ȯ̸,Ȯ̹,Ȯ̺,Ȯ̻,Ȯ̼,O},
9692     P = {Ṗ,Ṗ̄,Ṗ̅,Ṗ̆,Ṗ̇,Ṗ̈,Ṗ̉,Ṗ̊,Ṗ̋,Ṗ̌,Ṗ̍,Ṗ̎,Ṗ̏,Ṗ̐,Ṗ̑,Ṗ̒,Ṗ̓,Ṗ̔,Ṗ̕,Ṗ̖,Ṗ̗,Ṗ̘,Ṗ̙,Ṗ̚,Ṗ̛,Ṗ̜,Ṗ̝,Ṗ̞,Ṗ̟,Ṗ̠,Ṗ̡,Ṗ̢,Ṗ̣,Ṗ̤,Ṗ̥,Ṗ̦,Ṗ̧,Ṗ̨,Ṗ̩,Ṗ̪,Ṗ̫,Ṗ̬,Ṗ̭,Ṗ̮,Ṗ̯,Ṗ̰,Ṗ̱,Ṗ̲,Ṗ̳,Ṗ̴,Ṗ̵,Ṗ̶,Ṗ̷,Ṗ̸,Ṗ̹,Ṗ̺,Ṗ̻,Ṗ̼,P},
9693     R = {Ṛ,Ṝ,Ṛ̅,Ṛ̆,Ṛ̇,Ṛ̈,Ṛ̉,Ṛ̊,Ṛ̋,Ṛ̌,Ṛ̍,Ṛ̎,Ṛ̏,Ṛ̐,Ṛ̑,Ṛ̒,Ṛ̓,Ṛ̔,Ṛ̕,Ṛ̖,Ṛ̗,Ṛ̘,Ṛ̙,Ṛ̚,Ṛ̛,Ṛ̜,Ṛ̝,Ṛ̞,Ṛ̟,Ṛ̠,Ṛ̡,Ṛ̢,Ṛ̣,Ṛ̤,Ṛ̥,Ṛ̦,Ŗ̣,Ṛ̨,Ṛ̩,Ṛ̪,Ṛ̫,Ṛ̬,Ṛ̭,Ṛ̮,Ṛ̯,Ṛ̰,Ṛ̱,Ṛ̲,Ṛ̳,Ṛ̴,Ṛ̵,Ṛ̶,Ṛ̷,Ṛ̸,Ṛ̹,Ṛ̺,Ṛ̻,Ṛ̼,R},
9694     S = {Ŝ,Ŝ̄,Ŝ̅,Ŝ̆,Ŝ̇,Ŝ̈,Ŝ̉,Ŝ̊,Ŝ̋,Ŝ̌,Ŝ̍,Ŝ̎,Ŝ̏,Ŝ̐,Ŝ̑,Ŝ̒,Ŝ̓,Ŝ̔,Ŝ̕,Ŝ̖,Ŝ̗,Ŝ̘,Ŝ̙,Ŝ̚,Ŝ̛,Ŝ̜,Ŝ̝,Ŝ̞,Ŝ̟,Ŝ̠,Ŝ̡,Ŝ̢,Ṣ̂,Ŝ̤,Ŝ̥,Ș̂,Ş̂,Ŝ̨,Ŝ̩,Ŝ̪,Ŝ̫,Ŝ̬,Ŝ̭,Ŝ̮,Ŝ̯,Ŝ̰,Ŝ̱,Ŝ̲,Ŝ̳,Ŝ̴,Ŝ̵,Ŝ̶,Ŝ̷,Ŝ̸,Ŝ̹,Ŝ̺,Ŝ̻,Ŝ̼,S},
9695     T = {Ṭ,Ṭ̄,Ṭ̅,Ṭ̆,Ṭ̇,Ṭ̈,Ṭ̉,Ṭ̊,Ṭ̋,Ṭ̌,Ṭ̍,Ṭ̎,Ṭ̏,Ṭ̐,Ṭ̑,Ṭ̒,Ṭ̓,Ṭ̔,Ṭ̕,Ṭ̖,Ṭ̗,Ṭ̘,Ṭ̙,Ṭ̚,Ṭ̛,Ṭ̜,Ṭ̝,Ṭ̞,Ṭ̟,Ṭ̠,Ṭ̡,Ṭ̢,Ṭ̣,Ṭ̤,Ṭ̥,Ṭ̦,Ţ̣,Ṭ̨,Ṭ̩,Ṭ̪,Ṭ̫,Ṭ̬,Ṭ̭,Ṭ̮,Ṭ̯,Ṭ̰,Ṭ̱,Ṭ̲,Ṭ̳,Ṭ̴,Ṭ̵,Ṭ̶,Ṭ̷,Ṭ̸,Ṭ̹,Ṭ̺,Ṭ̻,Ṭ̼,T},
9696     U = {Ū,Ū̄,Ū̅,Ū̆,Ū̇,Ṻ,Ū̉,Ū̊,Ū̋,Ū̌,Ū̍,Ū̎,Ū̏,Ū̐,Ū̑,Ū̒,Ū̓,Ū̔,Ū̕,Ū̖,Ū̗,Ū̘,Ū̙,Ū̚,Ư̄,Ū̜,Ū̝,Ū̞,Ū̟,Ū̠,Ū̡,Ū̢,Ụ̄,Ṳ̄,Ū̥,Ū̦,Ū̧,Ų̄,Ū̩,Ū̪,Ū̫,Ū̬,Ṷ̄,Ū̮,Ū̯,Ṵ̄,Ū̱,Ū̲,Ū̳,Ū̴,Ū̵,Ū̶,Ū̷,Ū̸,Ū̹,Ū̺,Ū̻,Ū̼,U},
9697     V = {Ṽ,Ṽ̄,Ṽ̅,Ṽ̆,Ṽ̇,Ṽ̈,Ṽ̉,Ṽ̊,Ṽ̋,Ṽ̌,Ṽ̍,Ṽ̎,Ṽ̏,Ṽ̐,Ṽ̑,Ṽ̒,Ṽ̓,Ṽ̔,Ṽ̕,Ṽ̖,Ṽ̗,Ṽ̘,Ṽ̙,Ṽ̚,Ṽ̛,Ṽ̜,Ṽ̝,Ṽ̞,Ṽ̟,Ṽ̠,Ṽ̡,Ṽ̢,Ṿ̃,Ṽ̤,Ṽ̥,Ṽ̦,Ṽ̧,Ṽ̨,Ṽ̩,Ṽ̪,Ṽ̫,Ṽ̬,Ṽ̭,Ṽ̮,Ṽ̯,Ṽ̰,Ṽ̱,Ṽ̲,Ṽ̳,Ṽ̴,Ṽ̵,Ṽ̶,Ṽ̷,Ṽ̸,Ṽ̹,Ṽ̺,Ṽ̻,Ṽ̼,V},
9698     W = {Ẁ,Ẁ̄,Ẁ̅,Ẁ̆,Ẁ̇,Ẁ̈,Ẁ̉,Ẁ̊,Ẁ̋,Ẁ̌,Ẁ̍,Ẁ̎,Ẁ̏,Ẁ̐,Ẁ̑,Ẁ̒,Ẁ̓,Ẁ̔,Ẁ̕,Ẁ̖,Ẁ̗,Ẁ̘,Ẁ̙,Ẁ̚,Ẁ̛,Ẁ̜,Ẁ̝,Ẁ̞,Ẁ̟,Ẁ̠,Ẁ̡,Ẁ̢,Ẉ̀,Ẁ̤,Ẁ̥,Ẁ̦,Ẁ̧,Ẁ̨,Ẁ̩,Ẁ̪,Ẁ̫,Ẁ̬,Ẁ̭,Ẁ̮,Ẁ̯,Ẁ̰,Ẁ̱,Ẁ̲,Ẁ̳,Ẁ̴,Ẁ̵,Ẁ̶,Ẁ̷,Ẁ̸,Ẁ̹,Ẁ̺,Ẁ̻,Ẁ̼,W},
9699     X = {Ẋ,Ẋ̄,Ẋ̅,Ẋ̆,Ẋ̇,Ẋ̈,Ẋ̉,Ẋ̊,Ẋ̋,Ẋ̌,Ẋ̍,Ẋ̎,Ẋ̏,Ẋ̐,Ẋ̑,Ẋ̒,Ẋ̓,Ẋ̔,Ẋ̕,Ẋ̖,Ẋ̗,Ẋ̘,Ẋ̙,Ẋ̚,Ẋ̛,Ẋ̜,Ẋ̝,Ẋ̞,Ẋ̟,Ẋ̠,Ẋ̡,Ẋ̢,Ẋ̣,Ẋ̤,Ẋ̥,Ẋ̦,Ẋ̧,Ẋ̨,Ẋ̩,Ẋ̪,Ẋ̫,Ẋ̬,Ẋ̭,Ẋ̮,Ẋ̯,Ẋ̰,Ẋ̱,Ẋ̲,Ẋ̳,Ẋ̴,Ẋ̵,Ẋ̶,Ẋ̷,Ẋ̸,Ẋ̹,Ẋ̺,Ẋ̻,Ẋ̼,X},
9700     Y = {Ỳ,Ỳ̄,Ỳ̅,Ỳ̆,Ỳ̇,Ỳ̈,Ỳ̉,Ỳ̊,Ỳ̋,Ỳ̌,Ỳ̍,Ỳ̎,Ỳ̏,Ỳ̐,Ỳ̑,Ỳ̒,Ỳ̓,Ỳ̔,Ỳ̕,Ỳ̖,Ỳ̗,Ỳ̘,Ỳ̙,Ỳ̚,Ỳ̛,Ỳ̜,Ỳ̝,Ỳ̞,Ỳ̟,Ỳ̠,Ỳ̡,Ỳ̢,Ỵ̀,Ỳ̤,Ỳ̥,Ỳ̦,Ỳ̧,Ỳ̨,Ỳ̩,Ỳ̪,Ỳ̫,Ỳ̬,Ỳ̭,Ỳ̮,Ỳ̯,Ỳ̰,Ỳ̱,Ỳ̲,Ỳ̳,Ỳ̴,Ỳ̵,Ỳ̶,Ỳ̷,Ỳ̸,Ỳ̹,Ỳ̺,Ỳ̻,Ỳ̼,Y},
9701     Z = {Ẑ,Ẑ̄,Ẑ̅,Ẑ̆,Ẑ̇,Ẑ̈,Ẑ̉,Ẑ̊,Ẑ̋,Ẑ̌,Ẑ̍,Ẑ̎,Ẑ̏,Ẑ̐,Ẑ̑,Ẑ̒,Ẑ̓,Ẑ̔,Ẑ̕,Ẑ̖,Ẑ̗,Ẑ̘,Ẑ̙,Ẑ̚,Ẑ̛,Ẑ̜,Ẑ̝,Ẑ̞,Ẑ̟,Ẑ̠,Ẑ̡,Ẑ̢,Ẓ̂,Ẑ̤,Ẑ̥,Ẑ̦,Ẑ̧,Ẑ̨,Ẑ̩,Ẑ̪,Ẑ̫,Ẑ̬,Ẑ̭,Ẑ̮,Ẑ̯,Ẑ̰,Ẕ̂,Ẑ̲,Ẑ̳,Ẑ̴,Ẑ̵,Ẑ̶,Ẑ̷,Ẑ̸,Ẑ̹,Ẑ̺,Ẑ̻,Ẑ̼,Z},
9702     a = {ă,â,ă̄,ă̅,ă̆,ă̇,ă̈,ẳ,ă̊,ă̋,ă̌,ă̍,ă̎,ă̏,ă̐,ă̑,ă̒,ă̓,ă̔,ă̕,ă̖,ă̗,ă̘,ă̙,ă̚,ă̛,ă̜,ă̝,ă̞,ă̟,ă̠,ă̡,ă̢,ặ,ă̤,ḁ̆,ă̦,ă̧,ą̆,ă̩,ă̪,ă̫,ă̬,ă̭,ă̮,ă̯,ă̰,ă̱,ă̲,ă̳,ă̴,ă̵,ă̶,ă̷,ă̸,ă̹,ă̺,ă̻,ă̼,a}, % a°
9703     b = {ḃ,ḃ̄,ḃ̅,ḃ̆,ḃ̇,ḃ̈,ḃ̉,ḃ̊,ḃ̋,ḃ̌,ḃ̍,ḃ̎,ḃ̏,ḃ̐,ḃ̑,ḃ̒,ḃ̓,ḃ̔,ḃ̕,ḃ̖,ḃ̗,ḃ̘,ḃ̙,ḃ̚,ḃ̛,ḃ̜,ḃ̝,ḃ̞,ḃ̟,ḃ̠,ḃ̡,ḃ̢,ḅ̇,ḃ̤,ḃ̥,ḃ̦,ḃ̧,ḃ̨,ḃ̩,ḃ̪,ḃ̫,ḃ̬,ḃ̭,ḃ̮,ḃ̯,ḃ̰,ḇ̇,ḃ̲,ḃ̳,ḃ̴,ḃ̵,ḃ̶,ḃ̷,ḃ̸,ḃ̹,ḃ̺,ḃ̻,ḃ̼,b},
9704     c = {ç,ç̄,ç̅,ç̆,ç̇,ç̈,ç̉,ç̊,ç̋,ç̌,ç̍,ç̎,ç̏,ç̐,ç̑,ç̒,ç̓,ç̔,ç̕,ç̖,ç̗,ç̘,ç̙,ç̚,ç̛,ç̜,ç̝,ç̞,ç̟,ç̠,ç̡,ç̢,ç̣,ç̤,ç̥,ç̦,ç̧,ç̨,ç̩,ç̪,ç̫,ç̬,ç̭,ç̮,ç̯,ç̰,ç̱,ç̲,ç̳,ç̴,ç̵,ç̶,ç̷,ç̸,ç̹,ç̺,ç̻,ç̼,c},
9705     d = {ḏ,ḏ̄,ḏ̅,ḏ̆,ḏ̇,ḏ̈,ḏ̉,ḏ̊,ḏ̋,ḏ̌,ḏ̍,ḏ̎,ḏ̏,ḏ̐,ḏ̑,ḏ̒,ḏ̓,ḏ̔,ḏ̕,ḏ̖,ḏ̗,ḏ̘,ḏ̙,ḏ̚,ḏ̛,ḏ̜,ḏ̝,ḏ̞,ḏ̟,ḏ̠,ḏ̡,ḏ̢,ḏ̣,ḏ̤,ḏ̥,ḏ̦,ḑ̱,ḏ̨,ḏ̩,ḏ̪,ḏ̫,ḏ̬,ḏ̭,ḏ̮,ḏ̯,ḏ̰,ḏ̱,ḏ̲,ḏ̳,ḏ̴,ḏ̵,ḏ̶,ḏ̷,ḏ̸,ḏ̹,ḏ̺,ḏ̻,ḏ̼,d},
9706     e = {è,é,ê,ë,ē,ē̄,ē̅,ē̆,ē̇,ē̈,ē̉,ē̊,ē̋,ē̌,ē̍,ē̎,ē̏,ē̐,ē̑,ē̒,ē̓,ē̔,ē̕,ē̖,ē̗,ē̘,ē̙,ē̚,ē̛,ē̜,ē̝,ē̞,ē̟,ē̠,ē̡,ē̢,ẹ̄,ē̤,ē̥,ē̦,ȩ̄,ę̄,ē̩,ē̪,ē̫,ē̬,ḙ̄,ē̮,ē̯,ḛ̄,ē̱,ē̲,ē̳,ē̴,ē̵,ē̶,ē̷,ē̸,ē̹,ē̺,ē̻,ē̼,e},
9707     f = {ff},
9708     g = {ğ,ğ̄,ğ̅,ğ̆,ğ̇,ğ̈,ğ̉,ğ̊,ğ̋,ğ̌,ğ̍,ğ̎,ğ̏,ğ̐,ğ̑,ğ̒,ğ̓,ğ̔,ğ̕,ğ̖,ğ̗,ğ̘,ğ̙,ğ̚,ğ̛,ğ̜,ğ̝,ğ̞,ğ̟,ğ̠,ğ̡,ğ̢,ğ̣,ğ̤,ğ̥,ğ̦,ģ̆,ğ̨,ğ̩,ğ̪,ğ̫,ğ̬,ğ̭,ğ̮,ğ̯,ğ̰,ğ̱,ğ̲,ğ̳,ğ̴,ğ̵,ğ̶,ğ̷,ğ̸,ğ̹,ğ̺,ğ̻,ğ̼,g},
9709     h = {ḥ,ḥ̄,ḥ̅,ḥ̆,ḥ̇,ḥ̈,ḥ̉,ḥ̊,ḥ̋,ḥ̌,ḥ̍,ḥ̎,ḥ̏,ḥ̐,ḥ̑,ḥ̒,ḥ̓,ḥ̔,ḥ̕,ḥ̖,ḥ̗,ḥ̘,ḥ̙,ḥ̚,ḥ̛,ḥ̜,ḥ̝,ḥ̞,ḥ̟,ḥ̠,ḥ̡,ḥ̢,ḥ̣,ḥ̤,ḥ̥,ḥ̦,ḩ̣,ḥ̨,ḥ̩,ḥ̪,ḥ̫,ḥ̬,ḥ̭,ḥ̮,ḥ̯,ḥ̰,ḥ̱,ḥ̲,ḥ̳,ḥ̴,ḥ̵,ḥ̶,ḥ̷,ḥ̸,ḥ̹,ḥ̺,ḥ̻,ḥ̼,h},
9710     i = {ı,İ̇,İ̈,İ̉,İ̊,İ̋,İ̌,İ̍,İ̎,İ̏,İ̐,İ̑,İ̒,İ̓,İ̔,İ̕,İ̖,İ̗,İ̘,İ̙,İ̚,İ̛,İ̜,İ̝,İ̞,İ̟,İ̠,İ̡,İ̢,Ị̇,İ̤,İ̥,İ̦,İ̧,Į̇,İ̩,İ̪,İ̫,İ̬,İ̭,İ̮,İ̯,Ḭ̇,İ̱,İ̲,İ̳,İ̴,İ̵,İ̶,İ̷,İ̸,İ̹,İ̺,İ̻,İ̼,i},
9711     j = {ȷ},
9712     k = {ḵ,ḵ̄,ḵ̅,ḵ̆,ḵ̇,ḵ̈,ḵ̉,ḵ̊,ḵ̋,ḵ̌,ḵ̍,ḵ̎,ḵ̏,ḵ̐,ḵ̑,ḵ̒,ḵ̓,ḵ̔,ḵ̕,ḵ̖,ḵ̗,ḵ̘,ḵ̙,ḵ̚,ḵ̛,ḵ̜,ḵ̝,ḵ̞,ḵ̟,ḵ̠,ḵ̡,ḵ̢,ḵ̣,ḵ̤,ḵ̥,ḵ̦,ķ̱,ḵ̨,ḵ̩,ḵ̪,ḵ̫,ḵ̬,ḵ̭,ḵ̮,ḵ̯,ḵ̰,ḵ̱,ḵ̲,ḵ̳,ḵ̴,ḵ̵,ḵ̶,ḵ̷,ḵ̸,ḵ̹,ḵ̺,ḵ̻,ḵ̼,k},
9713     l = {ĺ,ĺ̇,ĺ̈,ĺ̉,ĺ̊,ĺ̋,ĺ̌,ĺ̍,ĺ̎,ĺ̏,ĺ̐,ĺ̑,ĺ̒,ĺ̓,ĺ̔,ĺ̕,ĺ̖,ĺ̗,ĺ̘,ĺ̙,ĺ̚,ĺ̛,ĺ̜,ĺ̝,ĺ̞,ĺ̟,ĺ̠,ĺ̡,ĺ̢,ḷ́,ĺ̤,ĺ̥,ĺ̦,ļ́,ĺ̨,ĺ̩,ĺ̪,ĺ̫,ĺ̬,ḽ́,ĺ̮,ĺ̯,ĺ̰,ḻ́,ĺ̲,ĺ̳,ĺ̴,ĺ̵,ĺ̶,ĺ̷,ĺ̸,ĺ̹,ĺ̺,ĺ̻,ĺ̼,l},

```

```

9714 m = {ṁ,m̈,m},
9715 n = {ṅ,n̈,n̉,n̊,n̋,ň,n̍,n̎}, % 'n
9716 o = {ò,ó,ô,õ,ö,ø,ō,ȯ,Ȱ,ȱ,Ȳ,ȳ,ȴ,ȵ,ȶ,ȷ,ȸ,ȹ,Ⱥ,Ȼ,ȼ,Ƚ,Ⱦ,ȿ,Ⱥ,Ȼ,ȼ,Ƚ,Ⱦ,ȿ},
9717 p = {ṗ,p̈},
9718 r = {ṙ,r̈,r̉,r̊,r̋,ř,r̍,r̎},
9719 s = {ṡ,s̈,s̉,s̊,s̋,š,s̍,s̎},
9720 t = {ṫ,ẗ,t̉,t̊,t̋,ť}, % t
9721 u = {ù,ú,û,ü,ũ,ű,ů,Ƞ,ȡ,Ȣ,ȣ,Ȥ,ȥ,Ȧ,ȧ,Ȩ,ȩ,Ȫ,ȫ,Ȭ,ȭ,Ȯ,ȯ,Ȱ,ȱ,Ȳ,ȳ,ȴ,ȵ,ȶ,ȷ,ȸ,ȹ,Ⱥ,Ȼ,ȼ,Ƚ,Ⱦ,ȿ},
9722 v = {v̇,v̈},
9723 w = {ẇ,ẅ,w̉,ẘ,w̋,w̌,w̍,w̎},
9724 x = {ẋ,ẍ},
9725 y = {ẏ,ÿ,ỷ,ẙ,y̋,y̌,y̍,y̎},
9726 z = {ż,z̈,z̉,z̊,z̋,ž},
9727 }
9728 (/Palatino)

```

### 3.1.5 Basic glyph set

There are quite a few fonts out there that don't even fill the T1 glyph set. To prevent a plethora of warnings, they may be aliased to the surrogate font TU-basic. Examples of such fonts are: Lato, Fontin and Bergamo.

```

9729 (*TU-basic)
9730 \DeclareCharacterInheritance
9731 { encoding = {TU,EU1,EU2},
9732   family = {TU-basic} }
9733 { A = {Ä,Å,À,Á,Â,Ã},
9734   a = {ä,å,à,á,â,ã},
9735   C = {Ç},
9736   c = {ç},
9737   D = {Ð},
9738   E = {Ê,É,Ê,Ë},
9739   e = {è,é,ê,ë},
9740   I = {Î,Í,Î,Ï},
9741   i = {ï,í,î,ï,ı},
9742   L = {Ł},
9743   l = {ł},
9744   N = {Ñ},
9745   n = {ñ},
9746   O = {Ø,Ö,Ô,Õ,Ö},
9747   o = {ø,ö,ô,õ,ö},
9748   S = {Š},
9749   s = {š},
9750   U = {Û,Ú,Û,Ü},
9751   u = {û,ú,û,ü},
9752   Y = {Ÿ,Ÿ},

```

For some reason, the **ÿ** in the next line comes out as **ß**. Don't worry, there's really a **y** diaeresis in the source.

```

9753 y = {ÿ,ß},
9754 Z = {Ž},
9755 z = {ž}
9756 }
9757 (/TU-basic)

```

### 3.1.6 Empty glyph set

Other fonts, e.g., the self-professedly awesome Font Awesome font, have no meaningful glyph arsenal at all, and should therefore be aliased so that empty settings are applied.

```

9758 (*TU-empty)
9759 \DeclareCharacterInheritance

```

```

9760 { encoding = {TU,EU1,EU2},
9761     family   = {TU-empty} }
9762 { }
9763 </TU-empty>

```

## 3.2 Character protrusion

```

9764
9765 %%% -----
9766 %%% PROTRUSION
9767

```

### 3.2.1 Latin Modern Roman/New Computer Modern

```

9768 <*LatinModernRoman|NewComputerModern>
9769 \SetProtrusion
9770 <LatinModernRoman> [ name = LMR-default ]
9771 <NewComputerModern> [ name = NCM-default ]
9772 <LatinModernRoman> { encoding = {TU,EU1,EU2},
9773 <LatinModernRoman>     family   = Latin Modern Roman }
9774 <NewComputerModern> { }
9775 {
9776     A = {50,50},
9777     Æ = {50, },
9778     F = { ,50},
9779     J = {50, },
9780     K = { ,50},
9781     L = { ,50},
9782     T = {50,50},
9783     V = {50,50},
9784     W = {50,50},
9785     X = {50,50},
9786     Y = {50,50},
9787     k = { ,50},
9788     r = { ,50},
9789     t = { ,70},
9790     v = {50,50},
9791     w = {50,50},
9792     x = {50,50},
9793     y = {50,70},
9794     0 = { ,50},
9795     1 = {100,200},
9796     2 = {50,50},
9797     3 = {50,50},
9798     4 = {70,70},
9799     5 = { ,50},
9800     6 = { ,50},
9801     7 = {50,100},
9802     8 = { ,50},
9803     9 = { ,50},
9804     . = { ,700},
9805     {,}= { ,500},
9806     := { ,500},
9807     ; = { ,500},
9808     ! = { ,100},
9809     ? = { ,200},
9810     @ = {50,50},
9811     ~ = {200,250},
9812     \% = {50,50},
9813     * = {300,300},
9814     + = {250,250},
9815     - = {400,500}, % /hyphen
9816     - = {400,300}, % /endash
9817     — = {300,200}, % /emdash
9818     _ = {200,200}, % /underscore

```

```

9819 / = {200,300},
9820 /backslash = {200,300},
9821 ' = {300,400}, % /quotesingle
9822 ‘ = {300,400}, ’ = {300,400},
9823 “ = {300,300}, ” = {300,300},
9824 , = {400,400}, „ = {400,400},
9825 ‹ = {400,400}, › = {300,500},
9826 « = {300,200}, » = {100,400},
9827 ¡ = {100, }, ¿ = {100, },
9828 ( = {300, }, ) = { ,300},
9829 < = {200,100}, > = {100,200},
9830 /braceleft = {400,200}, /braceright = {200,400},
9831 /angleleft = {400, }, /angleright = { ,400},
9832 † = {100,100},
9833 ‡ = { 80, 80},
9834 • = {200,200},
9835 · = {400,450}, % / periodcentered
9836 °C = { 80, 50},
9837 ℄ = { , 50},
9838 ° = {400,400},
9839 ™ = {100,200},
9840 © = {100,100},
9841 ® = {100,100},
9842 ª = {100,200},
9843 º = {100,200},
9844 ¹ = {200,250},
9845 ² = { 50,100},
9846 ³ = { 50,100},
9847 ¬ = {200, },
9848 − = {300,300},
9849 ± = {150,200},
9850 × = {150,250},
9851 ÷ = {150,250},
9852 € = {100, },
9853 < *LatinModernRoman >
9854 /one.oldstyle = {100,100},
9855 /two.oldstyle = { 50, 50},
9856 /three.oldstyle = { 30, 80},
9857 /four.oldstyle = { 50, 50},
9858 /seven.oldstyle = { 50, 80},
9859 < /LatinModernRoman >
9860 < *NewComputerModern >
9861 Α = {50,50}, % /Alphatonos
9862 Ά = {120,50}, %
9863 Ἀ = {120,50}, %
9864 Ἀ = {80,50}, %
9865 Ἀ = {220,50}, %
9866 Ἀ = {220,50}, %
9867 Ἀ = {170,50}, %
9868 Ἀ = {170,50}, %
9869 Ἀ = {190,50}, %
9870 Ἀ = {190,50}, %
9871 Ἀ = {150,50}, %
9872 Ἀ = {80,50}, %
9873 Ἀ = {220,50}, %
9874 Ἀ = {220,50}, %
9875 Ἀ = {170,50}, %
9876 Ἀ = {170,50}, %
9877 Ἀ = {210,50}, %
9878 Ἀ = {210,50}, %
9879 /uni1FBC.alt = {,205}, % Alpha prosgegrammeni
9880 /uni1F88.alt = {50,190}, %Alpha psili prosgegrammeni
9881 /uni1F89.alt = {,200}, %Alpha dasia prosgegrammeni
9882 /uni1F8A.alt = {130,180}, %Alpha psili baria prosgegrammeni
9883 /uni1F8B.alt = {130,190}, %Alpha dasia baria prosgegrammeni

```

```

9884 /uni1F8C.alt = {100,190}, %Alpha psili oxia prosgegrammeni
9885 /uni1F8D.alt = {70,190}, %Alpha dasia oxia prosgegrammeni
9886 /uni1F8E.alt = {120,190}, %Alpha psili perispomeni prosgegrammeni
9887 /uni1F8F.alt = {120,190}, %Alpha dasia perispomeni prosgegrammeni
9888 %
9889 /uni1FCC.alt = {205}, % Eta prosgegrammeni
9890 /uni1F98.alt = {185,170}, %Eta psili prosgegrammeni
9891 /uni1F99.alt = {185,170}, %Eta dasia prosgegrammeni
9892 /uni1F9A.alt = {220,170}, %Eta psili baria prosgegrammeni
9893 /uni1F9B.alt = {220,170}, %Eta dasia baria prosgegrammeni
9894 /uni1F9C.alt = {220,170}, %Eta psili oxia prosgegrammeni
9895 /uni1F9D.alt = {220,170}, %Eta dasia oxia prosgegrammeni
9896 /uni1F9E.alt = {255,170}, %Eta psili perispomeni prosgegrammeni
9897 /uni1F9F.alt = {255,170}, %Eta dasia perispomeni prosgegrammeni
9898 %
9899 O = {95,50}, %
9900 </NewComputerModern>
9901 Γ = { ,180}, % /Gamma
9902 <LatinModernRoman> Δ = {100,100}, % /Delta
9903 <NewComputerModern> Δ = {50,50}, % /Delta
9904 Θ = { 50, 50}, % /Theta
9905 <LatinModernRoman> Λ = {100,100}, % /Lambda
9906 <NewComputerModern> Λ = {50,50}, % /Lambda
9907 % Ξ = {,}, % /Xi
9908 % Π = {,}, % /Pi
9909 Σ = { 50, 50}, % /Sigma
9910 <LatinModernRoman> Υ = {100,100}, % /Upsilon
9911 <NewComputerModern> Υ = {80,80}, % /Upsilon
9912 Φ = { 50, 50}, % /Phi
9913 Ψ = { 50, 50}, % /Psi
9914 <NewComputerModern>
9915 Ω = { 20, 30}, % /Omega
9916 Ω = {150,30},
9917 Ω = {220,30},
9918 Ω = {205,30},
9919 Ω = {285,30},
9920 Ω = {285,30},
9921 Ω = {270,30},
9922 Ω = {270,30},
9923 Ω = {310,30},
9924 Ω = {310,30},
9925 Ω = {205,30},
9926 Ω = {205,30},
9927 Ω = {285,30},
9928 Ω = {285,30},
9929 Ω = {270,30},
9930 Ω = {270,30},
9931 Ω = {310,30},
9932 Ω = {310,30},
9933 /uni1FFC.alt = {,230}, % Omega prosgegrammeni
9934 /uni1FA8.alt = {185,190}, %Omega psili prosgegrammeni
9935 /uni1FA9.alt = {185,190}, %Omega dasia prosgegrammeni
9936 /uni1FAA.alt = {220,190}, %Omega psili baria prosgegrammeni
9937 /uni1FAB.alt = {220,190}, %Omega dasia baria prosgegrammeni
9938 /uni1FAC.alt = {220,190}, %Omega psili oxia prosgegrammeni
9939 /uni1FAD.alt = {220,190}, %Omega dasia oxia prosgegrammeni
9940 /uni1FAE.alt = {255,190}, %Omega psili perispomeni prosgegrammeni
9941 /uni1FAF.alt = {255,190}, %Omega dasia perispomeni prosgegrammeni
9942 %
9943 α = {,50},
9944 γ = {50,50},
9945 ζ = {,50},
9946 ϑ = {30,40},
9947 ι = {,50},
9948 ῑ = {-20,-30},

```

```

9949 x = {50,50},
9950 λ = {50,50},
9951 v = {50,25},
9952 π = {50,50},
9953 σ = {,50},
9954 c = {,50},
9955 τ = {50,50},
9956 χ = {50,50},
9957 ψ = {50,50},
9958 % /uni1F98.alt = {,},

```

CMU Serif doesn't include \*.end glyphs, and the OldStyle numbers' names differ.

```

9959 }
9960
9961 \SetProtrusion
9962 [ name = NCM-TU,
9963   load = NCM-default ]
9964 { encoding = {TU,EU1,EU2},
9965   family = {New Computer Modern} }
9966 {
9967   /a.end = {,330},
9968   /e.end = {,350},
9969   /k.alt = {,50},
9970   /r.end = {,300},
9971   /m.end = {,200},
9972   /n.end = {,300},
9973   /one.oldstyle = {100,100},
9974   /two.oldstyle = { 50, 50},
9975   /three.oldstyle = { 30, 80},
9976   /four.oldstyle = { 50, 50},
9977   /seven.oldstyle = { 50, 80},
9978 }
9979
9980 \SetProtrusion
9981 [ name = CMU-TU,
9982   load = NCM-default ]
9983 { encoding = {TU,EU1,EU2},
9984   family = {CMU Serif} }
9985 {
9986   /oneoldstyle = {100,100},
9987   /twooldstyle = { 50, 50},
9988   /threeoldstyle = { 30, 80},
9989   /fouroldstyle = { 50, 50},
9990   /sevenoldstyle = { 50, 80},
9991 }
9992 }
9993
9994 \SetProtrusion
9995 <LatinModernRoman> [ name = LMR-it ]
9996 <NewComputerModern> [ name = NCM-it ]
9997 <LatinModernRoman> { encoding = {TU,EU1,EU2},
9998 <LatinModernRoman>   family = Latin Modern Roman,
9999 <LatinModernRoman>   shape = {it,sl} }
10000 <NewComputerModern> { }
10001 {
10002 A = {125,100},
10003 Æ = {125,-55},
10004 B = {90,-40},
10005 C = {145,-75},
10006 D = {75,-28},
10007 E = {80,-55},
10008 F = {85,-80},
10009 G = {153,-15},
10010 H = {73,-60},
10011 I = {140,-120},

```

10012 IJ = {140,-80},  
10013 J = {135,-80},  
10014 K = {70,-30},  
10015 L = {87, 40},  
10016 M = {67,-45},  
10017 N = {75,-55},  
10018 O = {150,-30},  
10019 OE = {150,-55},  
10020 P = {82,-50},  
10021 Q = {150,-30},  
10022 R = {75, 15},  
10023 S = {90,-65},  
10024 \$ = {100,-20},  
10025 T = {220,-85},  
10026 U = {230,-55},  
10027 V = {260,-60},  
10028 W = {185,-55},  
10029 X = {70,-30},  
10030 Y = {250,-60},  
10031 Z = {90,-60},  
10032 a = {150,-10},  
10033 b = {170, },  
10034 c = {173,-10},  
10035 d = {150,-55},  
10036 e = {180, },  
10037 f = { , -250},  
10038 g = {150,-10},  
10039 h = {100, },  
10040 i = {210, },  
10041 ij = {210,-40},  
10042 j = { , -40},  
10043 k = {110,-50},  
10044 l = {240,-110},  
10045 m = {80, },  
10046 n = {115, },  
10047 o = {155, },  
10048 q = {170,-40},  
10049 r = {155,-40},  
10050 s = {130, },  
10051 t = {230,-10},  
10052 u = {120, },  
10053 v = {140,-25},  
10054 w = {98,-20},  
10055 x = {65,-40},  
10056 y = {130,-20},  
10057 z = {110,-80},  
10058 0 = {170,-85},  
10059 1 = {230,110},  
10060 2 = {130,-70},  
10061 3 = {140,-70},  
10062 4 = {130,80},  
10063 5 = {160, },  
10064 6 = {175,-30},  
10065 7 = {250,-150},  
10066 8 = {130,-40},  
10067 9 = {155,-80},  
10068 . = { , 500},  
10069 {,} = { , 450},  
10070 : = { , 300},  
10071 ; = { , 300},  
10072 & = {130,30},  
10073 \% = {180,50},  
10074 \* = {380,20},  
10075 + = {180,200},  
10076 @ = {180,10},



```

10077 ~ = {200,150},
10078 (= {300, }, ) = { ,70},
10079 / = {100,100},
10080 - = {500,300}, % /hyphen
10081 – = {500,300}, % /endash
10082 — = {400,170}, % /emdash
10083 _ = {100,200}, % /underscore
10084 ' = {300,400}, % /quotesingle
10085 " = {500,300},
10086 ‘ = {800,200}, ’ = {800,-20},
10087 “ = {540,100}, ” = {500,100},
10088 , = {300,700}, „ = {200,600},
10089 ‹ = {500,300}, › = {400,400},
10090 « = {400,100}, » = {200,300},
10091 ¡ = {200, }, ¿ = {200, },
10092 < = {300,100}, > = {200,100},
10093 /backslash = {300,300},
10094 /braceleft = {400,100}, /braceright = {200,200},
10095 † = {200, 80},
10096 ‡ = {120, 80},
10097 • = {220,100},
10098 · = {550,300}, % / periodcentered
10099 °C = {170, },
10100 ¢ = {100, 50},
10101 ¶ = {200, },
10102 ° = {500,300},
10103 ™ = {200, 70},
10104 © = { 50, 70},
10105 ® = { 50, 70},
10106 º = {140,100},
10107 º = {140,100},
10108 ¹ = {400,150},
10109 ² = {250, 80},
10110 ³ = {250, 80},
10111 ¬ = {250, 80},
10112 – = {300,200},
10113 ± = {150,170},
10114 × = {200,200},
10115 ÷ = {200,200},
10116 € = {150, },
10117 < *LatinModernRoman >
10118 /one.oldstyle = {100,100},
10119 /two.oldstyle = {100, 80},
10120 /three.oldstyle = { 80, 50},
10121 /four.oldstyle = { 80, 80},
10122 /five.oldstyle = { 50, },
10123 /six.oldstyle = { 50, },
10124 /seven.oldstyle = { 80, 80},
10125 /eight.oldstyle = { 50, },
10126 < /LatinModernRoman >
10127 Γ = {100,120}, % /Gamma
10128 Δ = {120,100}, % /Delta
10129 Θ = {120, 50}, % /Theta
10130 < LatinModernRoman > Λ = {130,100}, % /Lambda
10131 < NewComputerModern > Λ = {160,100}, % /Lambda
10132 Ξ = {100,}, % /Xi
10133 Π = {100,}, % /Pi
10134 Σ = {100, 50}, % /Sigma
10135 < LatinModernRoman > Υ = {180,100}, % /Upsilon
10136 < NewComputerModern > Υ = {260,100}, % /Upsilon
10137 Φ = {130, 70}, % /Phi
10138 Ψ = {130, 50}, % /Psi
10139 Ω = { 50,}, % /Omega
10140 < *NewComputerModern >
10141 Α = {190,50}, %

```

```

10142  Å = {220,50}, %
10143  Å = {200,50}, %
10144  Å = {300,50}, %
10145  Å = {300,50}, %
10146  Å = {300,50}, %
10147  Å = {300,50}, %
10148  Å = {320,50}, %
10149  Å = {320,50}, %
10150  Å = {200,50}, %
10151  Å = {200,50}, %
10152  Å = {300,50}, %
10153  Å = {300,50}, %
10154  Å = {300,50}, %
10155  Å = {300,50}, %
10156  Å = {320,50}, %
10157  Å = {320,50}, %
10158  /uni1FBC.alt = {,205}, % Alpha prosgegrammeni
10159  /uni1F88.alt = {50,190}, %Alpha psili prosgegrammeni
10160  /uni1F89.alt = {,200}, %Alpha dasia prosgegrammeni
10161  /uni1F8A.alt = {130,180}, %Alpha psili baria prosgegrammeni
10162  /uni1F8B.alt = {130,190}, %Alpha dasia baria prosgegrammeni
10163  /uni1F8C.alt = {100,190}, %Alpha psili oxia prosgegrammeni
10164  /uni1F8D.alt = {70,190}, %Alpha dasia oxia prosgegrammeni
10165  /uni1F8E.alt = {120,190}, %Alpha psili perispomeni prosgegrammeni
10166  /uni1F8F.alt = {120,190}, %Alpha dasia perispomeni prosgegrammeni
10167  %
10168  /uni1FCC.alt = {,205}, % Eta prosgegrammeni
10169  /uni1F98.alt = {185,170}, %Eta psili prosgegrammeni
10170  /uni1F99.alt = {185,170}, %Eta dasia prosgegrammeni
10171  /uni1F9A.alt = {220,170}, %Eta psili baria prosgegrammeni
10172  /uni1F9B.alt = {220,170}, %Eta dasia baria prosgegrammeni
10173  /uni1F9C.alt = {220,170}, %Eta psili oxia prosgegrammeni
10174  /uni1F9D.alt = {220,170}, %Eta dasia oxia prosgegrammeni
10175  /uni1F9E.alt = {255,170}, %Eta psili perispomeni prosgegrammeni
10176  /uni1F9F.alt = {255,170}, %Eta dasia perispomeni prosgegrammeni
10177  %
10178  O = {95,50}, %
10179  Ω = {120,30}, % /Omega
10180  Ω = {160,30},
10181  Ω = {250,30},
10182  Ω = {250,30},
10183  Ω = {300,30},
10184  Ω = {300,30},
10185  Ω = {300,30},
10186  Ω = {300,30},
10187  Ω = {330,30},
10188  Ω = {330,30},
10189  Ω = {30,30},
10190  Ω = {230,30},
10191  Ω = {230,30},
10192  Ω = {300,30},
10193  Ω = {300,30},
10194  Ω = {300,30},
10195  Ω = {300,30},
10196  Ω = {330,30},
10197  Ω = {330,30},
10198  /uni1FFC.alt = {,230}, % Omega prosgegrammeni
10199  /uni1FA8.alt = {185,190}, %Omega psili prosgegrammeni
10200  /uni1FA9.alt = {185,190}, %Omega dasia prosgegrammeni
10201  /uni1FAA.alt = {220,190}, %Omega psili baria prosgegrammeni
10202  /uni1FAB.alt = {220,190}, %Omega dasia baria prosgegrammeni
10203  /uni1FAC.alt = {220,190}, %Omega psili oxia prosgegrammeni
10204  /uni1FAD.alt = {220,190}, %Omega dasia oxia prosgegrammeni
10205  /uni1FAE.alt = {255,190}, %Omega psili perispomeni prosgegrammeni
10206  /uni1FAF.alt = {255,190}, %Omega dasia perispomeni prosgegrammeni

```

```

10207 %
10208   α = {50,50},
10209   γ = {100,50},
10210   δ = {30,50},
10211   ε = {30,},
10212   ζ = {20,50},
10213   θ = {30,40},
10214   ι = {,50},
10215   ï = {-20,-30},
10216   κ = {50,50},
10217   λ = {-20,50},
10218   ν = {50,25},
10219   ο = {40,},
10220   π = {50,50},
10221   σ = {40,50},
10222   ς = {20,50},
10223   τ = {50,50},
10224   υ = {80,},
10225   φ = {80,},
10226   χ = {20,},
10227   ψ = {80,},
10228 % /uni1F98.alt = {,},
10229 }
10230
10231 \SetProtrusion
10232 [ name = NCM-it-TU,
10233   load = NCM-it ]
10234 { encoding = {TU,EU1,EU2},
10235   family = {New Computer Modern},
10236   shape = {it,sl} }
10237 {
10238   /a.end = {,330}, %Fix
10239   /e.end = {,350}, %Fix
10240   /k.alt = {,50}, %Fix
10241   /r.end = {,300}, %Fix
10242   /m.end = {,200}, %Fix
10243   /n.end = {,300}, %Fix
10244   /one.oldstyle = {100,100},
10245   /two.oldstyle = {100,80},
10246   /three.oldstyle = {80,50},
10247   /four.oldstyle = {80,80},
10248   /five.oldstyle = {50,},
10249   /six.oldstyle = {50,},
10250   /seven.oldstyle = {80,80},
10251   /eight.oldstyle = {50,},
10252 }
10253
10254 \SetProtrusion
10255 [ name = CMU-it-TU,
10256   load = NCM-it ]
10257 { encoding = {TU,EU1,EU2},
10258   family = {CMU Serif},
10259   shape = {it,sl} }
10260 {
10261   /oneoldstyle = {100,100},
10262   /twooldstyle = {100,80},
10263   /threeoldstyle = {80,50},
10264   /fouroldstyle = {80,80},
10265   /fiveoldstyle = {50,},
10266   /sixoldstyle = {50,},
10267   /sevenoldstyle = {80,80},
10268   /eightoldstyle = {50,},
10269 </NewComputerModern>
10270 }
10271 </LatinModernRoman|NewComputerModern>

```

### 3.2.2 Charis SIL

```

10272 (*CharisSIL)
10273 \SetProtrusion
10274 [ name = Charis-default ]
10275 { encoding = {TU,EU1,EU2},
10276   family = Charis SIL }
10277 {
10278   A = {50,50},
10279   Æ = {50,50},
10280   C = {50, },
10281   D = { ,50},
10282   F = { ,50},
10283   G = {50, },
10284   J = {100, },
10285   K = { ,50},
10286   L = { ,50},
10287   Ḷ = { ,100},
10288   O = {50,50},
10289   Œ = {50, },
10290   P = { ,50},
10291   Q = {50,70},
10292   R = { ,50},
10293   ß = { ,40}, % capital sharp s
10294   T = {50,50},
10295   V = {50,50},
10296   W = {50,50},
10297   X = {50,50},
10298   Y = {50,50},
10299   k = { ,50},
10300   ḷ = { ,150},
10301   r = { ,50},
10302   t = { ,50},
10303   v = {50,50},
10304   w = {50,50},
10305   x = {50,50},
10306   y = { ,50},
10307   1 = {150,150},
10308   2 = {50,50},
10309   3 = {50, },
10310   4 = {100,50},
10311   6 = {50, },
10312   7 = {50,80},
10313   9 = {50,50},
10314   . = { ,600},
10315   {,} = { ,500},
10316   : = { ,400},
10317   ; = { ,300},
10318   ! = { ,100},
10319   ? = { ,200},
10320   @ = {50,50},
10321   ~ = {200,250},
10322   \% = { ,50},
10323   * = {300,300},
10324   + = {200,250},
10325   / = { ,200},
10326   /backslash = {150,200},
10327   | = {200,200},
10328   - = {400,500}, % hyphen
10329   - = {200,300}, % endash
10330   — = {150,250}, % emdash
10331   — = {200,200}, % Horizontal Bar = \texttwelveudash
10332   - = {150,150}, % Figure Dash = \textthreequartersemdash
10333   _ = {100,100},
10334   {=} = {100,100},

```

```

10335   ‘ = {300,400}, ’ = {300,400},
10336   “ = {300,300}, ” = {300,300},
10337   , = {400,400}, „ = {300,300},
10338   < = {400,300}, > = {300,400},
10339   « = {200,200}, » = {150,300},
10340   ¡ = {100, }, ¿ = {100, },
10341   ( = {200, }, ) = { ,200},
10342   < = {200,150}, > = {100,200},
10343   [ = {100, }, ] = { ,100},
10344   /braceleft = {200, }, /braceright = { ,300},
10345   † = { 80, 80},
10346   ‡ = {100,100},
10347   • = {200,200},
10348   ° = {150,200},
10349   ™ = {150,150},
10350   ¢ = { 50, },
10351   £ = { 50, },
10352   ¦ = {200,200},
10353   © = {100,100},
10354   ® = {100,100},
10355   º = {100,200},
10356   ¸ = {200,200},
10357   ¬ = {200, 50},
10358   μ = { ,100},
10359   ¶ = { ,100},
10360   · = {300,400},
10361   ¹ = {200,300},
10362   º = {100,200},
10363   ³ = {100,200},
10364   € = {100, },
10365   ± = {150,200},
10366   × = {200,200},
10367   ÷ = {250,250},
10368   /minus = {200,200},
10369   − = {200,200},
10370   % Cyrillic
10371   Б = { ,50},
10372   Г = { ,130},
10373   Ж = {50,50},
10374   З = {30,50},
10375   Л = {50, },
10376   У = {50,50},
10377   Ф = {50,50},
10378   Ч = {100, },
10379   Ъ = { ,50},
10380   б = { ,50},
10381   ѓ = {50,50},
10382   ю = { ,40},
10383   я = {50, },
10384   V = {50,50},
10385   € = {50, },
10386   Ъ = {50,100},
10387   € = {50, },
10388   Ъ = {50,50},
10389   Ъ = { ,50},
10390   Ъ = {50,50},
10391   Ъ = {100,100},
10392   Ъ = {50,50},
10393   Ъ = { ,50},
10394   Ъ = { ,50},
10395   Ъ = {50,80},
10396   Ъ = { ,80},
10397   Ъ = {50,50},
10398   Ъ = {50, },
10399   Ъ = {50,40},

```

```

10400   K = { ,50},
10401   Æ = {50, },
10402   J̥ = { ,50},
10403   H̥ = { ,50},
10404   d̥ = { ,100},
10405   ǫ = {50,50},
10406   ɾ = { ,70},
10407   ƙ = { ,50},
10408   ɭ = {50, },
10409   ɮ = {50,50},
10410   ϕ = {50,50},
10411   ч = {50, },
10412   ъ = { ,50},
10413   Ъ = { ,50},
10414   э = { ,50},
10415   я = {50, },
10416   љ = {50, },
10417   Ѣ = { ,50},
10418   Ъ = { ,50},
10419   v = {50,50},
10420   ƣ = {50, },
10421   Ъ = { ,50},
10422   ʎ = {50,50},
10423   Ъ = { ,50},
10424   Ъ = { ,50},
10425   d̥ = { ,100},
10426   ʒ = {100,100},
10427   ʒ = {50,50},
10428   ɭ = {50,70},
10429   ɮ = { ,70},
10430   æ = {50,30},
10431   Ъ = { ,50},
10432   Ъ = { ,50},
10433   %   Д П Ц Ш Щ Ъ Ы Ь Ѡ ѡ Ѣ ѣ Ѥ ѥ Ѧ ѧ Ѩ ѩ
10434   %   в д ж з и м н п ц ш щ ю ѧ ѧ ѧ ѧ ѧ ѧ ѧ ѧ ѧ ѧ
10435   % Greek
10436   Δ = {50,50},
10437   Ψ = {50,50},
10438   γ = {70,70},
10439   λ = {40,70},
10440   π = {40,50},
10441   ρ = { ,50},
10442   σ = { ,50},
10443   χ = {50,50},
10444 }
10445
10446 \SetProtrusion
10447 [ name = Charis-it ]
10448 { encoding = {TU,EU1,EU2},
10449   family = Charis SIL,
10450   shape = {it,sl} }
10451 {
10452   C = {50, },
10453   G = {50, },
10454   J = {50, },
10455   L = {50,50},
10456   O = {50, },
10457   Œ = {50, },
10458   Q = {50, },
10459   S = {50, },
10460   $ = {50, },
10461   T = {70, },
10462   o = {50,50},
10463   p = { ,50},
10464   q = {50, },

```

```

10465     t = { ,50},
10466     w = { ,50},
10467     y = { ,50},
10468     1 = {150,100},
10469     3 = {50, },
10470     4 = {100, },
10471     6 = {50, },
10472     7 = {100, },
10473     . = { ,700},
10474     {,}= { ,600},
10475     : = { ,400},
10476     ; = { ,400},
10477     ? = { ,150},
10478     & = { ,80},
10479     \% = {50,50},
10480     * = {300,200},
10481     + = {250,250},
10482     @ = {80,50},
10483     ~ = {150,150},
10484     / = { ,150},
10485     /backslash = {150,150},
10486     - = {300,400}, % hyphen
10487     – = {200,300}, % endash
10488     — = {150,200}, % emdash
10489     _ = { ,100},
10490     {=} = {200,200},
10491     ± = {150,200},
10492     × = {250,250},
10493     ÷ = {250,250},
10494     ° = {150,200},
10495     · = {300,400},
10496     ‘ = {400,200}, ’ = {400,200},
10497     “ = {300,200}, ” = {400,200},
10498     , = {200,500}, „ = {150,500},
10499     ‹ = {300,400}, › = {200,500},
10500     « = {200,300}, » = {150,400},
10501     ( = {200, }, ) = { ,200},
10502     < = {200,200}, > = {200,200},
10503     /braceleft = {300, }, /braceright = { ,200},
10504     % Cyrillic
10505     Ж = {50,30},
10506     Л = {50, },
10507     У = {50,30},
10508     Ф = {50, },
10509     Ч = {100, },
10510     Ъ = { ,50},
10511     Ь = { ,50},
10512     Э = {50,50},
10513     Я = {50, },
10514     В = {50,50},
10515     Љ = {50,50},
10516     Њ = {140,100},
10517     Ћ = {70,50},
10518     Ќ = {50,80},
10519     Ў = { ,80},
10520     Ъ = {50,50},
10521     Г = {50,50},
10522     Д = {50,30},
10523     М = {50, },
10524     Ф = {50, },
10525     Ч = {50, },
10526     Ъ = { ,50},
10527     Ь = { ,50},
10528     Э = { ,50},
10529     Я = {50, },

```

```

10530     њ = {50,50},
10531     Њ = { ,50},
10532     ѵ = {50,50},
10533     Ћ = { ,50},
10534     џ = {140,100},
10535     ʒ = {70,50},
10536     џ = {50,70},
10537     Ћ = { ,70},
10538     % Greek
10539     Γ = { ,130},
10540     Δ = {50,50},
10541     Ψ = {50,50},
10542     γ = {70,70},
10543     λ = {40,70},
10544     π = {40,50},
10545     ρ = { ,50},
10546     σ = { ,50},
10547     χ = {50,50},
10548 }

```

The small caps glyph names in Charis SIL have changed with version 5.0 of the font. We try to get the names right both with LuaTeX (where we can simply query the font version) and with XeTeX (where we check for glyph name).

```

10549
10550 % quick and dirty -- maybe we'll promote this to a
10551 % regular key some time
10552 \define@key{MT@pr@c}{command}{\csname #1\endcsname}
10553
10554 % glyph names have changed with version 5.0 of Charis SIL:
10555 % before: /a.SC, /b.SC, ...
10556 % after:  /a.sc, /b.sc, ...
10557 \ifx\MT@lua\undefined
10558   \gdef\MT@get@CHARIS@SC{
10559     % test whether glyph "a.sc" exists
10560     \ifnum\numexpr\XeTeXglyphindex "a.sc"\relax > 0
10561       \gdef\MT@CHARIS@SC{sc}%
10562     \else
10563       \gdef\MT@CHARIS@SC{SC}%
10564     \fi
10565   }
10566 \else
10567   \gdef\MT@get@CHARIS@SC{
10568     \gdef\MT@CHARIS@SC{\MT@lua{
10569       % check font version
10570       % -- why doesn't this work?:
10571       %   f = font.getfont(font.current());
10572       %   i = fontloader.info(f.filename);
10573       %   if (tonumber(i.version) < 5) then;
10574       %     if (tonumber(fontloader.info(font.getfont(font.current()).filename).version) < 5) then;
10575       %       tex.print("SC");
10576       %     else;
10577       %       tex.print("sc");
10578       %   end
10579     }}
10580   }
10581 \fi
10582
10583 \SetProtrusion
10584 [ name      = Charis-sc,
10585   load      = Charis-default,
10586   command   = {MT@get@CHARIS@SC} ]
10587 { encoding = {TU,EU1,EU2},
10588   family   = Charis SIL,
10589   shape     = {sc} }

```



```

10590 {
10591 %   A = {100,100}, % etc., doesn't work with \textsc
10592   /a.\MT@CHARIS@SC = {100,100},
10593   /c.\MT@CHARIS@SC = {50, },
10594   /d.\MT@CHARIS@SC = { ,50},
10595   /f.\MT@CHARIS@SC = { ,50},
10596   /g.\MT@CHARIS@SC = {50, },
10597   /j.\MT@CHARIS@SC = {100, },
10598   /k.\MT@CHARIS@SC = { ,50},
10599   /l.\MT@CHARIS@SC = { ,50},
10600 /f_l.\MT@CHARIS@SC = { ,50},
10601   /o.\MT@CHARIS@SC = {50,50},
10602   /oe.\MT@CHARIS@SC = {50, },
10603   /q.\MT@CHARIS@SC = {50,70},
10604   /r.\MT@CHARIS@SC = { ,50},
10605   /t.\MT@CHARIS@SC = {50,100},
10606   /v.\MT@CHARIS@SC = {50,50},
10607   /w.\MT@CHARIS@SC = {50,50},
10608   /x.\MT@CHARIS@SC = {50,50},
10609   /y.\MT@CHARIS@SC = {50,50}
10610 }
10611 <CharisSIL>

```

### 3.2.3 EB Garamond

```

10612 <*EBGaramond>
10613 \SetProtrusion
10614 [ name      = EBGaramond-TU,
10615   load      = EBGaramond-T1-LF ]
10616 { encoding = {TU,EU1,EU2},
10617   family   = EBGaramond }
10618 {
10619   /one.tosf = {150,150},
10620   /two.tosf = {50,50},
10621   /three.tosf = {50,50},
10622   /four.tosf = {50,50},
10623   /five.tosf = {50,50},
10624   /six.tosf = {50,50},
10625   /seven.tosf = {50,80},
10626   /eight.tosf = {50,50},
10627   /nine.tosf = {50,50},
10628   /one.lf = {50,50},
10629   /two.lf = {50,50},
10630   /four.lf = {50,50},
10631   /seven.lf = {50,50},
10632   /one.osf = {50,50},
10633   /two.osf = {50,50},
10634   /four.osf = {50,50},
10635   /seven.osf = {50,50},
10636   IV = { , 35},
10637   VI = { 35, },
10638   VII = { 30, },
10639   VIII = { 25, },
10640   IX = { , 35},
10641   XI = { 35, },
10642   XII = { 30, },
10643   iv = { , 25},
10644   vi = { 25, },
10645   vii = { 20, },
10646   viii = { 20, },
10647   ix = { , 25},
10648   xi = { 25, },
10649   xii = { 20, },
10650 % textcomp
10651 \textquotesingle = {400,500},
10652 _ = {200,250},

```

```

10653 f = { ,100},
10654 ℄ = { 50, },
10655 † = {100,100},
10656 ‡ = { 80, 80},
10657 • = { ,100},
10658 · = {300,400}, % periodcentered
10659 /twodotenleader = {150,200},
10660 /ellipsis = {100,150},
10661 °C = { 80, },
10662 ° = {400,400},
10663 ™ = {100,100},
10664 © = {100,100},
10665 ® = {100,100},
10666 º = {200,200},
10667 º = {200,200},
10668 ¹ = {200,200},
10669 º = {200,200},
10670 º = {200,200},
10671 ¬ = {200, },
10672 ¶ = { ,100},
10673 − = {300,300}, % minus
10674 ± = {150,200},
10675 × = {100,150},
10676 ÷ = {150,200},
10677 € = { 50,100},
10678 ¥ = { 50, 50},
10679 % Greek
10680 Γ = { ,150},
10681 Δ = {100,100},
10682 Θ = { 50, 50},
10683 Λ = {100,100},
10684 Ξ = { 50, 50},
10685 Υ = {100,100},
10686 Φ = { 50, 50},
10687 Ψ = { 50, 50},
10688 Ω = { , 50},
10689 ζ = { , 50},
10690 λ = { 50, 50},
10691 γ = { 50, 50},
10692 π = { 50, 50},
10693 ρ = { , 50},
10694 σ = { 50, 50},
10695 τ = { 50, 50},
10696 χ = { 50, 50},
10697 φ = { 50, 50},
10698 ϑ = { 50, 50},
10699 ψ = { 50, 50},
10700 % Cyrillic
10701 Γ = { ,150},
10702 Д = { 50, 50},
10703 Ж = { 50, 50},
10704 К = { , 50},
10705 Л = { 50, },
10706 Ъ = { 50, 50},
10707 З = { 50, 50},
10708 У = { 50,100},
10709 Ф = { 50, 50},
10710 Ч = { 70, },
10711 Я = { 50, },
10712 Ъ = { 50, 50},
10713 Ь = { , 50},
10714 ж = { 50, 50},
10715 ф = { 50, 50},
10716 ъ = { 50, 50},
10717 Ѣ = { 50, 50},

```

```

10718   r = {   , 50},
10719   V = { 50, 50},
10720 % other
10721   P = {   , 50},
10722   p = {   , 50},
10723   Δ = {100,100},
10724   (i) = { 35, 65},
10725   (a) = { 30, 60},
10726 }
10727
10728 \SetProtrusion
10729 [ name      = EBGaramond-it-TU,
10730   load      = EBGaramond-it-T1-LF ]
10731 { encoding = {TU,EU1,EU2},
10732   family   = EBGaramond,
10733   shape     = it }
10734 {
10735   /zero.tosf = {150,150},
10736   /one.tosf  = {150,150},
10737   /two.tosf  = {80,80},
10738   /three.tosf = {50,80},
10739   /four.tosf = {50,80},
10740   /five.tosf = {50,80},
10741   /six.tosf  = {50,50},
10742   /seven.tosf = {50,100},
10743   /eight.tosf = {50,50},
10744   /nine.tosf = {50,80},
10745   /one.lf    = {50,50},
10746   /two.lf    = {50,50},
10747   /three.lf  = {80,50},
10748   /four.lf   = {50,50},
10749   /five.lf   = {50,50},
10750   /six.lf    = {50,50},
10751   /seven.lf  = {50,50},
10752   /eight.lf  = {50,50},
10753   /nine.lf   = {50,   },
10754   /one.osf   = {50,50},
10755   /two.osf   = {50,50},
10756   /three.osf = {   ,80},
10757   /four.osf  = {50,50},
10758   /seven.osf = {50,50},
10759 % textcomp
10760   \textquotesingle = {800,100},
10761   − = {300,300}, % minus
10762   ¸ = {200,250},
10763   † = {200,100},
10764   ‡ = { 80, 80},
10765   • = {300,   },
10766   °C = {200,   },
10767   f = {100,   },
10768   Ø = {100,   },
10769   ™ = {200,   },
10770   © = {200,100},
10771   ® = {200,100},
10772   ¬ = {300,   },
10773   ° = {500,100},
10774   ± = {200,150},
10775   ¹ = {300,100},
10776   ² = {300,   },
10777   ³ = {300,   },
10778   · = {300,500}, % periodcentered
10779   /twodotenleader = {150,300},
10780   /ellipsis = {100,200},
10781   € = {100,   },
10782   × = {200,100},

```

```

10783   ÷ = {200,200},
10784   ¶ = { ,100},
10785   ª = {200,200},
10786   º = {200,200},
10787   ¥ = { 50, 50},
10788   % Greek
10789   Δ = {150,  },
10790   Θ = { 50,  },
10791   Λ = {150,  },
10792   Υ = {100, 50},
10793   Φ = { 50,  },
10794   Χ = { 50,  },
10795   Ψ = {100,  },
10796   Ω = { 50,  },
10797   γ = { , 50},
10798   λ = { 50,  },
10799   % Cyrillic
10800   Υ = { 50,  },
10801   Ч = {100,  },
10802   З = {100,  },
10803   % other
10804   Ъ = { 50, 50},
10805   ͂ = { , 50},
10806   }
10807
10808 \SetProtrusion
10809 [ name      = EBGaramond-sc-TU,
10810   load      = EBGaramond-TU ]
10811 { encoding = {TU,EU1,EU2},
10812   family   = EBGaramond,
10813   shape     = sc }
10814 {
10815   a = {50,50},
10816   \ae = {50,  },
10817   d = { ,50},
10818   f = { ,50},
10819   g = {50,  },
10820   j = {50,  },
10821   l = { ,50},
10822   o = {50,50},
10823   \oe = {50,  },
10824   q = {50,70},
10825   r = { , 0},
10826   t = {50,50},
10827   y = {50,50},
10828   % Greek
10829   α = {50,50},
10830   γ = { ,50},
10831   δ = {50,50},
10832   λ = {50,50},
10833   ο = {50,50},
10834   τ = {50,50},
10835   υ = {50,50},
10836   ψ = {50,50},
10837   % Cyrillic
10838   τ = {50,50},
10839   }
10840
10841 \SetProtrusion
10842 [ name      = EBGaramond-scit-TU,
10843   load      = EBGaramond-it-TU ]
10844 { encoding = {TU,EU1,EU2},
10845   family   = EBGaramond,
10846   shape     = scit }

```

```

10847 {
10848     a = {50,50},
10849     \ae = {50, },
10850     d = { ,50},
10851     f = { ,50},
10852     g = {50, },
10853     j = {50, },
10854     l = { ,50},
10855     o = {50,50},
10856     \oe = {50, },
10857     q = {50,70},
10858     r = { , 0},
10859     t = {50,50},
10860     y = {50,50},
10861     % Greek
10862     α = {50,50},
10863     γ = { ,50},
10864     δ = {50,50},
10865     λ = {50,50},
10866     ο = {50,50},
10867     τ = {50,50},
10868     υ = {50,50},
10869     ψ = {50,50},
10870     % Cyrillic
10871     τ = {50,50},
10872 }
10873 </EBGaramond>

```

### 3.2.4 Palatino

```

10874 <*Palatino>
10875 \SetProtrusion
10876 [ name      = palatino-default ]
10877 { encoding = {TU,EU1,EU2},
10878   family   = {Palatino} }
10879 {
10880     A = {50,50},
10881     D = { ,50},
10882     J = {50, },
10883     K = { ,50},
10884     L = { ,50},
10885     O = {25, },
10886     T = {50,50},
10887     V = {50,50},
10888     W = {50,50},
10889     X = {50,50},
10890     Y = {50,50},
10891     b = { ,25},
10892     d = {25,30},
10893     f = { ,50},
10894     g = { ,100},
10895     k = { ,50},
10896     p = { ,50},
10897     q = {50, },
10898     r = { ,50},
10899     t = { ,50}, ♦ = { ,50}, ♦ = { ,50},
10900     v = {75,50},
10901     w = {50,50},
10902     x = {50,50},
10903     y = {50,70},
10904     1 = {100,50},
10905     2 = {25,50},
10906     4 = {50, },
10907     6 = {50, },
10908     9 = {25, },

```

```

10909   Æ = {100, },
10910   Œ = {25, },
10911   . = { ,700},      .. = { ,350},      ... = {,150},
10912   {,} = { ,500},
10913   : = { ,500},
10914   ; = { ,500},
10915   ! = { ,100},      !! = { ,100},
10916   ? = { ,200},      ʔ = { ,200},
10917   @ = {50,50},
10918   ~ = {200,250},
10919   & = {50,100},
10920   \% = {100,100},
10921   * = {200,200},
10922   + = {250,250},
10923   ( = {100, },      ) = { ,300},
10924   / = {200,300},
10925   - = {400,500},
10926   \textendash      = {300,300},      \textemdash      = {200,200},
10927   \textquoteleft   = {500,700},      \textquoteright   = {500,700},
10928   \textquotedblleft = {300,400},      \textquotedblright = {300,400},
10929   \textbackslash     = {200,300},
10930   \quotesinglbase    = {400,400},      \quotedblbase     = {400,400},
10931   \guilsinglleft     = {400,400},      \guilsinglright    = {300,500},
10932   \guillemotleft     = {300,300},      \guillemotright    = {200,400},
10933   \textexclamdown    = {100, },      \textquestiondown  = {100, },
10934   \textbraceleft     = {400,200},      \textbraceright    = {200,400},
10935   \textless          = {200,100},      \textgreater       = {100,200},
10936   ≤                  = {200,100},      ≥                  = {100,200},
10937   \textminus         = {300,300},
10938   \texttrademark     = {200,200},
10939   \textcopyright     = {200,200},
10940   \textregistered    = {200,200},
10941   \textdegree        = {300,300},
10942   ¡                  = {450,500},      ¬                  = {250,150},
10943   ¯                  = {150,250},
10944   ·                  = {850, 700},
10945   ¶                  = {100,0},
10946   ×                  = {150, 300},
10947   ª                  = {300,300},      °                  = {300,300},
10948   ⁰ = {200,400},
10949   ¹ = {400,350},      ² = {200,300},      ³ = {250,400},
10950   ⁴ = {250,350},      ⁵ = {200,300},      ⁶ = {250,400},
10951   ⁷ = {200,450},      ⁸ = {250,400},      ⁹ = {200,350},
10952   ⁰ = {200,400},
10953   ¹ = {400,250},      ² = {200,300},      ³ = {250,400},
10954   ⁴ = {250,350},      ⁵ = {200,300},      ⁶ = {250,400},
10955   ⁷ = {200,450},      ⁸ = {250,400},      ⁹ = {200,350},
10956   ± = {150,100},      ÷ = {300,300},
10957   þ = { ,25},
10958   ˙ = {300,450},      ˘ = {300,450},
10959   ˙ = {300,450},      ˘ = {300,450},
10960   †                  = {200,250},      ‡                  = {200,250},
10961   π = {50, },
10962   f = { ,50},
10963   № = {100,150},
10964   \textservicemark   = {100,200},
10965   - = {400,500},      - = {400,500},      - = {200,300},
10966   - = {205,305},      — = {200,300},      — = {50,150},
10967   ● = {125,200},
10968   % /a.sc = {50,50},

10969   }
10970
10971 \SetProtrusion
10972   [ name = palatino-it ]
10973   { encoding = {TU,EU1,EU2},

```

```

10974     family   = {Palatino},
10975     shape     = {it,sl} }
10976 {
10977     A = {50,50},
10978     Æ = {50, },
10979     B = {50, },
10980     C = {50, },
10981     D = {50,50},
10982     E = {50, },
10983     F = {50, },
10984     G = {50, },
10985     H = {50, },
10986     K = {50, },
10987     L = {50, },
10988     O = {50, },
10989     Œ = {50, },
10990     P = {50, },
10991     Q = {50, },
10992     R = {50, },
10993     S = {50, },
10994     $ = {50, },
10995     T = {100, },
10996     U = {50, },
10997     V = {100,50},
10998     W = {50, },
10999     X = {50, },
11000     Y = {100,50},
11001     b = { ,50},
11002     c = {25, },
11003     g = {75, },
11004     i = {25, },
11005     m = { ,50},
11006     n = { ,50},
11007     p = { ,25},
11008     q = {25, },
11009     x = { ,50},
11010     1 = {100, },
11011     2 = {50, },
11012     4 = {50, },
11013     7 = {50, },
11014     . = { ,50},      .. = { ,350},      ... = { ,200},
11015     {,} = { ,50},
11016     : = { ,300},
11017     ; = { ,300},
11018     ? = { ,300},      ¿ = { ,300},
11019     & = {50,50},
11020     \% = {100,100},
11021     * = {200,200},
11022     + = {150,200},
11023     @ = {50,50},
11024     ~ = {200,150},
11025     ( = {200, },      ) = { ,200},
11026     / = {100,200},
11027     - = {300,500},
11028     \textendash      = {300,300},      \textemdash      = {200,200},
11029     \textquoteleft   = {700,400},      \textquoteright   = {700,400},
11030     \textquotedblleft = {500,300},      \textquotedblright = {500,300},
11031     _ = {100,100},
11032     \textbackslash    = {100,200},
11033     \quotesinglbase   = {500,500},      \quotedblbase     = {400,400},
11034     \guilsinglleft    = {400,400},      \guilsinglright   = {300,500},
11035     \guillemotleft    = {300,300},      \guillemotright   = {300,300},
11036     \textexclamdown   = {100, },      \textquestiondown = {200, },
11037     \textbraceleft    = {200,100},      \textbraceright   = {200,200},
11038     \textless         = {300,100},      \textgreater      = {200,100},

```

```

11039 ≤ = {200,100}, ≥ = {100,200},
11040 ' = {450,500}, ¬ = {250,150},
11041 · = {850, 700},
11042 ¶ = {100,0},
11043 × = {150, 300},
11044 ª = {300,250}, ° = {300,300}, º = {300,250},
11045 º = {300,200},
11046 ¹ = {300,150}, ² = {350,200}, ³ = {250,150},
11047 ⁴ = {350,100}, ⁵ = {300, 50}, ⁶ = {400,100},
11048 ⁷ = {400, 50}, ⁸ = {250, 50}, ⁹ = {300, 50},
11049 ⁰ = {300,300},
11050 ¹ = {300,350}, ² = {300,150}, ³ = {250,250},
11051 ⁴ = {400,200}, ⁵ = {300,100}, ⁶ = {450,200},
11052 ⁷ = {450,150}, ⁸ = {400,250}, ⁹ = {400,200},
11053 ± = {150,100}, ÷ = {300,300},
11054 þ = { 50, },
11055 † = {250,200}, ‡ = {250,200},
11056 ⁺ = {300,450}, ⁻ = {300,450},
11057 ⁺ = {300,450}, ⁻ = {300,450},
11058 - = {300,500}, - = {300,500}, - = {100,300},
11059 - = {125,305}, — = {200,300}, — = {125,150},
11060 • = {125,200}

11061 }
11062
11063 \SetProtrusion
11064 [ name = palatino-sc,
11065 load = palatino-default ]
11066 { encoding = {TU,EU1,EU2},
11067 family = {Palatino},
11068 shape = sc }
11069 {

11070 a = {50,50},
11071 æ = {50, },
11072 b = { 0, 0},
11073 d = { 0, 0},
11074 f = { 0, 0},
11075 g = { 0, 0},
11076 j = {50, },
11077 l = { ,50},
11078 o = { 0, 0},
11079 p = { 0, 0},
11080 q = { 0, },
11081 r = { , 0},
11082 t = {50,50},
11083 y = {50,50},
11084 fl = { 0,50},
11085 ffl = { 0,50},
11086 ◊ = { 0,50},
11087 ◊ = { 0,50}

11088 }
11089 </Palatino>

```

### 3.2.5 Basic glyph set

The protrusion settings will still be loaded from `microtype.cfg`.

```
11090 <TU-basic> %% No settings.
```

### 3.2.6 Empty glyph set

```

11091 <*TU-empty>
11092 \SetProtrusion
11093 [ name = empty ]
11094 { encoding = {TU,EU1,EU2},

```



```
11095     family    = {TU-empty} }
11096     { }
11097 </TU-empty>
11098
```

## 4 Auxiliary file for micro fine tuning

This file may be used to test protrusion and (less so) expansion settings.

```

11099 <test>
11100 \documentclass{article}
11101 %% options are passed through to microtype
11102 \usepackage[stretch=50]{microtype-show}
11103
11104 %% options for microtype-show
11105 \ShowGlyphIndextrue
11106 \ShowMissingGlyphstrue
11107 \def\GlyphScaleFactor{2}
11108
11109 %% load any required font packages:
11110 \ifpdftex
11111 \usepackage[T1]{fontenc}
11112 \else
11113 \usepackage{fontspec}
11114 \fi
11115
11116 \begin{document}
11117 \microtypesetup{expansion=false}
11118
11119 %% load your font here:
11120
11121 \ShowCharacterInheritance
11122
11123 \newpage
11124 \ShowProtrusion
11125
11126 \newpage
11127 %% show single glyphs
11128 %\ShowDummyLine
11129 %\ShowProtrusionLineGlyph{A}
11130 %\ShowProtrusionLineIndex{27}
11131
11132 %% loop through all glyphs of the font;
11133 %% protrusion values are shown in 1000th of 1em
11134 \ShowProtrusionDefined
11135
11136 %\ShowProtrusionMissing
11137
11138 %\ShowProtrusionAll
11139
11140 \newpage %% -----
11141 This is the current font stretched by 5%, normal, and shrunk by 5%:
11142
11143 \newlength{\MTln}
11144 \newcommand*{\teststring}
11145 {ABCDEFGHJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz}
11146 \settowidth{\MTln}{\teststring}
11147 \microtypesetup{expansion=true}
11148
11149 \bigskip\noindent\parbox{1.05\MTln}{\teststring\linebreak\\teststring}\par
11150 \bigskip\noindent\parbox{0.95\MTln}{\teststring}
11151 \end{document}
11152 </test>

```

Needless to say that things may always be improved. For suggestions, mail to [w.m.l@gmx.net](mailto:w.m.l@gmx.net) or file an issue at <https://github.com/schlicht/microtype/issues>.

## A The title logo

This is `microtype-logo.dtx`. You may treat this file in three different ways:

- compile it by itself
- `\input` it in the body of a `dtx` file
- `\input` it in the preamble: it then provides the command `\printlogo`, which will do just that

The first two cases require the style file `microtype-doc.sty`, which can be generated from `microtype.ins` with:

```
\makefile{microtype-doc.sty}{docsty}
```

11153 *(`*logo`)*

Here's how the logo on the title page was created.<sup>19</sup> It has nothing to do with `microtype`, actually, but uses `fontinst`. It is based on an experiment I posted to the [de.comp.text.tex](#) newsgroup.<sup>20</sup> It will show:

- the character
- the  $\TeX$  box
- the bounding box
- kerns

### A.1 Macros

To run this file,  $\TeX$  needs to find the `afm` file (either in the `TEXINPUTS` path, or in the current working directory).

First input `fontinst`.

11154 `\input fontinst.sty`

`bbox.sty` is an addition to `fontinst`, which makes dimensions of the bounding boxes available (and was written by Hàn Thế Thành, by the way). These dimensions are specified in the `afm` file, but not used by  $\TeX$ , which is why `fontinst` will discard them otherwise.

11155 `\input bbox.sty`

`\tempdim` Allocate some `dimen` registers.

11156 `\newdimen\tempdim`

`\fboxrulei` Frame width of the box as  $\TeX$  sees it.

11157 `\newdimen\fboxrulei`

11158 `\fboxrulei=0.1pt`

`\fboxruleii` Frame width of the bounding box.

11159 `\newdimen\fboxruleii`

11160 `\fboxruleii=0.1pt`

`\kernboxheight` Height of the box indicating the kern.

11161 `\newdimen\kernboxheight`

11162 `\kernboxheight=5pt`

`\scaletoem` An auxiliary macro. Return a dimension relative to the `em`-width of the font. Requires  $\mathrm{e}\TeX$ .

11163 `\setcommand\scaletoem#1{\dimexpr #1 sp*\fontdimen6\font/1000\relax}`

`\showlogo` A `fontinst` incantation whose sole purpose is to produce the logo. Its argument is a string (letters only).

11164 `\fontinstcc`

11165 `\def\showlogo#1{%`

Some fonts do not specify the `\fontdimen6` (width of an `em`) in the `afm` file. In this case, use the font size, which is correct in most cases.

11166 `\ifdim\fontdimen6\font = 0pt`

11167 `\typeout{***-Warning:-no-fontdimen-6-specified-***^^J%}`

11168 `***-setting-it-to-\pdffontsize\font \ifnum\pdfptextversion < 130 pt\fi-***}`

11169 `\fontdimen6\font=\pdffontsize\font \ifnum\pdfptextversion < 130 pt\fi\relax`

11170 `\fi`

11171 `\installfonts`

11172 `\input_metrics{{\logofont,\metrics\printbbs{#1}}\relax}`

<sup>19</sup> Note that the logo module will not be created when installing `microtype`. Instead, the source file `microtype-logo.dtx` is included as an attachment in the PDF file. If your PDF reader supports this, you can [click here](#) to extract it; alternatively, you may use the `pdftk` tool.

<sup>20</sup> Message ID: 42aa3687\$0\$24366\$9b4e6d93@newsread2.arcor-online.net

```

11173 \endinstallfonts
11174 }
11175 \normalcc
      Layers.
11176 \makeatletter
11177 \def\mtl@layer#1#2{\pdfliteral{/OC/#1 BDC}#2\pdfliteral{EMC}}
11178 \ifx\mt@objects\undefined\let\mt@objects\@empty\fi
11179 \ifx\mt@order\undefined\let\mt@order\@empty\fi
11180 \xdef\mt@order{\mt@order[(Logo)]}
11181 \let\mtl@resources\@empty
11182 \def\mtl@register#1{%
11183   \immediate\pdfobj{<< /Type/OCG /Name{#1} >>}
11184   \expandafter\xdef\csname mtl@#1\endcsname{\the\pdfobj\space 0 R }
11185   \xdef\mt@objects{\mt@objects\csname mtl@#1\endcsname}
11186   \xdef\mt@order{\mt@order\csname mtl@#1\endcsname}
11187   \xdef\mtl@resources{\mtl@resources/#1 \csname mtl@#1\endcsname}}
11188 \mtl@register{canvas}
11189 \mtl@register{characters}
11190 \mtl@register{bounding-boxes}
11191 \mtl@register{TeX-boxes}
11192 \xdef\mt@order{\mt@order]}
11193 \global\let\mtl@objects\mt@objects
11194 \def\togglelayer#1#2{%
11195   \pdfstartlink width \wd\logobox height \ht\logobox depth \dp\logobox
11196   user{/Subtype/Link
11197     /BS << /Type/Border/W 0 >> /H/0
11198     /A << /S/SetOCGState
11199     /State[/Toggle \csname mtl@#1\endcsname] >>
11200   }#2\pdfendlink
11201 }

```

\printbbs Preparation.

```

11202 \setcommand\printbbs#1{%
11203   \setbox0\hbox{#1}%
11204   \leavevmode
11205   \kern-\fboxrulei
      The canvas in the natural width of the text minus protrusion, in color bgcolor.
11206   \mtl@layer{canvas}{%
11207     \getboundarychars#1\relax
11208     \tempdim=\dimexpr\wd0 - (\scaletom{\lcode\font\firstchar}+
11209       \scaletom{\rcode\font\lastchar})\relax
11210     \kern\dimexpr\scaletom{\lcode\font\firstchar}\relax
11211     \lower\dimexpr\dp0+0.05em \relax \vbox{\color{bgcolor}%
11212       \hrule width \tempdim
11213       height \dimexpr\dp0+\ht0+0.15em\relax}%
11214     \kern-\tempdim

```

The baseline, in color blcolor.

```

11215     \vbox{\color{blcolor}%
11216       \hrule width \tempdim
11217       height \fboxrulei}%
11218   }%
11219   \kern-\dimexpr\wd0 -\scaletom{\rcode\font\lastchar}\relax

```

The string.

```

11220   \printbbs #1\relax\relax
11221 }

```

\getboundarychars Get first ....

```

11222 \def\getboundarychars#1#2\relax{%
11223   \def\firstchar{~#1}%
11224   \getlastchar#1#2\relax
11225 }

```

\getlastchar ... and last character.

```

11226 \def\getlastchar#1#2{%

```

```

11227 \ifx\relax#2\relax
11228 \def\lastchar{`#1}%
11229 \else
11230 \expandafter\getlastchar
11231 \fi #2%
11232 }

```

`\printbbs` Loop over all characters of the string.

```

11233 \def\printbbs#1#2#3\relax{%
11234 \ifx\relax#1\relax
11235 \else
11236 \ifx\relax#2\relax
11237 \printbb{#1}{}%
11238 \else
11239 \printbb{#1}{#2}%
11240 \fi
11241 \expandafter\printbbs
11242 \fi #2#3\relax
11243 }

```

`\printbb` Record the kern between the current and the following character, then print the character. `\kerning` is a fontinst command.

```

11244 \setcommand\printbb#1#2{%
11245 \setbox0\hbox{\kerning{#1}{#2}\xdef\thekern{\number\result}}%
11246 \showboxes{#1}%

```

This could be another application.

```

11247 % \quad
11248 % w: \the\scaletom{\width{#1}},
11249 % bb: \the\scaletom{\bbleft{#1}}/%
11250 % \the\scaletom{\bbright{#1}},
11251 % \the\scaletom{\number\numexpr\width{#1}-\bbright{#1}\relax}
11252 % h: \height{#1}/\bbtop{#1}, \bbbotttom{#1}/\depth{#1}\par
11253 }

```

`\showboxes` Print the boxes for char `<#1>`. This won't work if `<#1>` isn't also the PostScript name of the glyph (e.g., 'comma'  $\neq$  ',').

```

11254 \setcommand\showboxes#1{%
11255 \leavevmode
11256 \color{texcolor}%

```

We have to record the width of the glyph.

```

11257 \setbox0\hbox{\color{textcolor}{#1}}%
11258 \global\tempdim=\wd0\relax
11259 \kern-\fboxrulei

```

1. *The  $\TeX$  box*: Print a frame in color `texcolor`. This frame shows the glyph as  $\TeX$  sees it.

```

11260 \mtl@layer{TeX-boxes}{%
11261 \hbox{%
11262 \lower\dimexpr \dp0 + \fboxrulei\relax
11263 \hbox{%
11264 \vbox{%
11265 \hrule height\fboxrulei
11266 \hbox{%
11267 \vrule width\fboxrulei height \dimexpr\ht0 + 2\fboxrulei\relax
11268 \phantom{\unhcopy0}%
11269 \vrule width\fboxrulei
11270 }%
11271 \hrule height\fboxrulei}}}%
11272 }%

```

2. *The character*: Now we step back and print the actual glyph. We hold it back until now, so that it will be printed on top of its box.

```

11273 \kern-\wd0
11274 \mtl@layer{characters}{\hbox{\box0}}%

```

Step back by the amount that the character's bounding box differs from the  $\TeX$  box on the left side.

```

11275 \kern\dimexpr\scaletom{\bbleft{#1}}-\tempdim-\fboxruleii\relax

```

3. *The bounding box*: will be printed in color `bbcolor`.

```

11276 \mtl@layer{bounding-boxes}{%
11277   {\color{bbcolor}%
11278    \hbox{%
11279      \lower\dimexpr-\scaletom{\bbbottom{#1}}+\fboxruleii\relax
11280      \hbox{%
11281        \vbox{%
11282          \hrule height\fboxruleii
11283          \hbox to \dimexpr\scaletom{\numexpr
11284            \bbright{#1}-\bbleft{#1}\relax}+2\fboxruleii\relax{%
11285            \vrule height \dimexpr\scaletom{\numexpr
11286              \bbtop{#1}-\bbbottom{#1}\relax}%
11287              width\fboxruleii
11288              \hfill
11289              \vrule width\fboxruleii}%
11290            \hrule height\fboxruleii}}}%
11291      }%
11292      \kern-\dimexpr\fboxruleii+\fboxrulei\relax
11293    }%

```

4. *The kern*: We also print a small box in color `kerncolor` indicating the kerning between the current and the next character; filled for negative kerns, empty for positive kerns.

```

11294 \kern\scaletom{\numexpr\width{#1}-\bbright{#1}\relax}%
11295 \mtl@layer{TeX-boxes}{%
11296   {\ifnum\thekern<0
11297     \color{kerncolor}%
11298     \kern\scaletom{\thekern}%
11299     \lower\kernboxheight\hbox{\vrule width -\dimexpr\scaletom{\thekern}\relax
11300       height \kernboxheight}%
11301     \kern\scaletom{\thekern}%
11302   }else
11303     \color{texcolor}%
11304     \ifnum\thekern=0 \else
11305       \lower\kernboxheight
11306       \hbox{%
11307         \vbox{%
11308           \hrule height\fboxrulei
11309           \hbox{%
11310             \vrule height \kernboxheight width\fboxrulei
11311             \kern\dimexpr\scaletom{\thekern}-2\fboxrulei\relax
11312             \vrule width\fboxrulei
11313           }%
11314           \hrule height\fboxruleii}%
11315         \fi
11316       \fi
11317     }%
11318   }%
11319   % \kern-\fboxrulei
11320 }

```

\printlogo

```

11321 \newbox\logobox
11322 \def\printlogo{%
11323   \setbox\logobox=\hbox{\vbox{%
11324     \MakePercentComment

```

This is the Kepler MM font used in the logo.

```

11325 \def\logofont{pkpri9e10}
11326 \transformfont{\logofont}{\reencodefont{8r}{\fromafm{pkpmmri8a10}}}
11327 \font\thelogofont=\logofont\space at 82pt

```

This would load the italic Palatino font instead.

```

11328 %\def\logofont{pplri}
11329 %\transformfont{\logofont8r}{\reencodefont{8r}{\fromafm{\logofont8a}}}
11330 %\edef\logofont{\logofont8r}
11331 %\font\thelogofont=\logofont\space at 78pt

```

Load the font.

```
11332 \the\logofont
```

Protrusion values (overdone for didactic reasons).

```
11333 \lcode\font`M=96
```

```
11334 \rcode\font`e=46
```

Now we can generate the logo.

```
11335 \pdfliteral direct{/SXS gs}%
11336 \showlogo{Microtype}%
11337 % \rlap{\normalfont\normalsize\raisebox{55pt}{\footnotemark[1]}}%
11338 % \kern5pt\[\[3\baselineskip]
11339 % \long\def\@makefnstext##1{%
11340 % \leftskip 0pt
11341 % \parindent 0pt
11342 % \everypar{\parindent 0pt}%
11343 % \leavevmode\hbox to 15pt{\@thefnmark\hss}##1}
11344 % \footnotetext[1]{This graphic displays on a
11345 % \togglelayer{canvas}{canvas} the \togglelayer{characters}{characters},
11346 % their \togglelayer{bounding-boxes}{bounding boxes}
11347 % and \togglelayer{TeX-boxes}{\TeX\ boxes}.}
11348 %}%
11349 \edef\logodimens{width \the\wd\logobox height \the\ht\logobox depth \the\dp\logobox}
11350 \immediate\pdfobj{<</Type/ExtGState /CA 0.6 /ca 0.6 /BM/Normal >>}%
11351 \immediate\pdfxform
11352 attr {/Group <</Type/Group /S/Transparency /I true /CS/DeviceRGB >>}
11353 resources {/Properties <<\mtl@resources>>
11354 /ExtGState << /SXS \the\pdflastobj\space 0 R >> }
11355 \logobox
11356 % \vskip-2.5\baselineskip
11357 % \leavevmode
11358 % \togglelayer{characters}{%
11359 % \pdfrefxform\pdflastxform
11360 % }%
11361 \pdfannot\logodimens{%
11362 /Subtype/Widget /FT/Btn /T(Logo)
11363 %/F 4 % why did I say this?
11364 /AP << /N \the\pdflastxform\space 0 R >>
11365 /AA << /E << /S/SetOCGState /State[/Toggle \mtl@characters] >>
11366 /X << /S/SetOCGState /State[/Toggle \mtl@characters] >>
11367 /D << /S/SetOCGState /State[/Toggle \csname mtl@bounding-boxes\endcsname] >>
11368 /U << /S/SetOCGState /State[/Toggle \csname mtl@TeX-boxes\endcsname] >>
11369 >> }%
11370 \vspace{3\baselineskip}
11371 }
11372 \IfFileExists{pkpmmri8a10.afm}\relax{\def\printlogo{\MT@warning{File pkpmmri8a10.afm not found.
11373 \MessageBreak Cannot create logo}}}
```

Our font.

```
11374 \pdfmapline{+pkpmmri8r10 Kep1MM-It_385_575_10_ " TeXBase1Encoding ReEncodeFont " <8r.enc <pkpmmri8a10.pfb}
```

Define colours (thered and thegreen are copied from microtype.dtx).

```
11375 \def\mtdefinecolors{
11376 \definecolor{thered}{rgb}{0.65,0.04,0.07}
11377 \definecolor{thegreen}{rgb}{0.06,0.44,0.08}
11378 \colorlet{texcolor}{thegreen!50} % TeX boxes
11379 \colorlet{kerncolor}{texcolor} % negative kerns
11380 \colorlet{bbcolor}{thered!50} % bounding box
11381 \colorlet{bgcolor}{black!8} % canvas
11382 \colorlet{blcolor}{black!50} % baseline
11383 \colorlet{textcolor}{black!40} % text
11384 }
```

Use with microtype.dtx

```
11385 \ifx\documentclass\@twoclasseserror
11386 \usepackage[xcdraw]{xcolor}
11387 \mtdefinecolors
```

11388 \else

## A.2 Document

Now we can start the document.

```
11389 \documentclass[10pt,a4paper]{ltxdoc}
11390 \providecommand\MakePercentComment{\relax}
11391 \expandafter\def\csname ver@microtype.dtx\endcsname{2999/99/99}
    Re-use the preamble from microtype.dtx.
11392 \usepackage{microtype-doc}
11393 \usepackage{attachfile}
11394 \makeatletter
11395 \pdfcatalog{/OCGs [\mt@objects] /D << /Order [\mt@order] >> >>}
11396 \makeatother
11397 \begin{document}
    You are currently reading this.
11398 \DocInput{microtype-logo.dtx}
11399 \newpage
11400 And here it is:\vspace{6\baselineskip}
11401 \begin{center}
11402   \printlogo
11403 \end{center}
11404 \expandafter\enddocument
11405 \fi
    That's it.
11406 /logo
```

## B The letterspacing illustration

This is microtype-lssample.dtx. You may treat this file in three different ways:

- compile it by itself
- \input it in the body of a dtx file
- \input it in the preamble: it then provides the commands
  - \lssample: prints the letterspacing illustration
  - \anchorarrow: anchors an arrow for layer <#1>
  - \showarrow: toggles layer <#1> or <#2>, and prints <#2>

The first two cases require the style file microtype-doc.sty, which can be generated from microtype.ins with:

```
\makefile{microtype-doc.sty}{docsty}
```

```
11407 \ifx\lssample\undefined
11408 <*lssample>
```

Upon popular request, here's how I've created the letterspacing illustration. <sup>21</sup>

### B.1 Macros

Rule width and image height and depth.

```
11409 \makeatletter
11410 \newdimen\lsamount
11411 \newdimen\lsrule
11412 \lsrule=0.2pt
11413 \def\lsheight{8pt}
11414 \def\lsdepth{12pt}
```

<sup>21</sup> Note that the lssample module will not be created when installing microtype. Instead, the source file microtype-lssample.dtx is included as an attachment in the PDF file. If your PDF reader supports this, you can [click here](#) to extract it; alternatively, you may use the pdftk tool.



Our font (Adobe Caslon).

```
11415 \def\lsfont{\fontfamily{paca}\selectfont}
      Loop over all letters in <#2>, letterspacing them by <#1>.
11416 \def\dols#1#2{\lsamount=#1\relax \dolss#2\enddols}
11417 \def\dolss#1#2\enddols{%
11418   \ifx\empty#2\empty\divide\lsamount 2\fi
11419   \ls{#1}%
11420   \ifx\empty#2\empty\else \dolss#2\enddols \fi
11421 }
```

One tikz picture for each letter.

```
11422 \def\ls#1{%
11423   \begin{tikzpicture}[remember picture,line width=\lsrule]
11424     \tikzstyle{every node}=[inner sep=0pt]
```

The bounding box.

```
11425     \mts@layer{stuff}{%
11426       \node[draw=thegrey,
11427         fill=theshade,
11428         outer sep=\lsrule,
11429         anchor=base,
11430         font=\lsfont]{\phantom{#1}};
11431     }
```

The letter.

```
11432     \node[anchor=base,font=\lsfont](#1){#1};
```

Two auxiliary coordinates.

```
11433     \path (#1.south west) ++(+.5\lsrule,-.5\lsrule) coordinate (#1L);
11434     \path (#1.base east) ++(-.5\lsrule,-\lsdepth) coordinate (#1R);
11435     \mts@layer{stuff}{%
```

Now draw the normal character width,

```
11436       \draw[color=thered!75,
11437         fill=thered!30,
11438         outer sep=\lsrule]
11439         (#1L) rectangle (#1R);
11440       \ifdim\lsamount>0pt
11441         \path (#1.base east) ++(+.5\lsamount,-6pt) coordinate (#1_ls);
11442         \path (#1R) ++(\lsamount+\lsrule,\lsdepth) coordinate (#1E);
```

and the letter space.

```
11443       \draw[color=thered,
11444         fill=thered!50,
11445         outer sep=\lsrule]
11446         (#1R) ++(+\lsrule,+0pt) rectangle (#1E);
11447     \fi
11448   }
11449 \end{tikzpicture}%
11450 \ignorespaces
11451 }
```

Draw the interword space.

```
11452 \def\lssp#1#2#3#4{%
11453   \begin{tikzpicture}[remember picture,line width=\lsrule,inner sep=0pt]
11454     \mts@layer{stuff}{%
11455       \tikzstyle{every draw}=[anchor=bottom]
11456       \coordinate(#1space) at (#2/2,\lsdepth/2);
11457       \coordinate(#1stretch) at (#2+#3/2,+0pt);
11458       \coordinate(#1shrink) at (#2-#4/2,+0pt);
11459       \draw[color=thegreen,fill=thegreen!50,use as bounding box]
11460         (0,0) rectangle ++(#2,\lsdepth);
11461       \draw[color=thegreen,fill=thegreen!30]
11462         (+#2,-\lsrule) rectangle ++(+#3,-4pt+\lsrule);
11463       \draw[color=thegreen,fill=thegreen!50]
11464         (+#2,-\lsrule) rectangle ++(-#4,-4pt+\lsrule);
11465       \draw[->,line width=0.3pt,shorten <=0.5\lsrule,color=thegreen!50]
```

```

11466      (+#2,-2pt-.5\lsrule) -- ++(+#3,+0pt);
11467      \draw[->,line width=0.3pt,shorten <=0.5\lsrule,color=thegreen!30]
11468      (+#2,-2pt-.5\lsrule) -- ++(-#4,+0pt);
11469    }%
11470  \end{tikzpicture}%
11471  \ignorespaces
11472 }

Layers.
11473 \def\mts@layer#1#2{\pdfliteral page{/OC/#1 BDC}#2\pdfliteral page{EMC}}
11474 \def\mts@layer#1#2{\pdfliteral page{/OC/stuff BDC /OC/#1 BDC}#2\pdfliteral page{EMC EMC}}
11475 \ifx\mt@objects\undefined\let\mt@objects\@empty\fi
11476 \ifx\mt@order\undefined\let\mt@order\@empty\fi
11477 \xdef\mt@order{\mt@order[(Sheep)]}
11478 \let\mts@resources\@empty
11479 \def\mts@register#1{%
11480   \immediate\pdfobj<< /Type/OCG /Name(#1) >>
11481   \expandafter\xdef\csname mts@#1\endcsname{\the\pdflastobj\space 0 R }
11482   \xdef\mt@objects{\mt@objects\csname mts@#1\endcsname}
11483   \xdef\mt@order{\mt@order\csname mts@#1\endcsname}
11484   \xdef\mts@resources{\mts@resources/#1 \csname mts@#1\endcsname}}
11485 \mts@register{stuff}
11486 \mts@register{tracking}
11487 \mts@register{ispace}
11488 \mts@register{ospace}
11489 \mts@register{istretch}
11490 \mts@register{ishrink}
11491 \mts@register{ostretch}
11492 \mts@register{oshrink}
11493 \mts@register{okern}
11494 \mts@register{ligature}
11495 \mts@register{_compatibility}
11496 \xdef\mt@order{\mt@order]}

Anchor point for the arrow in the code.
11497 \newcommand\anchorarrow[1]{%
11498   \tikz[remember picture,overlay]\node(#1_c){};}

Add an arrow from code to image.
11499 \newcommand\add@arrow[5][left]{%
11500   \tikz[remember picture,overlay,bend angle=14,looseness=0.75,>=latex]{%
11501     \mts@layer{#3}{\draw[->,thick,color=the#2](#4) to[bend #1] (#5);}%
11502   }}

Toggle layer.
11503 \def\toggle@layer#1#2#3{%
11504   \pdfstartlink
11505   user{/Subtype/Link
11506     /BS << /Type/Border/W 0 >> /H/0
11507   %   /BS << /Type/Border/W 1 /S/D /D[4 1] >>
11508   %   /C[0.7 0.7 0.7] /H/0
11509     /Contents(Click to Toggle!)
11510     /A << /S/SetOCGState
11511       /State[/Toggle \csname mts@#1\endcsname] >> }%
11512   \rlap{#2}%
11513   {\fboxsep=0pt \fboxrule=0pt
11514     \mts@layer{stuff}{%
11515       \rlap{\fcolorbox{white}{white}{\vphantom{kg}\color{the#3}#2}}}%
11516     \mts@layer{#1}{%
11517       \fcolorbox{white}{the#3!50}{\vphantom{kg}\color{white}#2}}}%
11518   }%
11519   \pdfendlink
11520 }
11521 \newcommand\showarrow[2][]{%
11522   \ifx\relax#1\relax\def\@tempa{#2}\else\def\@tempa{#1}\fi
11523   \toggle@layer{\@tempa}{\itshape #2}}

```

The environment for our illustration.

```

11524 \def\ls@sample#1{%
11525   \parskip 4pt \parindent 0pt
11526   \par
11527   \vskip4pt
11528   {\leftskip 15pt
11529    \mt@pseudo@margin{\color{theblue}Click on the image to show the kerns
11530     and spacings involved. Click on emphasised words in the text below
11531     to reveal the relation of image and code.\strut}
11532    \mt@layer{_compatibility}%
11533     \mt@place{\rlap{\hskip-\marginparwidth \color{white}%
11534      \vrule width\dimexpr\hsize+\marginparwidth\relax height\mt@unvdimen}}
11535     \mt@pseudo@margin{\color{thered}%
11536      If you had a \acronym{PDF} viewer that understands
11537      \acronym{PDF}\,,{\smaller1.5}, you could hide the arrows selectively.}}
11538     \vskip-\mt@unvdimen}%
11539   \vskip-4pt
11540   \setlength\fbboxsep{4pt}%
11541   \leavevmode
11542   \pdfstartlink
11543     user{/Subtype/Link
11544       /BS << /Type/Border/W 0 >> /H/0
11545       /A << /S/SetOCGState
11546         /State[/Toggle \mts@stuff] >> }%
11547     \fcolorbox{theframe}{theshade}%
11548     {\fontsize{34}{38}\selectfont #1}%
11549   \pdfendlink
11550   \par\medskip
11551   }%
11552   \edef\x{\pdfpageresources{/Properties <<\mts@resources>>}}\x
11553 }

```

Now define the illustration to be used in the document.

```

11554 \def\lssample{%
11555   \ls@sample{%
11556     \dols{0pt}{Stop}
11557     \lssp{o}{0.45em}{0.25em}{0.15em}
11558     \dols{0.16em}{\st{ealing}\hskip-\dimexpr 0.08em+\lsrule\relax
11559     \lssp{i}{13.82pt}{4.65pt}{2.08pt}
11560     \dols{0.16em}{sheep}
11561     \dols{0pt}{!}
11562   }%

```

Don't forget to add the arrows.

```

11563   \vspace{-\baselineskip}
11564   \add@arrow{red}      {tracking}{lsamount_c.east}{a_ls}
11565   \add@arrow{red}      {okern}   {okernend_c.east}{p_ls}
11566   \add@arrow{green}    {ospace}  {ospace_c.east}  {ospace}
11567   \add@arrow{green}    {ispace}  {ispace_c.center}{ispace}
11568   \add@arrow{green!75} {istretch}{istretch_c.east}{istretch.north}
11569   \add@arrow{green!75} {ishrink} {ishrink_c.west} {ishrink.north}
11570   \add@arrow{green!75} {ostretch}{ostretch_c.east}{ostretch.north}
11571   \add@arrow{green!75} {oshrink} {oshrink_c.east} {oshrink.north}
11572   \add@arrow[right]{grey}{ligature}{nolig_c.east} {st.center}
11573 }
11574 \fi

```

This is for use with microtype.dtx

```

11575 \ifx\documentclass\@twoclasseserror
11576   \usepackage{tikz}
11577 \else

```

## B.2 Document

```

11578 \documentclass[10pt,a4paper]{ltxdoc}
11579 \expandafter\def\csname ver@microtype.dtx\endcsname{2999/99/99}

```

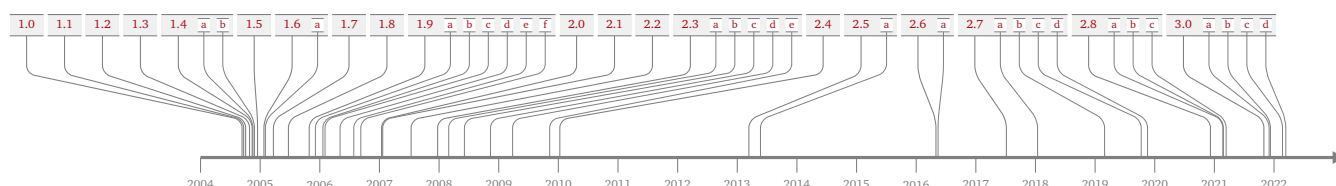
Re-use the preamble from microtype.dtx.

```

11580 \usepackage{microtype-doc}
11581 \usepackage{attachfile}
11582 \usepackage{tikz}
11583 \makeatletter
11584 \pdfcatalog{/OCProperties << /OCGs [\mt@objects]
11585                                     /D << /Order [\mt@order] /BaseState/OFF >> >> }
11586 \makeatother
11587 \begin{document}
  You are currently reading this.
11588 \DocInput{microtype-lssample.dtx}
  Now show what we are able to do.
11589 \noindent
11590 Since a picture is worth a thousand words, probably even more if, in our
11591 case, it depicts a couple of letterspaced words, let's bring one to sum up
11592 these somewhat confusing options. Suppose you had the following settings
11593 (which I would in no way recommend; they are only for illustrative purposes):
11594 \begin{verbatim}
11595 \SetTracking
11596   [ no ligatures = {"\anchorarrow{nolig}"f},
11597     spacing      = {60"\anchorarrow{ispace}"0*, "%
11598                   "-1"\anchorarrow{istretch}"00*, "\anchorarrow{ishrink}"},
11599     outer spacing = {4"\anchorarrow{ospace}"50, "%
11600                   "2"\anchorarrow{ostretch}"50, 1"\anchorarrow{oshrink}"50},
11601     outer kerning = {"\anchorarrow{okernbegin}"*, "%
11602                   "\anchorarrow{okernend}"*} ]
11603   { encoding = * }
11604   { 1"\anchorarrow{lsamount}"60 }
11605 \end{verbatim}
11606 and then write:
11607 \begin{verbatim}
11608 Stop \textls{stealing sheep}!
11609 \end{verbatim}
11610 this is the (typographically dubious) outcome:
11611
11612 \lssample
11613
11614 \noindent
11615 While the word 'Stop' is not letterspaced, the space between the letters in
11616 the other two words is expanded by the \showarrow[tracking]{tracking-amount}{red}
11617 of 160/1000\,em\,=\allowbreak\,0.16\,em.
11618 The \showarrow[ispace]{inner~space}{green} within the letterspaced text is
11619 increased by 60\%, while its \showarrow[istretch]{stretch}{green} amount is
11620 decreased by 10\% and the \showarrow[ishrink]{shrink}{green} amount is left
11621 untouched.
11622 The \showarrow[ospace]{outer~space}{green} (of 0.45\,em) immediately before the
11623 piece of text may \showarrow[ostretch]{stretch}{green} by 0.25\,em and
11624 \showarrow[oshrink]{shrink}{green} by 0.15\,em.
11625 Note that there is no outer space after the text, since the exclamation mark
11626 immediately follows; instead, the default \showarrow[okern]{outer~kern}{red}
11627 of half the letterspace amount (0.08\,em) is added.
11628 Furthermore, one \showarrow{ligature}{grey} wasn't broken up, because we
11629 neglected to specify the '~|s|' in the |no ligatures| key.
11630
11631 \expandafter\enddocument
11632 \fi
11633 \lssample

```

## C Change history



Numbers prefixed with 'U' refer to the User manual.

### 2004/09/11 **Version 1.0**

General: Initial version ..... [U1](#)

### 2004/09/21 **Version 1.1**

General: configuration file names in lowercase (suggested by <i>Harald Harders</i> ) .....	72	list .....	74
remove 8-bit characters from the configuration files (suggested by <i>Harald Harders</i> ) .....	134	<code>\MT@ifempty</code> : fix: use category code 12 for the percent character (reported by <i>Tom Kink</i> ) .....	20
Protrusion: add factors for some more characters settings for Adobe Minion (contributed by <i>Harald Harders</i> ) .....	142	<code>\MT@is@number</code> : numbers may also be specified in hexadecimal or octal (suggested by <i>Harald Harders</i> ) .....	80
<code>\DeclareCharacterInheritance</code> : new command: possibility to specify character inheritance .....	105	<code>\MT@pdfTeX@no</code> : fix: version check (reported by <i>Harald Harders</i> ) .....	15
<code>\MT@declare@sets</code> : remove spaces around set name .....	91	<code>\MT@permute</code> : don't use sets for empty encoding ..	107
<code>\MT@find@file</code> : fix: also check whether the file for the base font family has already been loaded ..	72	<code>\MT@setup@expansion</code> : issue an error instead of a warning, when pdfTeX version is too old for <code>autoexpand</code> .....	123
<code>\MT@get@basefamily</code> : only remove suffixes 'x' or 'j' ..	73	<code>\MT@split@codes</code> : fix: allow zero and negative values ..	43
<code>\MT@get@listname@</code> : don't check for empty attributes		<code>\MT@use@set</code> : remove spaces around set name .....	95

### 2004/10/03 **Version 1.2**

Font aliases: declare <code>cmor</code> as an alias of <code>cmr</code> .....	131	<code>\MT@get@inh@list</code> : fix: set inheritance list <code>\globally</code> to <code>\empty</code> .....	76
Font sets: new: <code>allmath</code> and <code>basicmath</code> .....	130	<code>\MT@get@listname@</code> : alternatively check for alias font name .....	74
Protrusion: add settings for Computer Modern Roman and Adobe Garamond in TS1 encoding .....	173	<code>\MT@get@size</code> : additional magic to catch some errors ..	93
add settings for Computer Modern Roman math symbols .....	177	<code>\MT@get@size@@</code> : hijack <code>\set@fontsize</code> instead of <code>\setfontsize</code> .....	93
<code>\MT@familyalias</code> : define alias font name as an alternative, not as a replacement .....	39	<code>\MT@loop</code> : fix: new macro, used instead of <code>\loop</code> ..	24
<code>\MT@get@basefamily</code> : also remove 'w' (swash capitals) .....	73	<code>\MT@maybe@do</code> : also check for alias font name .....	39
<code>\MT@get@highlevel</code> : check whether defaults have changed .....	91	<code>\MT@permute@@@@</code> : more sanity checks for <code>\SetProtrusion</code> and <code>\SetExpansion</code> .....	108
		<code>\MT@setupfont</code> : also search for alias font file .....	36
		fix: call <code>\@enc@update</code> if necessary .....	36

### 2004/10/27 **Version 1.3**

General: fix: specifying <code>load</code> option does no longer require to give a name, too .....	102	<code>\MT@fix@catcode</code> : check some category codes (compatibility with german) .....	5
Font aliases: declare <code>aer</code> , <code>zer</code> and <code>hfor</code> as aliases of <code>cmr</code> .....	131	<code>\MT@load@list</code> : check whether list exists .....	72

### 2004/11/12 **Version 1.4**

General: check for <code>pdfcprot</code> .....	30	the hook for <code>\MT@setupfont</code> .....	85
don't use scratch registers in global definitions ..	76	use one instead of five counters .....	26
use <code>\pickup@font</code> instead of <code>\define@newfont</code> as		Protrusion: tweak quote characters for <code>cmr</code> variants	

(OT1, T1, lmr) . . . . .	148	disabled in package options . . . . .	117
\microtypesetup: fix: set the correct levels, and remember them; warning when enabling an option		\SetExpansion: fix: specifying extra options does no longer require to give a name, too . . . . .	99

#### 2004/11/17 **Version 1.4a**

General: new option: final . . . . .	113	when reading files (reported by <i>Michael Hoppe</i> )	73
\MT@cfg@catcodes: fix: reset some more catcodes			

#### 2004/11/26 **Version 1.4b**

General: fix: set catcodes before reading global configuration file (reported by <i>Christoph Bier</i> ) . .	116	form abcz (reported by <i>Georg Verwey</i> ) . . . .	74
optimisation: use less \expandafers and \csnames	19	\MT@get@slot: don't define \MT@char globally (save stack problem) . . . . .	76
Protrusion: harmonise dashes in upshape and italic (cmr, pad, ppl) . . . . .	142	\MT@ifdimen: don't set \MT@count globally (save stack problem) . . . . .	21
slanted like italics . . . . .	153	\MT@setup@PDF: new message if \pdfoutput is changed . . . . .	121
\MT@checklist@family: fix: don't try alias family name if encoding failed . . . . .	40	\MT@use@set: don't use undeclared font sets . . . .	95
\MT@get@basefamily: fix: failed for font names of the			

#### 2004/12/15 **Version 1.5**

General: defaults: step: 4 (suggested by <i>Hàn Thế Thành</i> ) . . . . .	114	\MT@get@highlevel: don't test defaults if called after begin document . . . . .	91
new option: selected, by default false (suggested by <i>Hàn Thế Thành</i> ) . . . . .	112	\MT@scale@factor: warning for factors outside limits	45
Documentation: add 'Short history' . . . . .	U32	\MT@scale@to@em: don't use \lcode and \rcode for the calculation . . . . .	44
Inheritance: remove \ss from T1 list, add \DJ . .	135	\MT@set@ex@codes: allow non-selected font expansion . . . . .	54
Protrusion: settings for Bitstream Charter . . . .	143	\MT@set@pr@codes: adjust protrusion factors before setting the inheriting characters . . . . .	41
\DeclareMicrotypeAlias: remove spaces around arguments . . . . .	96	\MT@setup@expansion: defaults: calculate step as min(stretch,shrink)/5 . . . . .	122
\MT@cfg@catcodes: reset catcode of '=' (compatibility with Turkish babel) . . . . .	73	defaults: turn off expansion for DVI output . . .	122
\MT@fix@catcode: reset catcode of '^' (compatibility with chemsym) . . . . .	5	disable automatic expansion for DVI output . .	123

#### 2005/01/24 **Version 1.6**

General: defaults: turn off expansion for old pdfTeX versions . . . . .	115	tune CMR math letters (OML encoding) . . . . .	178
load a font if none is selected . . . . .	35	\MT@get@charwd: use e-TeX's \fontcharwd, if available	44
new option: factor, by default 1000 . . . . .	114	\MT@get@inh@list: correct message if selected is false . . . . .	76
restructure dtx file . . . . .	130	\MT@set@ex@codes: introduce factor option . . . .	54
test whether \pickup@font has changed . . . . .	87	\MT@set@pr@codes: introduce factor option . . . .	41
test whether numeric options receive a number	114	\MT@setup@expansion: disable automatic expansion for old pdfTeX versions . . . . .	123
use e-TeX's \ifcsname and \ifdefined if defined	19	\MT@use@set: retain current set if new set is undeclared . . . . .	95
Protrusion: add italic uppercase Greek letters . .	153	\MT@vinfo: new macro instead of \ifMT@verbose . .	6
improve settings for numbers (pointed out by <i>Peter Muthesius</i> ) . . . . .	144		

#### 2005/02/02 **Version 1.6a**

Documentation: add table of fonts with tailored protrusion settings . . . . .	U21	reported by <i>Bernard Gaulle</i> ) . . . . .	76
\MT@get@slot: completely redone, hopefully more robust (compatible with frenchpro; problem		\MT@pdfTeX@no: new macro . . . . .	14
		\MT@reset@ef@codes: only reset \efcodes for older pdfTeX versions . . . . .	55

2005/03/23 **Version 1.7**

General: allow specification of size ranges (suggested by <i>Andreas Böhmann</i> )	92	<code>\MT@get@slot</code> : remove backslash hack	76
disallow automatic expansion if pdfTeX too old	104	test for <code>\chardef</code> commands	77
fix: remove space after <code>autoexpand</code>	104	test whether <code>\(encoding)\(...</code> is defined	77
new value for verbose option: errors	114	<code>\MT@if@list@exists</code> : don't define <code>\MT@pr@cname</code> etc. globally, here and elsewhere	75
shorter command names	26	<code>\MT@if@dimen</code> : comparison with 1 to allow size smaller than 1 (suggested by <i>Andreas Böhmann</i> )	21
warning when running in draft mode	121	<code>\MT@increment</code> : use e-TeX's <code>\numexpr</code> if available	26
Documentation: add hint about compatibility	U28	<code>\MT@is@composite</code> : new macro: construct command for composite character; no uncontrolled expansion	83
remove table of match order (now table 1 on page 74)	U11	<code>\MT@scale</code> : new macro: use e-TeX's <code>\numexpr</code> if available	26
Protrusion: fix: remove <code>\</code> from OT1, add <code>\textbackslash</code> to T1 encoding	145	<code>\MT@set@ex@codes</code> : two versions of this macro	54
<code>\LoadMicrotypeFile</code> : new command (suggested by <i>Andreas Böhmann</i> )	97	<code>\MT@split@name</code> : don't define <code>\MT@encoding</code> &c. globally	39
<code>\Microtype@Hook</code> : new command for font package authors	116	<code>\MT@test@ast</code> : make it simpler	92
<code>\microtypesetup</code> : fix: warning also when setting to (no)compatibility	117	<code>\MT@try@order</code> : always check for size, too (suggested by <i>Andreas Böhmann</i> )	74
<code>\MT@begin@catcodes</code> : also use inside configuration commands	73	fix: also check for <code>//(series)/(shape)//</code> (reported by <i>Andreas Böhmann</i> )	74
<code>\MT@cfg@catcodes</code> : reset catcode of <code>'</code> (compatibility with french* packages)	73	<code>\MT@warn@code@too@large</code> : new macro: type out maximum protrusion factor	46
<code>\MT@DeclareMicrotypeAlias</code> : may also be used inside configuration files	97	<code>\MT@warn@err</code> : new macro: for verbose=errors	6
<code>\MT@get@listname@</code> : use <code>\tfor</code> ( <i>Andreas Böhmann</i> 's idea)	74	<code>\showhyphens</code> : modify <code>\showhyphens</code>	124

2005/06/23 **Version 1.8**

General: <code>\SetProtrusion</code> : new key: unit	103	<code>\MT@find@file</code> : no longer wrap names in commands	72
if font substitution has occurred, set up the substitute font, not the selected one	85	<code>\MT@fix@fontdimen@six</code> : new macro: test whether <code>\fontdimen 6</code> is defined	38
new option: config to load a different main configuration file	116	<code>\MT@get@charwd</code> : warning for missing (resp. zero-width) characters	44
new option: unit, by default character	114	<code>\MT@get@listname@</code> : made recursive	74
Documentation: add example for factor option	U12	<code>\MT@get@slot</code> : fix: expand active characters	76
add example of how to get rid of a widow (suggested by <i>Adam Kucharczyk</i> )	U14	test whether <code>\(encoding)\(...</code> is defined made more robust	77
add hint about error messages	U28	<code>\MT@get@unit</code> : new macro: get unit for codes	47
Font aliases: declare <code>pxr</code> and <code>txr</code> as aliases of <code>ptm</code> resp. <code>ptm</code>	132	<code>\MT@in@rlist</code> : made recursive	24
Font sets: add U encoding to <code>allmath</code>	130	<code>\MT@is@active</code> : new macro: translate inputenc-defined characters	80
Inheritance: remove <code>\DJ</code> from T1 list (it's the same as <code>\DH</code> )	135	<code>\MT@is@letter</code> : warning for non-ASCII characters	79
Protrusion: add LY1 characters for Times	151	<code>\MT@ledmac@setup</code> : character protrusion with <code>ledmac</code>	28
settings for AMS math fonts	181	<code>\MT@map@clist@n</code> : new macro: used instead of <code>\tfor</code>	23
verified settings for slanted Computer Modern Roman	163	<code>\MT@map@tlist@n</code> : new macro: used instead of <code>\tfor</code>	23
<code>\add@accent</code> : fix: disable micro-typographic setup inside <code>\add@accent</code> (reported by <i>Stephan Hennig</i> )	87	<code>\MT@old@cmd</code> : renamed commands from <code>\..MicroType..</code> to <code>\..Microtype..</code>	6
<code>\DeclareMicrotypeAlias</code> : warning when overriding an alias font	96	<code>\MT@pdf@tex@no</code> : case 5: pdfTeX 1.30	14
<code>\DeclareMicrotypeSetDefault</code> : new command: set default font set	95	<code>\MT@permute@@@@@</code> : add ranges to the beginning of the lists	108
<code>\MT@cfg@catcodes</code> : reset catcodes of the remaining ASCII characters	73	<code>\MT@scale</code> : fix: remove spaces in e-TeX variant (reported by <i>Mark Rossi</i> )	26
<code>\MT@check@rlist</code> : made recursive	109	<code>\MT@setupfont@hook</code> : restore <code>\%</code> and <code>\#</code> when <code>hyperref</code> is loaded	29
<code>\MT@curr@list@name</code> : new macro: current list type and name	83	restore <code>csquotes</code> 's active characters	29
<code>\MT@declare@sets</code> : warning when redefining a set	91	restore percent character if Spanish <code>babel</code> is loaded	29
<code>\MT@define@set@key@</code> : use comma lists instead of token lists	91	<code>\MT@split@codes</code> : get character width once only	43
		<code>\MT@use@set</code> : fix: remove braces in first line	95
		<code>\MT@xadd</code> : simplified	22

2005/10/28 **Version 1.9**

General: \DeclareMicrotypeSet: new key: font ..	94	settings for T5 encoded Computer Modern Roman	142
\SetProtrusion: value ‘relative’ renamed to ‘character’ for key unit .....	103	\DisableLigatures: new command: disable ligatures (requires pdfTeX 1.30) .....	97
allow context-specific font setup .....	85	\microtypecontext: new command: change setup context in the document .....	88
compatibility with TeX Live hack (reported by Herbert Voß) .....	13	\MT@checklist@family: fix: add two missing \expandafters .....	40
disable microtype setup inside hyperref’s \pdfstringdef (reported by Hàn Thế Thành) ..	30	\MT@detokenize@c: fix the $\mathbb{Z}$ -TeX version .....	20
fix: use true as the default value .....	111	\MT@exp@two@n: new macros: less \expandafters ..	19
option unit: rename value relative to character	114	\MT@get@opt: new key ‘preset’ to set all characters to the specified value before loading the lists ....	47
Documentation: add hint about verbatim environment .....	U27	\MT@is@active: redone: use \set@display@protect	80
add remark about Type 1 fonts required for automatic font expansion .....	U7	\MT@is@letter: using \catcode should be more efficient than inspecting the \meaning .....	79
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2008/06/04 **Version 2.3b**

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2009/03/27 **Version 2.3d**

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2009/11/09 **Version 2.3e**

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2. You may distribute a complete, unmodified copy of the Work as you received it. Distribution of only part of the Work is considered modification of the Work, and no right to distribute such a Derived Work may be assumed under the terms of this clause.
3. You may distribute a Compiled Work that has been generated from a complete, unmodified copy of the Work as distributed under Clause 2 above, as long as that Compiled Work is distributed in such a way that the recipients may install the Compiled Work on their system exactly as it would have been installed if they generated a Compiled Work directly from the Work.
4. If you are the Current Maintainer of the Work, you may, without restriction, modify the Work, thus creating a Derived Work. You may also distribute the Derived Work without restriction, including Compiled Works generated from the Derived Work. Derived Works distributed in this manner by the Current Maintainer are considered to be updated versions of the Work.
5. If you are not the Current Maintainer of the Work, you may modify your copy of the Work, thus creating a Derived Work based on the Work, and compile this Derived Work, thus creating a Compiled Work based on the Derived Work.
6. If you are not the Current Maintainer of the Work, you may distribute a Derived Work provided the following conditions are met for every component of the Work unless that component clearly states in the copyright notice that it is exempt from that condition. Only the Current Maintainer is allowed to add such statements of exemption to a component of the Work.
  - (a) If a component of this Derived Work can be a direct replacement for a component of the Work when that component is used with the Base Interpreter, then, wherever this component of the Work identifies itself to the user when used interactively with that Base Interpreter, the replacement component of this Derived Work clearly and unambiguously identifies itself as a modified version of this component to the user when used interactively with that Base Interpreter.
  - (b) Every component of the Derived Work contains prominent notices detailing the nature of the changes to that component, or a prominent reference to another file that is distributed as part of the Derived Work and that contains a complete and accurate log of the changes.
  - (c) No information in the Derived Work implies that any persons, including (but not limited to) the authors of the original version of the Work, provide any support, including (but not limited to) the reporting and handling of errors, to recipients of the Derived Work unless those persons have stated explicitly that they do provide such support for the Derived Work.
- (d) You distribute at least one of the following with the Derived Work:
  - i. A complete, unmodified copy of the Work; if your distribution of a modified component is made by offering access to copy the modified component from a designated place, then offering equivalent access to copy the Work from the same or some similar place meets this condition, even though third parties are not compelled to copy the Work along with the modified component;
  - ii. Information that is sufficient to obtain a complete, unmodified copy of the Work.
7. If you are not the Current Maintainer of the Work, you may distribute a Compiled Work generated from a Derived Work, as long as the Derived Work is distributed to all recipients of the Compiled Work, and as long as the conditions of Clause 6, above, are met with regard to the Derived Work.
8. The conditions above are not intended to prohibit, and hence do not apply to, the modification, by any method, of any component so that it becomes identical to an updated version of that component of the Work as it is distributed by the Current Maintainer under Clause 4, above.
9. Distribution of the Work or any Derived Work in an alternative format, where the Work or that Derived Work (in whole or in part) is then produced by applying some process to that format, does not relax or nullify any sections of this license as they pertain to the results of applying that process.
10. (a) A Derived Work may be distributed under a different license provided that license itself honors the conditions listed in Clause 6 above, in regard to the Work, though it does not have to honor the rest of the conditions in this license.
  - (b) If a Derived Work is distributed under a different license, that Derived Work must provide sufficient documentation as part of itself to allow each recipient of that Derived Work to honor the restrictions in Clause 6 above, concerning changes from the Work.
11. This license places no restrictions on works that are unrelated to the Work, nor does this license place any restrictions on aggregating such works with the Work by any means.
12. Nothing in this license is intended to, or may be used to, prevent complete compliance by all parties with all applicable laws.



## No Warranty

There is no warranty for the Work. Except when otherwise stated in writing, the Copyright Holder provides the Work ‘as is’, without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality and performance of the Work is with you. Should the Work prove defective, you assume the cost of all necessary servicing, repair, or correction.

In no event unless required by applicable law or agreed to in writing will The Copyright Holder, or any au-

thor named in the components of the Work, or any other party who may distribute and/or modify the Work as permitted above, be liable to you for damages, including any general, special, incidental or consequential damages arising out of any use of the Work or out of inability to use the Work (including, but not limited to, loss of data, data being rendered inaccurate, or losses sustained by anyone as a result of any failure of the Work to operate with any other programs), even if the Copyright Holder or said author or said other party has been advised of the possibility of such damages.

## Maintenance of The Work

The Work has the status ‘author-maintained’ if the Copyright Holder explicitly and prominently states near the primary copyright notice in the Work that the Work can only be maintained by the Copyright Holder or simply that it is ‘author-maintained’.

The Work has the status ‘maintained’ if there is a Current Maintainer who has indicated in the Work that they are willing to receive error reports for the Work (for example, by supplying a valid e-mail address). It is not required for the Current Maintainer to acknowledge or act upon these error reports.

The Work changes from status ‘maintained’ to ‘unmaintained’ if there is no Current Maintainer, or the person stated to be Current Maintainer of the work cannot be reached through the indicated means of communication for a period of six months, and there are no other significant signs of active maintenance.

You can become the Current Maintainer of the Work by agreement with any existing Current Maintainer to take over this role.

If the Work is unmaintained, you can become the Current Maintainer of the Work through the following steps:

1. Make a reasonable attempt to trace the Current Maintainer (and the Copyright Holder, if the two differ) through the means of an Internet or similar search.
2. If this search is successful, then enquire whether the Work is still maintained.
  - (a) If it is being maintained, then ask the Current Maintainer to update their communication data within one month.
  - (b) If the search is unsuccessful or no action to resume active maintenance is taken by the Current

Maintainer, then announce within the pertinent community your intention to take over maintenance. (If the Work is a L<sup>A</sup>T<sub>E</sub>X work, this could be done, for example, by posting to `comp.text.tex`.)

3. (a) If the Current Maintainer is reachable and agrees to pass maintenance of the Work to you, then this takes effect immediately upon announcement.
- (b) If the Current Maintainer is not reachable and the Copyright Holder agrees that maintenance of the Work be passed to you, then this takes effect immediately upon announcement.
4. If you make an ‘intention announcement’ as described in [2b](#) above and after three months your intention is challenged neither by the Current Maintainer nor by the Copyright Holder nor by other people, then you may arrange for the Work to be changed so as to name you as the (new) Current Maintainer.
5. If the previously unreachable Current Maintainer becomes reachable once more within three months of a change completed under the terms of [3b](#) or [4](#), then that Current Maintainer must become or remain the Current Maintainer upon request provided they then update their communication data within one month.

A change in the Current Maintainer does not, of itself, alter the fact that the Work is distributed under the LPPL license.

If you become the Current Maintainer of the Work, you should immediately provide, within the Work, a prominent and unambiguous statement of your status as Current Maintainer. You should also announce your new status to the same pertinent community as in [2b](#) above.

## Whether and How to Distribute Works under This License

This section contains important instructions, examples, and recommendations for authors who are considering distributing their works under this license. These authors are addressed as ‘you’ in this section.

### Choosing This License or Another License

If for any part of your work you want or need to use *distribution* conditions that differ significantly from those in this license, then do not refer to this license anywhere

in your work but, instead, distribute your work under a different license. You may use the text of this license as a model for your own license, but your license should not refer to the LPPL or otherwise give the impression that your work is distributed under the LPPL.

The document ‘`modguide.tex`’ in the base L<sup>A</sup>T<sub>E</sub>X distribution explains the motivation behind the conditions of this license. It explains, for example, why distributing L<sup>A</sup>T<sub>E</sub>X under the GNU General Public License (GPL) was considered inappropriate. Even if your work is unrelated

to L<sup>A</sup>T<sub>E</sub>X, the discussion in ‘modguide.tex’ may still be relevant, and authors intending to distribute their works under any license are encouraged to read it.

## A Recommendation on Modification Without Distribution

It is wise never to modify a component of the Work, even for your own personal use, without also meeting the above conditions for distributing the modified component. While you might intend that such modifications will never be distributed, often this will happen by accident – you may forget that you have modified that component; or it may not occur to you when allowing others to access the modified version that you are thus distributing it and violating the conditions of this license in ways that could have legal implications and, worse, cause problems for the community. It is therefore usually in your best interest to keep your copy of the Work identical with the public one. Many works provide ways to control the behavior of that work without altering any of its licensed components.

## How to Use This License

To use this license, place in each of the components of your work both an explicit copyright notice including your name and the year the work was authored and/or last substantially modified. Include also a statement that the distribution and/or modification of that component is constrained by the conditions in this license.

Here is an example of such a notice and statement:

```
% pig.dtx
%% Copyright 2005 M. Y. Name
%
% This work may be distributed and/or modified under the
% conditions of the LaTeX Project Public License, either version 1.3
% of this license or (at your option) any later version.
% The latest version of this license is in
% https://www.latex-project.org/lppl.txt
% and version 1.3 or later is part of all distributions of LaTeX
% version 2005/12/01 or later.
%
% This work has the LPPL maintenance status ‘maintained’.
%
% The Current Maintainer of this work is M. Y. Name.
%
% This work consists of the files pig.dtx and pig.ins
```

```
% and the derived file pig.sty.
```

Given such a notice and statement in a file, the conditions given in this license document would apply, with the ‘Work’ referring to the three files ‘pig.dtx’, ‘pig.ins’, and ‘pig.sty’ (the last being generated from ‘pig.dtx’ using ‘pig.ins’), the ‘Base Interpreter’ referring to any ‘L<sup>A</sup>T<sub>E</sub>X-Format’, and both ‘Copyright Holder’ and ‘Current Maintainer’ referring to the person ‘M. Y. Name’.

If you do not want the Maintenance section of LPPL to apply to your Work, change ‘maintained’ above into ‘author-maintained’. However, we recommend that you use ‘maintained’ as the Maintenance section was added in order to ensure that your Work remains useful to the community even when you can no longer maintain and support it yourself.

## Derived Works That Are Not Replacements

Several clauses of the LPPL specify means to provide reliability and stability for the user community. They therefore concern themselves with the case that a Derived Work is intended to be used as a (compatible or incompatible) replacement of the original Work. If this is not the case (e.g., if a few lines of code are reused for a completely different task), then clauses 6b and 6d shall not apply.

## Important Recommendations

### Defining What Constitutes the Work

The LPPL requires that distributions of the Work contain all the files of the Work. It is therefore important that you provide a way for the licensee to determine which files constitute the Work. This could, for example, be achieved by explicitly listing all the files of the Work near the copyright notice of each file or by using a line such as:

```
% This work consists of all files listed in manifest.txt.
```

in that place. In the absence of an unequivocal list it might be impossible for the licensee to determine what is considered by you to comprise the Work and, in such a case, the licensee would be entitled to make reasonable conjectures as to which files comprise the Work.